FINAL
Delta Plan
Program Environmental Impact Report
Volume 5, Binder 2 of 2: Section 4, Responses to Comments on the Recirculated Draft PEIR, Organizations, through Appendix B

May 2013

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DELTA STEWARDSHIP COUNCIL

FINAL
DELTA PLAN
PROGRAM ENVIRONMENTAL IMPACT REPORT
MAY 2013

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ROR001 ACWA

Association of California Water Agencies
Leadership Advocacy Information Since 1910

January 14, 2013

Cindy Messer
Program Manager
Delta Stewardship Council
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Transmitted electronically:
recirculateddpeircomments@deltacouncil.ca.gov

Subject: Comments on the Recirculated Draft Programmatic Environmental Impact Report (RDPEIR), Volume 3

Dear Ms. Messer:

The Association of California Water Agencies (ACWA) submits the following comments regarding the Recirculated Draft Programmatic Environmental Impact Report (RDPEIR), Volume 3, analyzing the November 2012 Final Draft Delta Plan. — ROR001-1

We have reviewed the RDPEIR and are disappointed that there is little to distinguish it from the previously circulated PEIR. Generally, in almost all respects, it perpetuates the problems and insufficiencies we, and others, identified in previous comments. Because the Council has requested that only comments on the Revised Project PEIR be submitted and not repeat comments made on the Proposed Project PEIR, we incorporate by reference here our prior comment letter for the record as those comments are still applicable. — ROR001-2

We note that correcting the numerous deficiencies in the RDPEIR to satisfy CEQA will require substantive changes to the document and hence a recirculation of it. We urge the Council, while taking the time necessary to satisfy these CEQA deficiencies, to also take the opportunity to reevaluate its role in furthering the achievement of the coequal goals, take a hard look at what authorities it does *and does not* possess to do so, and most importantly evaluate how it can best add value to management of the Delta consistent with the objectives inherent in the coequal goals (see §85320) and the fundamental legislative directives regarding the contents of the Delta Plan as stated in §85300 et. seq. We particularly encourage the Council, without delay, to pursue its unique prerogative to provide oversight and facilitate the integration and synthesis of pertinent state agency activities in the Delta and to develop a comprehensive Delta Science Program that will optimize efficiency and effectiveness in support of improved public policy choices related to the Delta. — ROR001-3 — ROR001-4

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Response to comment ROR001-1

Comment noted.

Response to comment ROR001-2

Please see the responses to the commenter's prior letter, OR90. Comments submitted on the Draft Program EIR were responded to, and are included in Section 3 of this FEIR.

Response to comment ROR001-3

The revisions that are found in Sections 5 and 6 of the Final EIR clarify, amplify, and make insignificant modifications to the text of the EIR that do not constitute significant new information; therefore, further recirculation is not required pursuant to CEQA Guidelines section 15088.5. The portion of this comment regarding the Council's role and authority is a comment on the project, not on the EIR.

Response to comment ROR001-4

This is a comment on the project, not on the EIR.

ACWA and its members stand ready to continue to collaborate on the development of such an improved Delta Plan after revision and recirculation of a legally sufficient EIR. ROR001-5

Thank you for your consideration.

Sincerely,

Timothy H. Quinn
Executive Director

Response to comment ROR001-5

Comment noted.

Start 2nd page here.

No comments

- n/a -

ROR002 CA Water Research

Cindy Messer

Delta Plan Program Manager

Delta Stewardship Council

Via email to: recirculateddpeircomments@deltacouncil.ca.gov

Comments on the RPEIR, water quality recommendations,

and piecemealing under CEQA

The revised Delta Plan has some significant changes with respect to water quality. The revised Delta Plan introduces five new recommendations:

> WQ R1 (Protect Beneficial Uses) , WQ R2 (Identify Covered Action Impacts) ,WQ R3 (SpecialWater Quality Protections for the Delta), WQ R11 (Manage Dissolved Oxygen in Stockton Ship Channel) andWQ R12 (Manage Dissolved Oxygen in Suisun Marsh).

The RPEIR attempts to make the "no action alternative" for these new recommendations to be the adoption of the 5th draft Delta Plan.

As discussed in our comments for the 5th draft Delta Plan PEIR, here incorporated by reference, the "no action alternative" for the adoption of the water quality recommendations in the Delta Plan should be the continuation of the existing state water quality policies under the 2000 CALFED Record of Decision.

ROR002-1

In the revised Delta Plan, WQ R1 (Protect Beneficial Uses) recommends that Delta water quality be maintained to support, enhance, and protect beneficial uses identified by the SWRCB and regional water quality control boards.

This recommendation is much weaker than the explicit goal in the 2000 CALFED ROD of "improving or maintaining water quality in the Delta." The state appears to have no other explicit anti-degradation policy for the Delta. Turning this policy into an optional

ROR002-2

Response to comment ROR002-1

The Revised Project is the November 2012 Final Draft Delta Plan, which was analyzed in the Recirculated Draft Program EIR (Volume 3 of the Draft Program EIR) which was circulated for public review and comment from November 30, 2012 through January 14, 2013. The Fifth Staff Draft Delta Plan is the Proposed Project Alternative, which is one of six alternatives to the proposed Delta Plan. One of the other alternatives is the No Project Alternative, which is required by CEQA Guidelines section 15126.6(e). As explained in the Draft Program EIR, pages 2A-85 through 2A-92, and the Recirculated Draft Program EIR, page ES-5, the No Project Alternative consists of the existing conditions plus what would be reasonably expected to occur in the foreseeable future if the project were not approved. The No Project Alternative includes physical activities/projects that are funded at this time. The No Project Alternative is not the same as the Proposed Project Alternative, which is the Fifth Staff Draft Delta Plan.

Response to comment ROR002-2

The Delta Plan does not authorize violation of the State's anti-degradation policy, or any other water quality law, regulation or policy. The potentially significant water quality impacts of the Delta Plan are analyzed in Section 3 (Water Resources) of the EIR. See DPEIR, Subsection 3.4.2 (Thresholds of Significance), p. 3-77 (would the project "[v]iolate any water quality standards or waste discharge requirements or otherwise substantially degrade water quality").

"recommendation" could have very significant and foreseeable environmental effects, and these potential effects and required mitigation need to be addressed in the RPEIR.

The new water quality recommendations by the Delta Stewardship Council are also far less specific and detailed than the water quality actions which were begun under the CALFED program. These actions were defined in the California Environmental Quality Act Requirements[1], and included the following:

- Pesticides - Reduce the impacts of pesticides through (1) development and implementation of BMPs, for both urban and agricultural uses; and (2) support of pesticide studies for regulatory agencies, while providing education and assistance in implementation of control strategies for the regulated pesticide users.
- Organochlorine pesticides - Reduce the load of organochlorine pesticides in the system By reducing runoff and erosion from agricultural lands through BMPs.
- Trace metals - Reduce the impacts of trace metals, such as copper, cadmium, and zinc, in upper watershed areas near abandoned mine sites. Reduce the impacts of copper through urban storm water programs and agricultural BMPs.
- Mercury - Reduce mercury levels in rivers and the estuary by source control at inactive and abandoned mine sites.
- Selenium - Reduce selenium impacts through reduction of loads at their sources and through appropriate land fallowing and land retirement programs. — ROR002-2
- Salinity - Reduce salt sources in urban and industrial wastewater to protect drinking and agricultural water supplies, and facilitate development of successful water recycling, source water blending, and groundwater storage programs. Salinity in the Delta will be controlled both by limiting salt loadings from its tributaries, and through managing seawater intrusion by such means as using storage capability to maintain Delta outflow and to adjust timing of outflow, and by export management.
- Turbidity and sedimentation - Reduce turbidity and sedimentation, which adversely affect several areas in the Bay Delta and its tributaries.
- Low dissolved oxygen - Reduce the impairment of rivers and the estuary from substances that exert excessive demand on dissolved oxygen.
- Toxicity of unknown origin - Through research and monitoring, identify parameters of concernin the water and sediment and implement actions to reduce their impacts to aquatic resources.

Since the revised Delta Plan now includes many recommendations with respect to the Delta watersheds, there seems to be little justification for turning these explicit goals, which were

[1] CALFED Record of Decision, attachment 1, California Environmental Quality Act Requirements, CEQA Findings of Fact, p. 6

No comments

- n/a -

developed, funded, and studied over the previous decade, into a set of optional recommendations with no associated performance metrics.

To the extent that contaminants and eutrophication in the Delta are major stressors in the ecosystem, this lack of explicit water quality performance metrics also violates the legislative mandate of the Delta Reform Act for quantitative measurements of the health of the estuary:

> 85211. The Delta Plan shall include performance measurements that will enable the council to track progress in meeting the objectives of the Delta Plan. The performance measurements shall include, but need not be limited to, quantitative or otherwise measurable assessments of the status of
>
> (a) The health of the Delta's estuary and wetland ecosystem for supporting viable populations of aquatic and terrestrial species, habitats, and processes, including viable populations of Delta fisheries and other aquatic organisms.

ROR002-2

The omission of clear policies and metrics also allows piecemealing of consideration of water quality impacts of new conveyance on the Delta. Any new conveyance that diverts Sacramento River water that currently flows into the estuary will likely increase the problems with contaminants and eutrophication.

Degradation of water quality continues to be one of the major forseeable adverse impacts of the proposed BDCP project. But the Delta Plan only has an optional recommendation to even analyze water quality impacts:

> WQ R2 …recommends that covered actions identify any significant impacts to water quality.

ROR002-3

WQ R1 and R2 are considerably weaker than the existing state water quality policies in the Delta. At a minimum, the Delta Stewardship Council needs to change these recommendations to mandatory policies for all projects in the Delta.

In addition, to avoid piecemealing of consideration of major water quality impacts of the change in policies and of required mitigation measures, the RPEIR needs to consider the new water quality polices and recommendations as an extension of the 5th draft Delta Plan, not as a completely new project. The new water quality recommendations should then be compared to the existing state water quality policies.

ROR002-4

While the RPEIR states that currently funded projects are considered as the baseline under CEQA 15125(a), the Delta Stewardship Council is not proposing to fund or supervise projects in the Delta Plan. The Delta Plan is primarily a policy document. Therefore the baseline for the Delta Plan under CEQA 15125(a) should be the existing state policies.

ROR002-5

Response to comment ROR002-3

Please see response to comment ROR002-2 and Master Response 1 regarding the BDCP.

Response to comment ROR002-4

Please see responses to comments ROR002-1 and ROR002-2.

Response to comment ROR002-5

The environmental baseline consists of the existing conditions at the time of the publication of the Notice of Preparation of this EIR in December 2010, which is the normal CEQA environmental baseline pursuant to CEQA Guidelines section 15125(a). The projected conditions under the proposed Delta Plan (Revised Project) and the alternatives are compared to this baseline for purposes of determining whether the Delta Plan or the alternatives may have a significant effect on the environment.

The state's commitment in CALFED to maintain or improve water quality in the Delta was an integral part of the mitigation under CEQA for increased Delta exports, and part of the state's agreement to comply with anti-degradation policies in the Clean Water Act. Later opposition by export water agencies to fund projects to improve water quality in the Delta should not be an excuse for the state, or the Delta Stewardship Council as an agency of the state, to abandon that commitment. ROR002-6

Sincerely,

Deirdre Des Jardins

California Water Research

Response to comment ROR002-6

Comment noted.

ROR003 CSPA et al.

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January 14, 2013

VIA E-MAIL and CERTIFIED MAIL RETURN RECEIPT REQUESTED

Delta Stewardship Council
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Re: *Comments of the California Sportfishing Protection Alliance (CSPA), California Water Impact Network (C-WIN), and AquAlliance to the Revised Draft Delta Plan Program Environmental Impact Report*

Dear Ms. Macaulay,

C-WIN, CSPA, and AquAlliance, hereinafter the groups, appreciate the opportunity to provide comments to the Recirculated Draft PEIR (RDPEIR) for the Delta Plan project. Unfortunately, most of the deficiencies we addressed in our comments to the first draft PEIR remain unaddressed by the DRPEIR. Therefore, in addition to incorporating our original comments by reference, we provide additional comments on the revised recirculated draft, attached hereto. — ROR003-1

s/MICHAEL B. JACKSON
Michael B. Jackson
Attorney for the California Water Impact Network (C-WIN), the California Sportfishing Protection Alliance (CSPA), and AquAlliance

Response to comment ROR003-1

Please see the responses to the commenter's prior letter, OR102.

C-WIN, CSPA, and AquAlliance, Comments to
the Recirculated Draft PEIR (RDPEIR) for the Delta Plan project
January 14, 2013

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No comments

- n/a -

I. The RDPEIR for the Delta Plan Project Fails as a Programatic EIR

Using a programatic EIR affords a lead agency no cover for a CEQA document that "does not provide decision-makers, and the public, with the information about the project required by CEQA." (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892, 916.) A program EIR cannot rationalize vague or evasive analysis. The CEQA guidelines' list of "advantages" to preparing a program EIR include a "more exhaustive" examination of effects and alternatives, "full consideration" of cumulative impacts, and allowance for analysis of "broad policy alternatives and program wide mitigation measures" at a time when the lead agency has the best opportunity to address them properly. (Cal. Code Regs., tit. 14, § 15168(b).)

Programatic EIRs are intended to provide a broad look at policies and potential cumulative impacts of a series of actions. A program EIR may be prepared on a series of actions that are related either: (1) geographically, (2) procedurally (where the actions are a logical step in contemplated actions), (3) in connection with the issuance of rules, regulations, plans, etc. that govern the conduct of a continuing program, or (4) as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways. (CEQA Guidelines, § 15168, subd. (a).) The benefits of Program EIRs include providing for an occasion for a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action, ensuring consideration of cumulative impacts that might be slighted in a case-by-case analysis, and avoiding duplicative reconsideration of basic policy considerations, among other things. Without an understanding of the types of projects that will follow, the PDEIR cannot possibly contain substantial evidence to support its conclusions (CEQA Guidelines, § 15384), thus failing to uphold the requirements of CEQA. (See *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892, 916) (CEQA not satisfied if document fails to provide decision-makers and the public with the required information about the project.)

ROR003-2

The Vol.1 RDPEIR states that "[f]uture environmental documents would be completed by other agencies when they propose to implement projects that are subject to consistency reviews by the Council, or projects which are encouraged or otherwise influenced by the Delta Plan. Hence, this program EIR is not intended to provide project-level clearance for any specific project." It is not clear whether the RDPEIR appears to permit an agency to determine that

Response to comment ROR003-2

Please see the responses to the commenter's prior letter, OR102. Please also see Master Response 1, regarding the covered action consistency determination process, and Master Response 2, regarding the scope of the EIR.

unspecified future projects are "within the scope" of the Delta Plan, thereby sidestepping further environmental review. The DEIR should be revised to specify that it is not intended to be the sole environmental review for any future projects. ROR003-2

A. The RDPEIR Fails to Provide an Adequate Project Description

An adequate project description is vital to understanding the environmental setting, and concerns that arise therein. Without an adequate project description, crucial decisions regarding project impacts, and viable alternatives cannot be effectively determined by the agency, or the public reviewing the environmental documents. CEQA Guidelines § 15125 subdivisions (c) and (d) state that:

> Knowledge of the regional setting is critical to the assessment of environmental impacts. Special emphasis should be placed on environmental resources that are rare or unique to that region and would be affected by the project. The EIR must demonstrate that the significant environmental impacts of the proposed project were adequately investigated and discussed and it must permit the significant effects of the project to be considered in the full environmental context. The EIR shall discuss any inconsistencies between the proposed project and applicable general plans and regional plans. Such regional plans include, but are not limited to . . . habitat conservation plans, natural community conservation plans and regional land use plans . . . In failing to provide an adequate description of upstream areas, the RDPEIR also violates CEQA mandates on establishing a baseline. ROR003-3

CEQA Guidelines 15124, requires *a statement briefly describing the intended uses of the EIR*, including the information known to the Lead Agency. The RDPRIR and DEIR fail to include a comprehensive statement of intended uses of the RDPEIR, leaving it vulnerable to misuse in the future and violating CEQA Guidelines, section 15124. The RDPEIR does not include a revised project description that delineates the geographic scope of upstream areas. CEQA Guidelines 15124 state that:

> [t]he description of the project *shall* contain the following information… (a) The precise location and boundaries of the proposed project shall be shown on a detailed map, preferably topographic, [and] (c) A general description of the project's technical, economic, and environmental characteristics, considering the principal engineering proposals if any and supporting public service facilities. ROR003-4

Vol. I RDPEIR (Section 1.4.2) included a map of a vast "upstream" area, but did not include actual analysis of most of these areas. The RDPEIR does casually mention that "operation of

Response to comment ROR003-3

Please see Master Response 2. As explained on DEIR pages ES-9 and 1-13 to 1-14 and on RDEIR pages ES-11 and 1-2, the intended use of this EIR is by the Delta Stewardship Council to adopt the Delta Plan and associated rulemaking by the State Office of Administrative Law.

Response to comment ROR003-4

Please refer to Master Response 2. The EIR study area has not changed from the Draft Programmatic EIR to the Recirculated Draft Programmatic EIR. The study area in the EIR was delineated in the manner described in Section 1 of the Draft Program EIR because these are the areas in which the significant environmental effects of the Delta Plan may occur, which includes a greater geographic area than the area in which the Delta Stewardship Council has jurisdiction over covered actions pursuant to the Delta Reform Act. For example, the impacts of Delta ecosystem restoration projects within the Delta may include impacts associated with the construction and operating footprint of the projects, while the impacts of such projects in the Delta watershed and in areas outside the Delta that use Delta water would primarily relate to changes in water supply. Because Central Valley Project and State Water Project water flows through the Delta, many of the changes to the management or delivery of such water would "occur, in whole or in part, within the boundaries of the Delta," would therefore potentially be a "covered action" under Water Code section 85057.5. Sections 3 through 21 of the EIR describe the existing environmental and regulatory conditions relevant to the resource under discussion. For example, Subsection 3.3.4 of the DPEIR describes the environmental setting of Delta watershed areas. Appendix D of the DPEIR summarizes the regulatory framework pertaining to water resources. As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. To the extent known, projects that may be encouraged by the Delta Plan are named in the EIR. In addition, types of projects that may be encouraged by the Delta Plan are identified.

facilities within the rivers and streams upstream of the Delta or in the Delta could result in changes in salinity in the Delta by reducing Delta freshwater inflows during some periods of the year." (p. 3-13.) However, by failing to revise the Project Description to describe the upstream areas in the impact analysis, it is impossible to determine the impacts on the project. The Revised Project (as well as the Proposed Project) supports certain projects without any quantitative justification on costs, yield, impacts on the environment, or evaluation of the public trust values involved. (CEQA Guideline 15126.5, "Discussion of Alternatives," Guideline 15146, "Degree of Specificity.") Further, "[l]ead agencies should define the geographic scope of the area affected by the cumulative effect and provide a reasonable explanation for the geographic limitation used." CEQA Guidelines 15130.The RDPEIR claims to have expanded its scope into upstream areas, but fails to describe these areas or justify the parameters of its scope. While this RDPEIR states that the Revised Project includes upstream areas, it fails to establish the environmental setting for these areas; thus, its discussion of potential impacts to these areas is essentially speculation. It furthermore does not include a description of the relevant regulatory schemes in these areas and how such regulations would be reconciled with the policies and recommendations in the Delta Plan. This omission violates CEQA. (CEQA Guidelines, § 15125.) The current state of the Delta as well as its tributaries must be established in order to have a legitimate discussion of a project's impacts. ROR003-4

B. The RDPEIR Fails to Provide an Adequate Disclosure of the Environmental Setting of the Project.

The Delta is a critically important natural resource for California and the nation. It serves Californians concurrently as both the hub of the California water system and the most valuable estuary and wetland ecosystem on the west coast of North and South America. (Water Code Section 85002). The Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis and existing Delta policies are not sustainable. Resolving the crisis requires fundamental reorganization of the state's management of Delta watershed resources. (Water Code Section 85001(a).) ROR003-5

1. Baseline

The Environmental Setting of the RDPEIR must be revised to reflect the state of drastic overextended entitlements of water coming from the Delta. An agency may not escape its duty

Response to comment ROR003-5

Please see the responses to the commenter's prior letter, OR102. The EIR describes existing conditions in Sections 3 through 21 of the DEIR including declining conditions in the Delta, such as deteriorating water quality in Section 4.3.2.1, Factors Affecting the Delta Ecosystem. Pursuant to Public Resources Code § 15126.2(a), the EIR analyzes the Project's impacts as compared to the physical environment as it existed at the time of the publication of the Notice of Preparation (December 10, 2010). Over-appropriation of water is a legal matter and not a physical issue. Please refer to Master Response 1.

by ignoring that duty and then presenting the result as a *fait accompli* incorporated into an environmental baseline. *League to Save Lake Tahoe v. Tahoe Reg'l Planning Agency*, 739 F. Supp. 2d 1260, 1272 (E.D. Cal. 2010) aff'd in part, vacated in part, remanded, 469 F. App'x 621 (9th Cir. 2012). The DEIR and RDPEIR utterly fail to include a comprehensive analysis of the availability of water coming into the Delta. In order to demonstrate how such a comprehensive analysis could be done, we incorporate by reference the report prepared by Tim Stroshane for CSPA, CWIN, and AquAlliance in the State Board hearings regarding amendment of the Bay/Delta Water Quality Control Plan (Appendix 1 and 1a herein). This document, which includes 223 pages listing existing water rights, demonstrates that the Bay/Delta watershed is indeed grossly over-appropriated and that until this problem is resolved it is impossible for the DSC to approve a Delta Plan that can meet the requirements of the Delta Reform Act to recover the Bay/Delta and to improve reliability of the California water supply.

The average annual water supplies of the Sacramento and San Joaquin river watersheds between 1998 and 2005 totaled approximately 35 MAF. Tables 3-1 and 3-4, Volume 1 & 2. This includes groundwater extraction and agricultural return flows. The average combined unimpaired flow of the two watersheds has been identified as approximately 29 MAF. However, there are 153.9 MAF of legal claims to that water. Consequently, the watersheds are seriously over-appropriated. As California's water rights system is seniority based and restrained by Area of Origin and Watershed Protection statutes, any fair disclosure CEQA document addressing water supply reliability and Delta restoration would be seriously inadequate if it failed to extensively discuss and analyze the over-subscription of water and legal constraints on out-of-basin transfers of water. ROR003-5

The problem of over-appropriation has been known and well documented since the Central Valley Project Act was passed by the Legislature in 1933. Governor Earl Warren, testified in 1951 that those in State Government felt "for many years that there should be a complete adjudication of the water rights on the Sacramento River, and we believed it should be done before the Central Valley project was completed and in operation."[1] The formal Findings of the 1951 Engle Congressional Committee held that:

[1] Appendix 2. *As quoted in:* Gleason, Walter M. 1960. Opinion of Attorney Walter M. Gleason Regarding Various Legal Aspects of Burns-Porter Act (SB 1106) (Proposition One), California Senate Interim Committee on Water Projects. 28 October 1960. p. 16.

1. "For all practical purposes, the developed water supplies of the Sacramento River are overcommitted and oversubscribed."[2]
2. Without adjudication, "The State of California and Bureau of Reclamation officials may create a 'legal Frankenstein,' which would destroy all hope for State control of Central Valley water rights…"[3]
3. State and federal projects were claiming and depending upon the same Feather River water rights.[4]

Despite the clear problem, nothing was done to remedy the over-appropriation problem. In 1960, during consideration of the Burns-Porter Act (State Water Project), Senator Stephen Teale, Chairman of the California Senate Interim Committee on Water Projects asked legendary water rights attorney Walter M. Gleason to submit a legal assessment of the proposed State Water Project.[5] In a 72-page opinion, Mr. Gleason, incorporated herein as Appendix 2, he observed that there wasn't "any accurate or proper administrative determination by the State of the extent of the 'surplus' water which is or will be available in the Central Valley for export."[6] He described the consequences of a failure to identify and quantify vested rights, said that the project would not protect the Delta and would aggravate the existing salinity and hydrology problems,[7] and said the export schemes were based, "wholly and entirely in assumptions." ROR003-5

Over-appropriation is a huge factor in determining impacts to the environment, especially in light of the current degraded condition of the Sacramento-San Joaquin Bay Delta. In 2009, the Delta Reform Act held that "[t]he Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis." Section 85001. For example, the Delta region has a severely depleted groundwater basin, yet the RDPEIR fails to reflect the SWRCB conclusions regarding how inadequate flows into and out of the Bay Delta are contributing to this environmental hazard. As it stands, the Delta aquifer is critically over drafted, causing a void that pulls in sea water from the Bay in an easterly direction. New diversions would reduce the natural flushing of the Delta and could eliminate the natural salt water barrier created by the freshwater inflows into the Delta, causing increased migration and intrusion of brackish water in the groundwater basin. The cumulative impacts of the diversion for the Revised Project, and other activities affecting groundwater including over drafting must be addressed in the EIR. ROR003-6

[2] Ibid. p. 22.
[3] Ibid. p. 49.
[4] Ibid. p. 50.
[5] Ibid. pp. 1-3.
[6] Ibid. p. 17.
[7] Ibid. p. 39.

Response to comment ROR003-6

Please see response to comment ROR003-5. Groundwater condition in the Delta and Suisun Marsh region is discussed in Subsection 3.3.3.3 of the DPEIR. The Delta Plan encourages the SWRCB to complete the updated Bay-Delta Water Quality Control Plan flow objectives. However, only the SWRCB has authority to set those objectives. The Delta Plan and the EIR therefore cannot project what those objectives will be. The Delta Plan and the sources it cites (including especially the SWRCB's 2010 Flow Criteria Report) explains that the flow objectives that best advance the coequal goals will be those that bring about more natural functional flows within and out of the Delta. *See* Delta Plan, pp. 136 to 142, 155, and sources cited therein. The EIR thus assumes, consistent with CEQA, that the SWRCB will adopt updated objectives that will advance such a flow regime. The general assumption of a more natural flow regime is sufficient for the EIR's programmatic approach. The impacts of the flow objectives are analyzed in greater, quantitative detail, in the SWRCB's Draft Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary: San Joaquin River Flows and Southern Delta Water Quality (December 2012). See Master Response 5 for further discussion.

Resolving this crisis "requires fundamental reorganization of the state's management of Delta watershed resources." Section 85001. This revised management of Delta resources requires pursuing the coequal goals of "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem." Section 85054. The coequal goals "shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource and agricultural values of the Delta as an evolving place." *Id.* For the purposes of informing planning decisions for the Delta Plan and the Bay Delta Conservation Plan, the Legislature required the State Water Resources Control Board to develop new flow criteria for the Delta ecosystem necessary to protect public trust resources. Section 85086(c)(1). The Delta Plan and its accompanying environmental documents fail miserably to implement the coequal goals required under the Delta Reform Act. From the beginning, the Stewardship Council has failed to define what it believes to be the "coequal goals" of this plan, nor has it established quantifiable goals, or measurements for achieving the goals of the plan. Instead, the Delta Plan only recommends, and the RDPEIR only evaluates, proposals that continue to violate existing environmental laws. The RDPEIR utterly fails to adequately analyze, discuss, disclose or compare defensible and quantifiable goals, yardsticks and mileposts for achieving the coequal goals and their effects on various alternatives. The RDPEIR merely proposes and analyzes a plan that perpetuates an unsustainable status quo. Further, the Stewardship Council declined to conduct a water quality analysis to evaluate the impacts to pollutant concentration and residence time from diverting additional dilution flows around an already degraded estuary. Central Valley waterways are polluted despite more than forth years of laws prohibiting pollution. Yet the Delta Plan assumes that agencies that have failed to prevent pollution will, somehow, in the future prevent pollution by implementing programs that failed to prevent pollution. The Delta Plan cannot assume, given the historical record, that continuation of programs that have failed to prevent pollution will, in fact, improve water quality. The RDPEIR is inadequate because it failed to adequately analyze, discuss and disclose how a continuation of existing and largely failed programs will produce different outcomes in the future and how continued pollution will affect various analyzed alternatives. The over appropriation of Central Valley waters has been long known and amply documented, and there can be no justification for not providing decision makers with this crucial information. Such information is fundamental for making intelligent

ROR003-7

Response to comment ROR003-7

As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. Without specific details of future projects, it is not possible for the Delta Stewardship Council to develop quantitative thresholds of significance, conduct site-specific quantitative analyses, and design site-specific mitigation measures. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR. The comment on the performance measures in the proposed Delta Plan is a comment on the project, not on the EIR.

choices regarding water supply reliability or Delta restoration, and projects and plans cannot be evaluated properly without this information. ROR003-7

a) An Overprescribed and Unhealthy Delta

The Delta Reform Act specifically mandates a comprehensive review and analysis of the impacts of "possible changes in total precipitation and runoff patterns" due to climate change on the Proposed Project before incorporation into the Delta Plan. The Delta Plan must specifically address the requirements of the Delta Reform Act, and must describe a review process that will ensure that the Bay Delta Conservation Plan takes a sufficiently comprehensive look at how shifts in precipitation and runoff from climate change could affect the planned project and operations, as well as the environment. The Proposed Project, however, does not require specific water reliability projects. Rather, the project contains broad requirements and recommendations that make it unclear what types of projects will actually be implemented as a result of the Proposed Project policies and recommendations. The Delta Plan must clearly and specifically address how the Delta Stewardship Council will ensure adequate review of the BDCP climate change analysis prior to incorporation of BDCP into the Delta Plan. This is an essential duty of the Delta Stewardship Council as an independent agency and should not be delegated to the Department of Water Resources or any other agency. ROR003-8

In water resources planning, it is often assumed that future hydrologic variability will be similar to historical variability, which is an assumption of a statistically stationary hydrology. This assumption no longer holds true under climate change where the hydrological variability is non-stationary. Recent scientific research indicates that future hydrologic patterns are likely to be significantly different from historical patterns, which is also described as an assumption of a statistically non-stationary hydrology. In an article in *Science*, Milly et al. (2008) stated that "Stationarity is dead" and that "finding a suitable successor is crucial for human adaptation to changing climate." A growing number of climate change studies have projected an increase in the frequency and severity of droughts in the Sierras and the Central Valley, and particularly under the higher greenhouse gas emissions scenarios. Major shifts in precipitation and runoff could have huge impacts on yields of proposed storage and conveyance projects, as well as huge environmental impacts. It is essential that information on potential flows and diversions under ROR003-9

Response to comment ROR003-8

This is a comment on the project, not on the EIR. Please refer to Master Response 1 regarding the process for incorporating the BDCP into the Delta Plan.

Response to comment ROR003-9

The effects of climate change within the study period (through the year 2030) are described in Section 21, Climate Change and Greenhouse Gas Emissions, of the EIR.

drier climate change scenarios be made available so that the risk can be evaluated by the public trust agencies, and the public.

The lengthy analysis of water supply, for instance, barely addresses the State Board's Delta flow recommendations. These recommendations underscore the imperative to reduce water exports to sustain the Delta's ecosystem, as well as beneficial uses and public trust values. The State Board recommended flow criteria to protect these values in August 2010: "Recent Delta flows are insufficient to support native Delta fishes for today's habitats…." In order to preserve the attributes of a natural variable system to which native fish species are adapted, many of the criteria developed by the State Board are crafted as percentages of natural or unimpaired flows. These criteria include:

- 75% of unimpaired Delta outflow from January through June;
- 75% of unimpaired Sacramento River inflow from November through June; and
- 60% of unimpaired San Joaquin River inflow from February through June."[8]

It is inconceivable that in thousands of pages of Delta Plan and EIR that is no serious effort to disclose, analyze or discuss water availability and the over appropriation of water in the Central Valley. It is the failure to undertake these assessments that has led to the present crisis. Failure to undertake them now will simply perpetuate an unsustainable status quo that will only exacerbate an already dire situation. The Delta Stewardship Council must ensure that these deficiencies are remedied, prior to incorporation of the Bay Delta Conservation Plan into the Delta Plan, and should ensure that adequate analysis of potential drought impacts of climate change is done for all projects incorporated into the Delta Plan.

b) Necessary Economic Considerations

The Legislature has required that the Delta Protection Commission to prepare and submit to the Council an economic sustainability plan for the Delta. Section 29759. However, the Stewardship Council rejected conducting a comprehensive socioeconomic cost/benefit analysis indispensable for maximizing the use of limited resources for the greatest good for all Californians. The last time a significant water body underwent a public trust balancing in California was by the court in *Mono Lake,* which held economic analysis to be of critical

[8] Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem, State Water Resources Control Board, Aug. 3, 2010, p. 5, *available at* http://www.swrcb.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow.

ROR003-9

ROR003-10

ROR003-11

Response to comment ROR003-10

Please see response to comment ROR003-5, Master Response 1, regarding SWRCB flow criteria and flow objectives, and Master Response 5.

Response to comment ROR003-11

CEQA does not require a cost-benefit analysis. That is because social and economic impacts are not effects on the environment under CEQA, and are therefore not analyzed in the EIR (CEQA Guidelines §§ 15064(e) and 15131). Please see Master Response 2. Compliance with the public trust doctrine is required by the Delta Reform Act, as recognized in Water Code sections 85022(c)(3) and 85032(h). Please see Master Response 1 regarding the public trust and BDCP.

importance in performing a public trust analysis. Although the evaluation of economic effects is optional under CEQA Guidelines (15131), the economic balancing of public trust values is so important that they should be evaluated in this RDPEIR. The economic impact of not paying for a $12 to $15 billion tunnel project is so significant that should be considered. Further, the DRPEIR does not include estimates for jobs lost, when CEQA requires such a description. (CEQA Guidelines, § 15131, *Citizens Association for Sensible Development of Bishop Area v. County of Inyo* (4th Dist. 1985) 172 Cal.App.3d 151, 170, (even if economic effects are not to be considered significant impacts in isolation, the EIR must determine the relationship between economic impacts and potentially significant environmental impacts.) These deficiencies must be remedied. ROR003-11

Therefore, at a minimum, the DPEIR must set forth basic costs and clearly defined baseline conditions so that the Proposed Program can be measured against the various Alternatives, which it does not do. To this end, C-WIN/CSPA has attached "Bay/Delta Water-Economics of Choice," a report from ECONorthwest, that showcases the critical necessity of economic analysis to the informed balancing of the public trust. This report is incorporated herein as Appendix 3. The RDPEIR is inadequate because it failed to adequately analyze, discuss, disclose or compare the economics of California's current water distribution scheme, and failed to evaluate the socioeconomic benefits and costs of various alternatives.

C. The RDPEIR Fails to Provide an Adequate Impact Analysis

Under CEQA, a "project" includes the whole of an action that may result in either a direct or *reasonably foreseeable indirect* physical change in the environment. (CEQA Guidelines, § 15278, subd. (a) (emphasis added.) The discussion following Section 15152 states that there will be some effects for which mitigation will not be feasible at an early step of approving a particular development project, and the section would allow a Lead Agency to defer mitigation of that kind of effect to a later step. While a Program EIR need not analyze impacts that would be better addressed in a site-specific analysis, the RDPEIR fails to identify significant effects of the projects it proposes with any specificity. Moreover, the RDPEIR makes significance determinations on these impacts that for which it admittedly has little to no information. ROR003-12

Response to comment ROR003-12

Please see response to comment ROR003-7. Mitigation measures for the significant environmental effects of the proposed Delta Plan, including the projects and actions that may be encouraged by the Delta Plan, are identified in Sections 3 through 21 of the EIR. Without specific details of future projects, it is not possible to develop site-specific mitigation measures to be implemented or adopted by other agencies. Because the ability to require changes or alterations in future projects encouraged by the Delta Plan may be within the responsibility and jurisdiction of other public agencies, in such cases the Delta Stewardship Council cannot conclude that the mitigation measure will be implemented or that the impact will be reduced to a less-than-significant level (Public Resources Code section 20181(a)(2)). Please see Master Responses 2 and 4. Neither the Delta Reform Act nor the Delta Plan affect water rights (Water Code §§ 85031, 85032(i)). Please see Master Response 5 for further discussion of the EIR's analysis of the protections for exiting water uses and users. These protections are included in all of the alternatives analyzed in the EIR.

For example, the RDPEIR notes that the projects the Delta Plan encourages will result in long-term environmental impacts, many of which will likely be significant. The DRPEIR fails, however, to describe these types of impacts, much less offer any proposed mitigation. This approach violates CEQA. Even if the RDPEIR need not analyze each potential project in detail, it can evaluate reasonably foreseeable impacts given the general type of project and given the type of terrain and habitat in the Sierra Nevada region. For example, the DSC failed to take into account the water needs of water rights holders within the Delta watershed, and failed to consider the water needs sufficient to sustain beneficial uses, including environmental needs, in the watersheds that are protected by the "area of origin." CEQA Guidelines require "direct and indirect significant effects of the project on the environment" to be "clearly identified and described, giving due consideration to both the short-term and long-term effects. . . [including the] [s]ignificant irreversible environmental changes which would be caused by the proposed project should it be implemented." Section 15126.2, subd (a), (c). Additionally, "[i]rretrievable commitments of resources should be evaluated to assure that such current consumption is justified." *Id.* The RDPEIR utterly fails to analyze reasonably foreseeable significant effects of the project, even for projects that have already been formulated and or analyzed. (See for example the Shasta Dam raise, the Temperance Flat Reservoir, and the Sites Reservoir.) The Delta Plan incorporates and encourages the completion of the BDCP, and yet fails to provide a meaningful discussion on how this historically mammoth and expensive infrastructure would affect Californians into the future. The irretrievable commitment of upstream resources without any real analysis, and the lack of analysis of the large scale infrastructure (the BDCP) violate Section 15126.2 of CEQA. ROR003-12

The Legislature noted that the 2009 Delta Reform Act did not, "…diminish, impair, or otherwise affect in any manner whatsoever any area of origin, watershed or origin, county of origin, or any other water rights protections, including, but not limited to, rights to water appropriated prior to December 19, 1914, provided under the law." Section 85031. Yet, the RDPEIR lists many reservoir projects that would be affected by the Delta Plan without conducting even a superficial analysis of these projects, other than to say that certain impacts may be "significant and unavoidable." A "Significant and Unavoidable" conclusion can only properly be reached after an agency has made a determination with respect to the feasibility of mitigation measures and alternatives. Public agencies may *not* approve projects with significant

environmental effects if there are feasible alternatives or mitigation measures that can substantially lessen or avoid those effects. (Pub. Resources Code, § 21002, *Mountain Lion Foundation v. Fish and Game Commission* (1997) 16 Cal.4th 105, 134.) Therefore, absent an analysis of the feasibility of the mitigation measures disclosed, the conclusion that certain impacts are "significant and unavoidable" is erroneous and should be eliminated from the document.

The RDPEIR fails to include substantial evidence to support its conclusion. CEQA Guidelines section 15384 defines substantial evidence as:

> enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached. Whether a fair argument can be made that the project may have a significant effect on the environment is to be determined by examining the whole record before the lead agency. *Argument, speculation, unsubstantiated opinion or narrative*, evidence which is clearly erroneous or inaccurate, or evidence of social or economic impacts which do not contribute to or are not caused by physical impacts on the environment does not constitute substantial evidence. Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts. (Subds. (a) and (b), emphasis added.)

ROR003-12

The RDPEIR has admitted that no details are known about most of its encouraged projects, and yet claims that it has substantial evidence to supports its conclusions. This constitutes mere speculation in violation of the statute. With no quantification, there is no substantial evidence to justify this conclusion.

Water users upstream from the Delta are understandably concerned that their long-standing water rights will be seized to subsidize increased inflow in the Delta in order to maintain maximum water exports to junior water rights users that are served by the state and federal project pumps in the Delta. Such a result would directly conflict with the Delta Reform Act, which admonishes against interference with area of origin laws and the system of water rights seniority. The looming BDCP process, and the umbrella authority for BDCP built into the Delta plan, needs to be disclosed and analyzed within the DPEIR, with alternatives compared and watershed needs mitigated. The omission of these important discussions in the present draft of the DPEIR will result in a skewed and incomplete understating of potential environmental effects on the Delta, which at a minimum will serve to exacerbate water rights litigation throughout the state.

D. The RDPEIR Fails to Properly Consider the Public Trust

In pursuing the coequal goals set out in the 2009 Delta Reform Act, the Legislature held that "[t]he longstanding constitutional principle of reasonable use and the public trust doctrine shall by the foundation of state water management and are particularly important and applicable to the Delta." Section 85023. "The longstanding constitutional principle of reasonable use and the *public trust doctrine* shall be the foundation of state water management policy and are particularly important and applicable to the Delta." Water Code Section 85023. In the seminal California Supreme Court case of *National Audubon Society v. Superior Court of Alpine County,* (1983) 33 Cal.3d 419 in which the court held that the state has "an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust whenever feasible." The Supreme Court further quoted, with favor, that "the requirements of the California Environmental Quality Act (Public Resources Code 21000 et. seq.) impose a similar obligation."

The planning and allocation of limited and oversubscribed resources implies that there has been an analysis and balancing of the competing demands on these resources. Inexplicably, the Fifth Draft of the Delta Plan makes no effort to balance the public trust and resolve these competing demands for limited resources. The Stewardship Council refused to undertake a water availability analysis that is essential to separating real water from paper water, addressing the legal rights to it and providing the information necessary for informed decision-making. The state has over-promised and over-distributed scare water resources to a historic degree. Water rights granted to divert water from the Central Valley are now more than five (5) times the average unimpaired water runoff per year, and exceed the total amount of water produced in the wettest year in California history by more than double that number. The Final Draft of the Plan contains no water availability analysis that would show, at a minimum, what water will be available to meet the Reform Act's goals. The Stewardship Council rejected multiple comments from various groups to develop a public trust analysis to ensure that the common property rights of all Californian's are protected and balanced against those of special interests. Yet, despite the California Supreme Court's holding that the state must balance the public trust in water supply planning decisions, the RDPEIR fails to do so. The RDPEIR is therefore inadequate because it fails to adequately analyze, discuss, disclose or compare how a public trust balancing would

ROR003-13

Response to comment ROR003-13

Please see response to comment ROR003-5, and Master Response 1 regarding the public trust. Compliance with the public trust doctrine is required by the Delta Reform Act, as recognized in the Delta Reform Act in Water Code sections 85022(c)(3) and 85032(h). Please see DEIR Sections 2A, 2B, and 3. The Final Staff Draft Delta Plan discusses the public trust doctrine throughout, particularly at pages 81 through 83. The EIR analyzes the Delta Plan's impacts on all relevant public trust resources, including water resources (Section 3), fisheries (Section 4), recreation (Section 18), and navigation (Section 24). The Delta Plan also recommends that the State Water Resources Control Board evaluate all applications for compliance with the constitutional principle of reasonable and beneficial use.

affect various alternatives. A public trust balancing of the present unbalanced system will inevitably affect both of the coequal goals and must be analyzed and disclosed. Further, the RDPEIR is inadequate because it fails to adequately analyze, discuss, or disclose the realities of the oversubscribed California water system, thereby failing to compare projects and alternatives within the framework of a water system already in heavy deficit. The Plan and its DEIR do none of these things. Our groups dispute the DSC's position that an analysis of the public trust doctrine is unwarranted, and request an analysis of whether it is feasible to protect the trust under each of the proposed alternatives. ROR003-13

E. The RDPEIR Fails to Properly Consider Climate Change

The DPEIR fails to use the latest information on changing hydrology in the Delta watershed, thereby invalidating its "no project" assessment. The "harms associated with climate change are serious and well recognized." (*Massachusetts v. Environmental Protection Agency* (2007) 127 S. Ct. 1438, 1455). In 2006, the California Legislature passed Assembly Bill 32, which states that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California," including a "reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems." (Health & Saf. Code, § 38501(a).) The Legislature went on to list multiple uses of water it expects to be reduced or threatened by global warming, including the quality and supply of water from Sierra snowpack, hydropower generation, the protection of recreational uses, fisheries, marine life, and public health. Health & Saf. Code, § 38501(b). ROR003-14

In addition to the Legislature's recognition of the perils of climate change, several studies sponsored by the California Climate Change Center have been published that directly address the effects of climate change on California hydrology in the future. And while an agency is not expected to foresee the unforeseeable, it is expected to use its "best efforts to find out and disclose all that it reasonably can." (CEQA Guidelines § 15144; see also *City of Richmond*, 184 Cal.App.4th at p. 96; *Vineyard,* 40 Cal.4th at p. 428.) Yet, despite the seeming recognition of climate change by the Legislature, the courts, and other organizations, climate change goes

Response to comment ROR003-14

The effects of climate change within the study period (through the year 2030) are described in Section 21, Climate Change and Greenhouse Gas Emissions, of the EIR.

virtually unmentioned in the PDEIR's discussion of the program, its potential facilities, and the existing environmental setting. The RDPEIR fails to perform cumulative impact analysis in the RDPEIR of how revised and related projects would affect water availability, environmental conditions, and fisheries throughout the Sacramento River and San Joaquin River watersheds upstream from the Delta now and in the future. These climate change projections need to be an essential part of cumulative impact evaluation of the Revised Project, together with other diversions and with actions to maintain sufficient flows to protect the Delta as well as upstream waters under the public trust doctrine.

The DSC DPEIR should therefore include climate data available to its sister agencies, such as DWR's *California Water Plan Update, 2005*. This report finds that "evaluating impacts of global climate change on the management of the SWP can be done with existing resources" and that "state government must help predict and prepare for the effects of global climate change on our water resources and water management systems." (Maurice Roos, *Accounting for Climate Change*, in DWR, *Water Plan 2005*, appendix 4.) This DWR report surveys the "large number of potential effects on California water resources infrastructure due to global warming." (*Id.* at p. 4-616.) While the EIR notes its reference to some uncertainty, that uncertainty is "primarily on the degree of change to be expected," and that the report found that "[r]esponsible planning requires that the California planning community work with climate scientists and others to reduce these uncertainties and to begin to prepare for those impacts that are well understood, already appearing as trends, or likely to appear." (Roos, *op cit.,* at 4-612.) The failure of the DPEIR to disclose and analyze potential climate change effects on the hydrology upon which the Delta Plan relies is stunningly incompetent. This omission makes it impossible for the public and the decision-makers to evaluate the alternatives, the mitigations, and the true nature of the environmental impacts of the proposed DSC program, all of which are violations of CEQA's fair disclosure requirements. ROR003-14

Finally, having recognized that global climate change is likely to have an enormous impact on future water supply (including a 4.5 to 6 million acre-foot reduction in snowpack), the EIR inconsistently applies that insight. Incredibly, the EIR cites climate change in its discussion of the disadvantages of Alternative 2 (due to its additional "facilities") but fails to apply climate change concerns to the Delta Plan's core issue: whether sufficient water supply will exist to serve the "reliability" component without severely compromising the Plan's ability to protect the

"paramount concern" of enabling "permanent protection" of the Delta's resources. (Wat. Code § 85022(c)(2).) This failure also makes it impossible for the DPEIR to evaluate alternatives, potential mitigations, or to provide the disclosure necessary to allow the public and the DSC decision-makers to evaluate the effectiveness of the proposed Delta Plan. ROR003-14

F. The RDPEIR Fails to Properly Consider Available Science

The RDPEIR fails to incorporate or consider readily available science to analyze the significance of environmental impacts of the project. The Stewardship Council largely ignored the Delta Protection Commission's Economic Sustainability Analysis, the Department of Fish and Game's flow criteria and biological objectives report and the State Water Resource Control Board's flow criteria for the Delta. These reports were mandated by the Legislature to inform the Delta planning process and their results must be discussed and incorporated into the Delta Plan.

The California Legislature, in the Delta Reform Act, (as specified above) tasked the SWRCB to gather the best available science and develop flow criteria for the Delta ecosystem necessary to protect public trust resources, including the volume, quality, and timing of water needed under different conditions. The SWRCB conducted a proceeding in the matter. An astonishing assemblage of biologists and scientists from resource and water agencies, academia and the NGO community testified and presented evidence in the hearing. A final report was issued on August 3, 2010. The report observes that "[t]he combined effects of water exports and upstream diversions reduced average annual net outflow from the Delta from unimpaired conditions by 33% and 48% during the 1948 – 1968 and 1986 – 2005 periods, respectively and that Sacramento River inflows over the last 18 to 22 years have been about 50% on average between April through June compared to unimpaired conditions. [9] The report determined that "[r]ecent Delta flows are insufficient to support native Delta fishes for today's habitats." The report's criteria for flows include, among many other measures, "75% of unimpaired Delta outflow from January through June and 75% of unimpaired Sacramento River inflow from November through June."[10] Existing water criteria fails to address many issues that must be considered in considering impacts on aquatic life. For example, during the SWRCB's Delta flow hearing, Dr. G. Fred Lee pointed out that: ROR003-15

[9] SWRCB. 2010. Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem. 3 August 2010. 3.3.2, page 28.
[10] Ibid. 1.2 Summary Determinations, Flow Criteria and Conclusions, page 5.

Response to comment ROR003-15

The EIR describes existing conditions in Sections 3 through 21 of the DEIR including declining conditions in the Delta, such as deteriorating water quality in Section 4.3.2.1, Factors Affecting the Delta Ecosystem. Section 3 of the Draft Program EIR addresses water quality issues that have been identified by the SWRCB and Central Valley and San Francisco Bay RWQCBs and that are being addressed in ongoing programs, including programs for drinking water in small and disadvantaged communities and water quality objectives to be addressed with ongoing Total Maximum Daily Load programs. The proposed Delta Plan and the alternatives assume that ongoing water quality improvement programs will be completed within the schedules currently approved by the SWRCB and RWQCBs. The California Department of Fish and Game's 2008 report, *Ecosystem Restoration Program (ERP) Conservation Strategy for Stage 2 Implementation, Sacramento-San Joaquin Delta and Suisun Marsh and Bay Planning Area,* is one of the sources of information for Chapter 4 of the DEIR. Please see Master Response 1, regarding the Delta Protection Commission's Economic Sustainability Plan and Delta flow criteria, and Master Response 5 regarding flow criteria.

> The current US EPA criteria development approach only considers some and in some cases a small part of the impacts of chemical contaminates on aquatic life. For example, the approach currently used to develop water quality criteria does not include additive/synergistic properties of regulated chemicals that occur in concentration below the water quality criteria allowing unanticipated adverse impacts to aquatic life. Adverse impacts of chemicals to aquatic life that occur for especially sensitive species, such as zooplankton which serve as fish food organism were not included in the development of the water quality criteria. These criteria are only applicable to protecting about 90% of the species. Therefore there could readily be fish species in the Delta and its tributaries that are more sensitive to a chemical than those used to establish the water quality criterion value. There is also very limited information on chronic exposure to sub-lethal impacts of a chemical and mixtures of chemicals to fish populations. Another issue is that other stressor such as low DO, ammonia etc. that can impact the lethal and especially sub-lethal impacts of chemicals. It has been well known for over 40 years through biomarker studies that fish and other organisms show organism biochemical responses to chemical exposures at concentrations well below the water quality criterion. The significance of these biomarker responses to an organism or group of organisms is largely unknown. Chemicals can adversely impact the health of the fish and other aquatic life that weaken their ability to resist adverse impact of stressors such as low DO, elevated temperature and predation as well to disease. It's been known for over 40 years that very low levels of copper affect the "breathing" rate of some fish.[11]

ROR003-15

Dr. Lee went on to point out, "many thousands of unregulated chemicals, including pharmaceuticals and personal care products, industrial chemicals, and other potentially hazardous chemicals, are discharged to waterways, including the Delta and its tributaries, in domestic wastewaters, agricultural runoff and waste waters."[12]

This data, and other volumes of relevant evidence are largely ignored or downplayed by the Delta Plan and the DPEIR. Relevant evidence necessary to determine whether or not the proposed Delta Plan and the alternative examined would arrest this dire situation, and whether mitigations could bring these impacts below a state of significance are not included. This is a CEQA failure of huge magnitude. In several instances, the RDPEIR notes that an impact may be "Less Than Significant" or "Significant" without any substantial evidence or science to support such a conclusion. For example, the discussion of Impact 3-3b states:

> [b]ecause of the availability of alternative water supplies and continued availability of Delta water supplies, there is substantial evidence that this impact would not be significant. This conclusion is based on the inability to

[11] Ibid. Page 4.
[12] Ibid. Page 4.

> identify a reasonably plausible scenario in which a potential significant impact would occur. It is therefore concluded that this impact would likely be less than significant. Future project specific analyses may develop adequate information to arrive at a different conclusion; however, for purposes of this program-level analysis, there is no available information to indicate that another finding is warranted or supported by substantial evidence.

ROR003-15

Simply because there is not substantial evidence to support a significance determination does not imply that there is substantial evidence to support a *less than* significant determination. This example is particularly egregious considering the host of information provided by countless environmental groups demonstrating plausible scenarios in which this impact would be significant. The RDPEIR is therefore inadequate because it fails to adequately analyze, discuss and disclose the findings and information contained in the above entitled scientific reports, and how the information from these reports affects the various alternatives.

G. The RDPEIR Fails to Properly Mitigate Impacts

CEQA Guidelines 15126.4 states, "[w]here several measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified. Formulation of mitigation measures should not be deferred until some future time." However, measures may "specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way." *Id.* The problem is that the mitigation measures discussed in the RDPEIR are general, rather than specific, making it impossible to determine if they will be able to effectively mitigate the impacts of the project. For example, the Revised Project allegedly adds performance measures to assist in implementation of the policies and recommendations in the Plan (RDPEIR p. ES-1) but it is not clear whether (1) some or all of the proposed mitigation must be adopted in order to be considered a "Covered Action" or "Recommended Action," (2) whether the stated mitigation measures would reduce impacts to a less than significant level, or (3) when or how the mitigation measures are to be implemented. For example, in several instances, the RDPEIR offers potential land purchases or water transfer purchases as mitigation measures without conducting any analysis on the availability of such mitigation. This approach violates CEQA, as there can be no assurance that such mitigation measures are either available or adequate. (See *Kings County Farm Bureau v. City of Hanford* (5th Dist. 1990) 221 Cal.App. 3d 692.)

ROR003-16

Response to comment ROR003-16

Please see Master Response 4.

Further undermining the effectiveness of the mitigation measures is the lack of measurable performance standards. The Legislature decreed that the 2009 Delta Plan "shall include performance measurements that will enable the Council to track progress in meeting the objectives of the Delta Plan." Section 85211. The performance measurements include "quantitative or otherwise measurable assessments of the status and trends of the following: (a) The health of the Delta's estuary and wetland ecosystem for supporting viable populations of aquatic and terrestrial species, habitats, and processes, (b) The reliability of California water supply imported from the Sacramento River or the San Joaquin River watershed." Section 85211. "The use of performance standards is particularly appropriate in connection with 'first tier' approvals or other planning decisions that will necessarily be followed by additional, project-level environmental review." (Remy, et al., Guide to the California Environmental Quality Act (11th Ed. 2007), p. 552, internal citation omitted.) CEQA further requires that lead agencies describe the impacts that will result from the mitigation measures themselves. (15126.4, subd. (a)(1)(D).) ROR003-17

The RDPEIR fails to identify the impacts that would arise from mitigation measures, such as purchases of additional water for transfer and land purchases. With respect to water transfers being ameliorated due to releases from upstream reservoirs, the RDPPEIR fails to include a description of the multitude of impacts that will result from this drawdown. Lead agencies must analyze not only the impacts of their proposed projects, but also of their proposed mitigation measures if such measures may have a significant effect on the environment. (CEQA Guidelines, § 15126.4; *Save Our Peninsula Committee v. Monterey County Bd. Of Supervisors* (6th Dist. 2001) 87 Cal.App.4th 99.) Mitigation measures must be directly connected to an impact. Assigning mitigation measures to a group of impacts defeats the intention of demonstrating whether the measures will actually mitigate the impacts. The use of group mitigation measures should be revised and tied to specific impacts. These flaws must be remedied so the decision-makers and the public can adequately analyze whether any of the mitigation measures are reasonable. ROR003-18

H. The RDPEIR Fails to Provide Adequate Alternatives

CEQA Guidelines 15124 (b) requires a statement of objectives sought by the proposed project, because "[a] clearly written statement of objectives will help the lead agency develop a *reasonable range of alternatives* to evaluate in the EIR and will aid the decision makers in ROR003-19

Response to comment ROR003-17

Please see Master Response 4 regarding mitigation measures. The performance measures are part of the Delta Plan, and are not mitigation measures.

Response to comment ROR003-18

The impacts of the mitigation measures would not differ from the construction and operation impacts of the Delta Plan and the projects and actions encouraged by the Delta Plan, and are therefore covered in Sections 3 through 21 of the EIR. However, without specific details of future projects, it is not possible to develop quantitative thresholds of significance and specific mitigation measures to be implemented by other agencies.

Response to comment ROR003-19

The project objectives, as corrected to conform to the Delta Reform Act, are stated on page ES-4 of the RDEIR. The eight inherent objectives from the Delta Reform Act are reproduced on pages 1-1 to 1-2 of the DEIR. Please see Master Response 1.

preparing findings or a statement of overriding considerations, if necessary." (emphasis added) The projective objectives set out in the RDPEIR are invalid because they overlook the statutory mandate to achieve coequal goals, does not reduce reliance on the Delta, and are otherwise so vague and ambiguous that project alternatives cannot be reasonably assessed. When project objectives are incorrectly described, there is a substantial risk that potentially feasible alternatives and mitigations that would reduce or eliminate significant environmental impacts will not be considered. (See Habitat and Watershed Caretakers v. City of Santa Cruz (2012)_Cal.app.6th_Case No. H037545). For example, the objectives of the RDPEIR overlook the statutory mandate that "coequal goals be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place." (Water Code Sec. 85054) This impacts the consideration of projects under the BDCP, as well as project alternatives that could more properly protect and enhance the value of the Delta. ROR003-19

One of the coequal goals of the Delta Plan is providing a more reliable water supply. Achieving a more reliable water supply is one of the five categories of the Delta Plan's policies and recommendations. The Delta Reform Act prohibits inclusion of the BDCP into the Delta Plan unless BDCP includes a comprehensive review and analysis of "[t]he resilience and recovery of Delta conveyance alternatives in the event of catastrophic loss caused by earthquake or flood or other natural disaster." Section 85320(b)(2)(F). Throughout the Delta Plan, there are numerous references to the seismic vulnerability of Delta levees and the hypothetical potential that earthquakes could cause a major disruption in California's water supply system in the Delta and San Francisco Bay area. A theoretical earthquake is one of the major justifications for isolated conveyance facilities.

Unfortunately, the Delta Plan only considers seismic disruption in the Bay and Delta. It fails to examine the potential for seismic disruption along the several hundred miles of aqueduct that runs parallel to and crosses documented major active earthquake faults. Nor does it evaluate the potential for seismic disruption of San Luis Reservoir. For example, the San Luis Dam (now called the B.F. Sisk Dam) was completed in 1967 and almost failed in 1981.[13] The documents referenced in this section can be found in Appendix 4, 5, and 6. The U.S. Bureau of Reclamation found that the dam is in a seismically active area (actually there are two faults that cross the ROR003-20

[13] Appendix 4. Park, D., 2008. Dam Safety in California.

Response to comment ROR003-20

Seismic hazards are discussed in Section 11 (Geology and Soils) of the EIR. The EIR addresses changes in existing environmental conditions due to the proposed Delta Plan and the alternatives. If those changes in existing physical conditions are significant and adverse ("significant impacts"), feasible mitigation measures are required. CEQA does not require mitigation of existing conditions. Delta levee conditions and compliance with levee design standards, including PL 84-99, are discussed in Subsection 5.3 of the DPEIR. Delta Plan Policy RR P1 and Recommendation RR R4 are designed to prioritize State investments in Delta levees operations, maintenance, and improvements. Please see Section 2 of this FEIR for a complete text of the policies and recommendations.

reservoir) and could fail during an earthquake and inundate hundreds of square miles including Santa Nella and parts of Stockton.[14]

Seismic failure of the California Aqueduct or San Luis Reservoir could cause the same or similar disruptions to the reliability of the state's export water delivery system as a hypothetical failure in the Delta. Yet, the Delta Plan, DPEIR and DRPEIR focuses almost solely on potential seismic disruptions in the Bay and Delta and ignores the threats to the aqueduct, San Luis Reservoir or terminal facilities in Southern California that could pose equal, if not greater threats, to water supply reliability. The Delta Plan fails to comply with the Delta Reform Act and the DPEIR and DRPEIR fail to comport with CEQA requirements by failing to adequately analyze, discuss and disclose these other potential seismic threats to water supply reliability. What could be the justification of spending billions of dollars constructing an isolated conveyance facility that would change the hydrology of the Delta with unknown consequences while ignoring equal or similar threats south of the Delta? ROR003-20

Engineers who routinely work on Delta levees have suggested that the doomsday predictions of seismic failure of Delta levees are vastly overstated.[15] They believe that improvements can be made to upgrade levees to PL 84-99 or above criteria that would significantly reduce any threat of seismic failure at a fraction of the cost of an isolated conveyance facility. These upgrades would also protect against rising sea levels and would provide protection to people, Delta communities, farmlands and infrastructure; something not accomplished by an isolated conveyance. However, these alternatives were essentially ignored in the Delta Plan and not adequately evaluated in the DPEIR or DRPEIR. Consequently, the Delta Plan is inconsistent with requirements in the Delta Reform Act to "reduce risks to people, property and state interests in the Delta," which the Legislature said was inherent in the coequal goals for management of the Delta. The DPEIR and DRPEIR are inadequate by failing to disclose, analyze, compare and discuss these viable cost-effective alternatives.

Under the current RDPEIR, the revised project would encourage new or expanded reservoirs, groundwater production facilities, groundwater production facilities, ocean ROR003-21

[14] Appendix 5. Bureau of Reclamation. 2007. Letter to Central Valley Project Water Contractors titled Actions to Address Dam Safety Issues at B.F. Sisk Dam, Central Valley Project (CVP, California.
[15] Appendix 6. Pyke, R. 2012. Letter to Governor Brown titled The Truth About Delta Levees or The Shaky Justification for the BDCP.

Response to comment ROR003-21

Please refer to Master Response 2. As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. To the extent known, projects that may be encouraged by the Delta Plan are named in the EIR. In addition, types of projects that may be encouraged by the Delta Plan are identified. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP and other cumulative projects, are described in Section 22 (Cumulative Impact Assessment) of the EIR. The BDCP is discussed in more detail in EIR Section 23.

desalination facilities, recycled water facilities, and the BDCP, among other things. The BDCP will have many significant environmental effects and must be considered as a cumulative project. It is improper for the DSC to encourage projects without even a minimal look at the impacts associated with these types of projects. Rather, the RDPEIR should provide at least a general description of these projects and the types of impacts that are anticipated, propose suggested mitigation measures, and indicate how these encouraged projects and their associated projects can be reconciled with the goals of the Delta Reform Act. For example, the RDPEIR could include a goal of achieving the numerical anadromous fish doubling requirements mandated by the Central Valley Project Improvement Act or define specific numerical water quality improvements required by the Clean Water Act. Instead, the Delta Plan's quantifiable performance measures consist largely of recommendations for actions and programs by other agencies. Many of these actions and programs are already underway and have been unsuccessful in preventing fisheries decline and water quality impairment. ROR003-21

The Delta Plan fails to comply with requirements of the Delta Reform Act by not including specific quantifiable performance measures. Instead, the RDPEIR states that "[t]his EIR assumes that the Delta Plan will be successful and will lead to other agencies taking the encouraged actions." ES-2. As we show below, this unwarranted assumption ignores reality and undermines the legal adequacy of the document. For example, the Delta Plan recommendation ERP1 says that the State Water Resources Control Board should update the Bay-Delta Water Quality Control Plan and by June 2, 2014, adopt and implement updated flow objectives for the Delta that are necessary to achieve the coequal goals. However, deferring updated flow objectives does not historically achieve quantifiable performance measures.[16] In the analysis of

[16] In 1978 the State Water Board adopted D-1485 and a water quality control plan. The Board stated that "protection all fishery species in the Delta would require the virtual shutting down of the project export pumps." In 1986, Judge Racanelli ruled that D-1485 was inadequate and, in the next year, USEPA notified the Board that the water quality control plan was inadequate under the federal Clean Water Act. In October 1988, following hundreds of days of hearings, the State Water Board released a draft Water Quality Control Plan for Salinity. It called for significant reductions in Delta exports. In response to protests from exporters, Governor Deukmejian ordered the Board to withdraw the proposed order. In December 1992, the State Board released draft Water Right Decision 1630. It called for numerous measures including a significant reduction in exports. Internal documents from the State Water Contractors revealed that they believed that D-1630 would have required, at least, a 25-50% reduction in exports. In response to pleas from exporters, Governor Wilson ordered the Board to withdraw D-1630 in 1993. In 1995 the State Board released a Water Quality Control Plan for the Bay-Delta and essentially readopted it with minor changes in 2006 (8 years late). The 1995 plan was implemented though Water Rights Decision D-1641 in late 2000. The requirements in both the 1995 plan and D-1641 are seriously deficient, as evidenced by increasing exports and plummeting fisheries. Further, all of the protective standards in D-1641, including the Vernalis flow objective, interior Delta salinity standards, outflow objectives and the inflow/export ratio have been routinely ROR003-22

Response to comment ROR003-22

Please see responses to comments ROR003-7 and ROR003-17, and Master Responses 1 and 5 regarding flow criteria and flow objectives.

various evaluated alternatives, the Stewardship Council refused to address the historic failure to implement and enforce existing environmental laws and regulations by agencies responsible for the prevention of fishery and water quality declines. This is significant because, without disclosure of the failings of these agencies to implement and enforce existing environmental laws, the public cannot understand how likely it is that the laws will be ignored in the future. The RDPEIR fails to fully inform the public when it fails to adequately analyze, discuss, and disclose the chronic failure to implement and comply with legal requirements of the responsible agencies, and the consequences of those failures as they pertain to the various evaluated alternatives. ROR003-22

The DPEIR and RDPEIR are therefore inadequate because they fail to adequately identify, analyze, discuss, disclose or compare defensible and quantifiable goals, yardsticks and mileposts for achieving the coequal goals and their effects on the various alternatives.

I. The RDPEIR Fails to Provide an Adequate Cumulative Impact Assessment

CEQA defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Guideline § 15355. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project "when added to other closely related past, present, and reasonably foreseeable probable future projects." Guideline § 15355(b). The discussion of cumulative impacts in an EIR is required to reflect "the severity of the impacts and their likelihood of occurrence." Guideline § 15130(b). Required contents include either a list of past, present, and probable future projects producing related or cumulative impacts, or a summary of projections that describe and evaluate the conditions contributing to the cumulative effect. Guideline § 15130(b)(A), (B). It is clear that all projects within the watershed must be assessed, given that the Guideline section uses as an example: "Location may be important, for example, when water quality impacts are at issue since projects outside the watershed would probably not contribute to a cumulative effect." Guideline § 15130(b)(2). ROR003-23

In *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, an EIR was held to violate CEQA for failing to consider possible curtailment in obtaining water

violated without consequence. Last year was no exception. Vernalis flow was violated in the spring, salinity standards were violated most of the summer and I/O standard was being violated as recently as late October, when 68% of inflow was being diverted. Exports have increased, water quality has worsened and fisheries have continued their precipitous decline following every State Water Board Delta water quality or water right decision over the last 30-plus years.

Response to comment ROR003-23

The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1.

from a river and the cumulative impacts of that effect. 108 Cal.App.4th at 871. Pursuant to Guideline § 15130(b)(1)(A), CEQA requires an agency to assess the changing environment resulting from the incremental impacts of the project "when added to other closely related past, present, and reasonably foreseeable probable future projects." "The Agency must interpret this requirement in such a way as to 'afford the fullest possible protection of the environment.'" *Friends of the Eel River,* 108 Cal.App.4th 859, 868. In clear violation of the requirements of Guideline § 15130(b)(1), there is neither a list nor summary of projections of past, present, and reasonably foreseeable probable future diversions in the RPDEIR or Draft EIR.

Here, there has been complete failure to identify and evaluate the impacts of the BDCP Delta Tunnels which would have the capacity to divert 15,000 cfs of water from the Sacramento River upstream from the Delta. The BDCP is mentioned in a sentence including 11 other items under the Water Resources portion of the Cumulative Impact Assessment. (RDPEIR 22-2). The only cumulative impact information about the BDCP project is provided in the Cumulative Impact Assessment in the Draft EIR. There, a brief description in a table states that the BDCP permits and related EIR/EIS were scheduled to be completed by December 2012. That, of course, has not happened. The only additional information provided in the table is "modify SWP and CVP Delta water conveyance facilities and operations in the Delta." (RDPEIR 22-24). ROR003-23

The RPDEIR has failed to take into account the impact of diverting 15,000 cfs upstream from the Delta on whether existing and future water supplies and minimum stream flow requirements can be satisfied, and has failed to evaluate the environmental impacts of diverting 15,000 cfs. Having claimed that the BDCP project is a cumulative project, the Council must evaluate cumulative impacts including those caused by the cumulative project. Moreover, this is *not* a defect that can be cured by responses to comments in a Final EIR. Consequently, neither the public nor the decision-makers have before them basic, foundational information on which to enable one to even start in evaluating the cumulative impacts of this project together with other related projects. In order to comply with CEQA, a new Draft EIR must be prepared that includes the necessary information and analysis to allow the public and decision-makers to conduct informed review of the cumulative impacts of this project and other related projects. This RDEIR fails to do so with respect to the reasonably foreseeable effects of the BDCP as currently proposed (including 23.6.5: Agriculture and Forestry Resources, 23.6.13: Noise, 23.6.16:

Recreation.) Further, the RDEIR does not address the potential of the major new diversions on the Sacramento River to interfere with recreation, both during and after construction. ROR003-23

II. Conclusion

The absence of these analyses has sabotaged the entire Delta planning process. As previously discussed, the Delta Reform Act states, [t]he Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis and existing Delta policies are not sustainable. Resolving the crisis requires fundamental reorganization of the state's management of Delta watershed resources." The Delta Plan was envisioned to be that "fundamental reorganization." Instead, it simply kicks the status quo can down the road.

The Delta has declined because water projects have deprived the estuary of half its flow; turned the natural hydrograph on its head; reduced temporal and spatial variability; eliminated crucial habitat, complexity and diversity and deprived the estuary of dilution necessary to assimilate increased pollutant loading. No estuarine ecosystem in the world has survived this level of abuse. California's water supply system is in crisis because the state has over promised, over-allocated, wasted and inequitably distributed scarce water resources. The Delta Plan and RDPEIR are fundamentally inadequate because they have avoid addressing tough questions, such as:

1. What does water supply reliability mean in an arid state where we have granted rights to far more water than actually exists? ROR003-24
2. What is the definition of co-equal goals and what are the yardsticks by which they are measured?
3. Does water supply reliability apply to both public trust resource needs and consumptive uses?
4. Are statutory requirements to protect water quality and listed species equivalent to water supply reliability for lawns or surplus, subsidized and non-food crops?
5. Is the standard by which we measure water supply reliability the same for junior and senior appropriators?
6. Does efficient and multiple use of water have higher priority over waste, inefficient and unreasonable use?
7. Should we prioritize consumptive use on the basis of economic benefit?
8. Does health and safety take precedence over certain agricultural uses of water?
9. Are food crops more important than non-food commodities?
10. Is it reasonable that the Westside of the San Joaquin Valley, comprising 0.3 % of the state's economy and population, should receive two-thirds of Delta exports while urban areas representing half the state's population and economy get one-third?

Response to comment ROR003-24

Comment noted. Please see responses to comments ROR003-2 through ROR003-23.

11. Is protection of a "national treasure" and one of the world's great estuaries more valuable to society than irrigating impaired soils, that by the nature of being irrigated, discharge prodigious quantities of toxic wastes back to our waterways?
12. If someone uses water that generates pollutants that eliminate assimilative capacity and beneficial use of water for others, should the degraded water be deducted from the water supply provided the polluter?
13. Should water supply reliability be conditioned upon specific and quantitative requirements to maximize reclamation, reuse, conservation and development of alternative local sources of water?
14. Do uses of water that require vast public subsidies have the same priority as uses that don't require subsidy of public funds and are uses that internalize adverse impacts equal to uses that externalize them?

ROR003-24

Because the Delta Plan and RDPEIR have failed to address the root causes of the Delta's decline and our water supply crisis, they are inadequate as fair disclosure documents and fail to comport with CEQA, the Delta Reform Act and are inconsistent with numerous statutes. The RPDEIR and Draft EIR are so fundamentally and basically inadequate and conclusory in nature with respect to disclosure and analysis of cumulative impacts that meaningful public review and comment have been precluded. We urge you to prepare and circulate a new Draft EIR so that the public and decision-makers are afforded the information and analysis with respect to cumulative impacts that they must have pursuant to CEQA.

Dated: February 14, 2013

s/MICHAEL B. JACKSON
Michael B. Jackson
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california water impact network

AQUALLIANCE
DEFENDING NORTHERN CALIFORNIA WATERS

Testimony on Water Availability Analysis for Trinity, Sacramento, and San Joaquin River Basins Tributary to the Bay-Delta Estuary

Submitted by
Tim Stroshane
Senior Research Associate
California Water Impact Network (C-WIN)

and on behalf of
California Sportfishing Protection Alliance
and AquAlliance

October 26, 2012

for

Workshop #3
Analytical Tools for Evaluating the Water Supply, Hydrodynamic, and Hydropower Effects of the Bay-Delta Plan
November 13 and 14, 2012

The State Water Resources Control Board called for workshops to receive information from and discuss with participating parties the scientific and technical bases for considering potential changes to the 2006 Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary for Phase II of the Board's comprehensive review of this plan.

According to the State Board's public notice for these workshops, the prompts for Workshop 3 testimony are:

1. What types of analyses should be completed to estimate the water supply, hydrodynamic, and hydropower effects of potential changes to the Bay-Delta Plan?

2. What analytical tools should be used to evaluate these effects? What are the advantages, disadvantages and limitations of these tools?

No comments

- n/a -

Water Availability Analysis
Workshop 3 Testimony, Bay Delta Plan
Submitted by California Water Impact Network,
California Sportfishing Protection Alliance, and AquAlliance

The California Water Impact Network, the California Sportfishing Protection Alliance, and AquAlliance (hereinafter, C-WIN) are pleased to submit this testimony to the State Water Resources Control Board. This testimony addresses the close linkage between the Board's public trust responsibilities on behalf of the State of California, its water quality control planning function, and its duty to regulate water rights in California. Water quality control planning efforts to date have led the Board to consider proportional tributary contributions needed to meet Delta inflow objectives from the Sacramento and San Joaquin River Basins to improve water quality and protect all beneficial uses, including fish and wildlife, in the Delta. The State Water Resources Control Board has authority over water rights in the Basins that would enable it to reallocate water usage and ensure compliance with the Board's new instream flow objectives.

Water availability analysis is an important method for modeling how the Board would implement new flow objectives. Our testimony illustrates the use of a planning-level water availability analysis for the Trinity River (much of whose flows are diverted to the Central Valley watershed of the Bay-Delta Estuary), and the major tributaries of the Sacramento and San Joaquin River Basins. We incorporate into the analysis the Basins' hydrologic variability, instream flow requirements based on the Board's 2010 public trust Delta flow determinations, and then operate publicly available water rights data and priorities on the divertable flows that remain in the system. We find that under public trust protective flow determinations, the promised water represented in water rights claims far exceed flow conditions available to these claims in most years.

We recommend for the Bay-Delta Plan's implementation program that the State Water Resources Control Board draw on its new flow determinations to increase the seasons during which rivers in the Bay-Delta Estuary's Central Valley watershed are fully appropriated, and push back the water rights priority date on which Term 91 curtailments are now based. Our water availability analysis suggests distinct parameters for both actions.

Finally, we conclude that the Board should use the Bay-Delta Plan process to tighten up its regulation of surplus water usage and export by the State Water Project and Central Valley Project to avoid permanently damaging Sacramento Valley groundwater resources. The Board's Delta flow determinations, coupled with comprehensive enforcement of water rights priorities, can help to protect both groundwater and surface water resources in the Sacramento Valley over the long term.

Government's Public Trust Responsibility

Governments have a permanent fiduciary responsibility and obligation to protect the public trust. In *National Audubon Society v. Superior Court* (1983) 33 Cal 3d 419, 441, the court held that "the public trust is more than an affirmation of state power to use public property for public purposes. It is an affirmation of the duty of the state to protect the people's common heritage of streams, lakes, marshlands and tidelands, surrendering that right of protection only in rare cases when abandonment of that right is consistent with the purposes of the trust." The act of appropriating water is an acquisition of a property right from the waters of the state, an act that is therefore subject to regulation under the state's public trust responsibilities.

The State Water Resources Control Board has invoked its public trust responsibilities in regulating the waters of California and now acknowledges that the public trust is one of its ongoing regulatory responsibilities. Its most publicly prominent instance came in Water Rights Decision 1631 (D-1631) in 1994. In D-1631, the Board balanced the needs of the City of Los Angeles for water supply from the tributaries of Mono Lake with the lake's own needs for water to sustain its ecosystem. It required Los Angeles to make releases from each of its tributaries that would sustain riparian ecosystems and help restore fish populations to the tributaries by prescribing lake level targets in a

No comments

- n/a -

specified time period. (State Water Resources Control Board 1994) The Board has also adopted regulations governing how it treats the public trust in matters of the appropriation of water in California. (State Water Resources Control Board 2011b: Article 14, Standard Permit Terms and Conditions)

The trial court in *United States v. State Water Resources Control Board* (1986, 182 Cal.App.3d 82) determined that the State Water Resources Control Board had the authority to modify an appropriative water right permit once it had been issued, and that it could reduce the US Bureau of Reclamation's Central Valley Project permits to gain compliance from the Bureau. But the trial court held new fish and wildlife objectives the Board had approved in Water Rights Decision 1485 (D-1485) in 1978 to be invalid because the Board failed to identify the *source* of its authority. Justice John Racanelli, the author of the subsequent appellate court decision cited above, stated that the source of the Board's authority to issue and enforce new fish and wildlife objectives such as those contained in Water Rights Decision 1485 (D-1485) was the Public Trust Doctrine:

> ...the state as trustee of the public trust retains supervisory control of the state's waters such that no party has a vested right to appropriate water in a manner harmful to the interests protected by the public trust. (182 Cal.App.3d 82, 149)

Stevens (2005) summarizes the present range of coverage that American and California law gives the public trust doctrine:

1. It applies to all navigable streams.
2. It applies to ecological preservation.
3. It applies to wetland areas.
4. It applies underground (citing the Waiahole decision from Hawai'i).
5. It applies to artificially enlarged waters.
6. It applies to wild animals, including fish.[1]

The Public Trust and Paper Water

In the next few years, the State Water Resources Control Board is expected to make several crucial decisions on California's water future. These decisions include:

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[1] The California Constitution also provides an absolute right to fish among the fundamental declared rights it accords all California citizens. Article I, Section 25 states:

> ARTICLE 1 DECLARATION OF RIGHTS
>
> Section 25. The people shall have the right to fish upon and from the public lands of the State and in the waters thereof, excepting upon lands set aside for fish hatcheries, and no land owned by the State shall ever be sold or transferred without reserving in the people the absolute right to fish thereupon; and no law shall ever be passed making it a crime for the people to enter upon the public lands within this State for the purpose of fishing in any water containing fish that have been planted therein by the State; provided, that the legislature may by statute, provide for the season when and the conditions under which the different species of fish may be taken.

In combination with California Fish and Game Code Section 5937, which provides that owners of dams must preserve fish populations downstream in "good condition", preservation of this right logically should be construed as an important aspect of the public trust responsibilities of government. It retains meaning as a right only when there exist sufficient fish to catch sustainably.

No comments

- n/a -

- Determining how to provide sufficient flows from the Sacramento and San Joaquin River's major tributaries to the Bay-Delta Estuary.
- Updating its 2006 Bay-Delta Water Quality Control Plan to include those new Sacramento and San Joaquin River flow and South Delta salinity objectives.
- Deciding whether to extend the water rights *permits* of the California State Water Project and the federal Central Valley Project, or instead *license* them at levels that represent reasonable and public trust protective water usage.
- Deciding whether and/or how to permit a "north Delta diversion"—a diversion that is now more familiarly known as the Peripheral Tunnels Project.
- Deciding whether and/or how to permit new reservoirs on the San Joaquin River and in the southwestern Sacramento Valley (and/or to raise existing dams to increase storage elsewhere) that would be added to the storage capacities of the Central Valley Project and the State Water Project.

As a regulatory agency, the State Water Resources Control Board is not known for making and holding to courageous or visionary decisions that protect beneficial uses of water throughout California. Their record of delay and incrementalism has contributed to the poor condition of the Bay Delta Estuary and the great rivers of its watershed, the great Sacramento and San Joaquin Rivers.

The State Water Resources Control Board has authority to make bold decisions and hold to them. (Cahill 2008)

The State Water Resources Control Board will need to balance protection of the public trust with other competing beneficial uses of water reliant on the Delta. The Board has already determined the flows that fish and other aquatic species need. (State Water Resources Control Board 2010: 114-123) In completing and implementing the Bay-Delta Plan, the Board's next step is to evaluate the feasibility of measures needed to protect public trust resources fully. (California Supreme Court 1983; Kibel 2011: 6) These steps will need to include: determination of flow needs of public trust resources, water rights reallocation, flow modification, benefit-cost analysis, and habitat restoration. In the process. key questions must be answered:

1. How does the State Water Resources Control Board intend to prioritize water use in terms of coequal goals, of public trust balancing? How does its long-established water rights priority system fit into this policy framework?

2. What does water supply reliability mean in an arid state where we have granted rights to far more water than actually exists? Should water supply reliability be conditioned upon specific requirements to maximize reclamation, reuse, conservation and development of alternative local sources of water?

3. Is the standard by which we measure water supply reliability the same for junior and senior appropriators? Do uses of water that require vast public subsidies have the same priority as uses that don't require subsidy of public funds? Are uses that internalize adverse impacts equal in priority to uses that externalize them?

4. Should the worth of water be confined only to its economic value in use? Or does water supply reliability apply to both public trust resource needs as well as consumptive uses (i.e., is legislation needed for better protection of public resources through water rights)?

5. Are statutory requirements to protect water quality and listed species equivalent to water supply reliability for lawns or surplus, subsidized, and non-food crops? Are food crops more

No comments

- n/a -

important than non-food commodities when it comes to allocating water? Does health and safety take precedence over certain agricultural uses of water?

6. Does efficient use of water have higher priority over wasteful and inefficient use? Is protection of the Bay-Delta Estuary as a "national treasure" and one of the world's great estuaries more valuable to society than irrigating impaired soils, that by their nature when irrigated, discharge prodigious quantities of salt and toxic wastes back to our waterways and aquifers?

Answers to these questions are central to resolving California's water problems.

The California Legislature consolidated the State of California's water rights and water quality control responsibilities in the State Water Resources Control Board in 1967. Since that time, the Board has considerable authority to grapple with these questions and arrive at answers and solutions from them. The Board has authority to:

- Plan for water quality control.
- Receive, condition, and approve new water rights applications as permits.
- Regulate and license water rights permits specifying the point of diversion, diversion flows, place of use, and purpose of use for water.
- Investigate pre-1914 and riparian water rights to determine whether such claims to divert and use water are legal, including follow-up enforcement against illegal uses when determined (discussed below).
- Investigate and enforce the state's prohibition of waste and unreasonable use and wasteful and unreasonable method of diversion of water under the California Constitution, Article X, Section 2.
- Protect the public trust. As an agency of the state, the Board is charged with ensuring the state of California carries out its fiduciary responsibility to protect air, running water, the sea, and the seashore, "these things that are common to all," as stated originally in Roman law (the Institutes of Justinian).

California's constitution promises water rights only up to what is a reasonable use. No one has a right in California to use water unreasonably, not even the federal government. (California Constitution, Article X, Section 2) The Public Trust Doctrine provides that no one has a vested right to appropriate water in a manner harmful to the interests protected by the public trust. (*National Audubon Society v. Superior Court*, 33 Cal.3d 419, 189 Cal.Rptr 346, 658 P.2d 709) And the dictionary definition of usufructuary rights, of which both riparian and appropriative water rights are examples, indicates that a fundamental principle of usufruct is that it connotes only a right to *use* a resource like water, not to waste or use it unreasonably. The State Water Resources Control Board, in taking up all of the key questions we outline above, will be deciding whether and how California's abundant legal authorities apply to the Bay-Delta Estuary's Central Valley watershed.

The Public Trust and Proportional Delta Inflows

In mid-2009, the State Water Resources Control Board updated its review of the Water Quality Control Plan which its Water Right Decision 1641 (D-1641) implements. The Board took the position that to change its water quality and flow criteria it needed more scientific information about flows reasonably needed to protect fish and wildlife beneficial uses (State Water Resources Control Board, 2009: 17). Its impetus to consider making changes at that time included pronounced fisheries declines among both open water resident and migratory fish, and the still-unfolding impacts of climate change and its impacts on the Bay-Delta estuarine system (State Water

No comments

- n/a -

Resources Control Board, 2009: 9). The California Department of Fish and Game sought to build a salmon survival model to assist the Board's need for additional information. (California Department of Fish and Game 2010)

Later in 2009, the California Legislature directed the State Water Resources Control Board to prepare a report on Delta flow criteria that would "develop new flow criteria for the Delta ecosystem necessary to protect public trust resources" and in so doing "use the best available scientific information." The Legislature directed the Board to gather the information as part of an "informational proceeding" rather than through an evidentiary hearing. And the Legislature charged the Board with including volume, quality and timing of water necessary for the Delta ecosystem under different conditions (California Water Code: Section 85086(c)).

The Board produced its Delta flow criteria report after taking detailed testimony on the best available science for key fish species and ecosystems. The report identified a set of broad flow regimes for upstream tributaries providing inflow to the Bay-Delta Estuary that fish need to survive and recover. They represent the Board's consideration of the best available fishery and hydrologic science it considered during 2010 addressing the question: what flows do fish need? The Board confirms this when it stated in a footnote, "...the flow criteria developed in this proceeding are intended to halt population decline and increase populations of certain species," and acknowledged that, "Recent Delta flows are insufficient to support native Delta fishes for today's habitats....Flow and physical habitat interact in many ways, but they are not interchangeable." (State Water Resources Control Board 2010: 5, 120)

The Board states that the flow criteria "must be considered" in context:

- The flow criteria do not consider any balancing of public trust resource protection with public interest needs for water.
- The State Water Board does not intend that the criteria should supersede requirements for health and safety such as the need to manage water for flood control.
- There is sufficient scientific information to support increased flows to protect public trust resources; ***while there is uncertainty regarding specific numeric criteria, scientific certainty is not the standard for agency decision making.*** (State Water Resources Control Board 2010: 4; emphasis added)

The Board's flow determinations are:

- 75 percent of unimpaired Delta outflow from January through June.
- 75 percent of unimpaired Sacramento River inflow from November through June.
- 60 percent of unimpaired San Joaquin River inflow from February through June.
- Increased fall Delta outflow in wet and above normal years.
- Fall pulse flows on the Sacramento and San Joaquin Rivers to stimulate migrating fish.
- Flow criteria in the Delta interior to help protect fish from mortality in the central and southern Delta caused by operations of the state and federal water export pumps.

In essence, these flow determinations represent the Board's answer to the question, "what flows do fish need in the Central Valley watershed and the Bay-Delta Estuary?" The State Water Resources Control Board's 2010 Delta flow criteria report acknowledged that protective Delta outflows start with protective tributary inflows to the Delta. The Board's Delta inflow criteria rely on a percentage of unimpaired flow measure, which enables the flow criteria on the Sacramento and San Joaquin rivers to more closely mimic their natural hydrographs than now occurs.

No comments

- n/a -

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For the San Joaquin River, the State Water Resources Control Board approved its determination that 60 percent of unimpaired flow from February through June for the river basin would protect juvenile Chinook salmon during their peak emigration period. For the Sacramento River, the Board adopted the criterion of 75 percent of unimpaired flow from November through June. (This is because numerous runs of migratory salmon use the Sacramento River Basin for more of the year.) These constrained periods would also benefit the rearing period of juvenile salmon in the basin's major tributaries upstream. The Board also adopted in that report (2010) a fall season Delta inflow criterion calling for an average flow of 3,600 cubic feet per second for 10 days sometime during late October.

Nearly all scientists testifying to the Board in March 2010 agreed that mimicking the natural hydrograph (in shape if not in magnitude and volume of flow) is necessary to improve conditions for native fish species, and to counter invasive species in the Delta. Existing Board water quality and flow objectives intended to protect fish and wildlife beneficial uses in the south Delta are not working, as shown in abundant evidence presented to the Board at its hearings for the Delta Flow Criteria report. The Board includes much of that data in its report. (State Water Resources Control Board 2010) C-WIN provide a brief evaluation of the Vernalis Adaptive Management Plan to supplement this record of failure in Appendix A to this testimony.

In August 2010, the State Water Board approved these currently nonbinding Delta inflow determinations for the Sacramento and San Joaquin rivers. (State Water Resources Control Board 2010: 114-123) The State Water Resources Control Board observed that using such flow criteria would mean that "to achieve the attributes of a natural hydrograph, the criteria are advanced as a percentage of unimpaired flow on a 14-day average, *to be achieved on a proportional basis from the tributaries to the San Joaquin River.*" (State Water Resources Control Board, 2010: 120, emphasis added) The Board makes an important point that mimicking natural hydrograph and improving prospects for species recovery depends on achieving proportional flow allocations from all the major tributaries. Proportional tributary contributions would be needed to implement the Board's broader Delta inflow criteria. The Board will need to answer key questions including: what should those proportions be, how should responsibility for them be assigned, and who will be responsible for providing them? And: when will the upper San Joaquin River be included by the Board in making these determinations? (Right now, the Board excludes the upper San Joaquin River from its Bay-Delta Estuary planning deliberations. C-WIN evaluates the Board's stance in Appendix B.)

The question for the Board is how to do proportional flows *legally.* Proportional tributary contributions from Delta inflow are not new. In 1992, the California Department of Fish and Game proposed a method to identify tributary contributions to Delta inflows based on the pro rata share of unimpaired runoff each tributary generates to the Delta, as identified in the California Department of Water Resource's Bulletin 120 each year (California Department of Fish and Game, 1992). Other allocation methods could be devised as well, such as one based on reservoir storage on these same tributaries. The State Water Board in its Draft Water Right Decision 1630 presented such a method, but which excluded contributions from the San Joaquin River above Mendota Pool (State Water Resources Control Board, 1992: Tables IV and V).

Proportional tributary contributions needed to fulfill Delta inflow determinations from the Trinity River, and the major tributaries of the Sacramento and San Joaquin River Basins will require changes to the water rights of major water users in these Basins. The State Water Resources Control Board has authority over water rights to reallocate water usage and ensure compliance with the Board's Delta inflow objectives.

No comments

- n/a -

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Paper Water Means Boundary Disputes and Clouded Titles

Property is often legally conceived as a bundle of rights representing "investment-backed expectations" of a future stream of benefits accruing to its owner, usually in the form of money. Water rights are a form of property, conveying to their owners rights to use water from a stream. Unlike real property in land, however, we have a situation in which far more in rights to use water have been granted by the state or claimed by right holders than Nature and reality actually provide.

California's modern water code and its body of water rights case law is the result of more than a hundred and sixty years of legislation and legal precedent. Riparian water rights are the most paramount rights, followed by pre-1914 appropriative rights and, lastly, post-1914 appropriative rights, as determined by the seniority requirements of first-in-time-and-use.

But despite this accumulated legal tradition, human promises of water exceed Nature's provisions. A shorthand description of this condition is "paper water." The paper water problem in the area of water and rivers in California has close analogies in concepts like "clouded title," and "boundary dispute" for a piece of real property (say, a house, or a plot of land) that has more than one owner claiming the same piece or portion of ground. Typically, boundary disputes are resolved by one or more disputants engaging the services of a surveyor to establish where the boundary is actually located. From there, the owners have a common set of facts on which they may agree to resolve their boundary dispute.

"Clouded title" has relevance here as well. A clouded title means the ownership of a title in water has some defect or potential defect arising from a competing claim for the same source of water.

One of the earliest recognitions of the problem of paper water in California occurred over a century ago and helps illustrate the clouded condition of paper water. In 1900, Frank Soulé, a professor of civil engineering at the University of California, was retained by the US Department of Agriculture's Office of Irrigation Investigations to study water rights claims in the San Joaquin River basin. Soulé found that the San Joaquin River's average winter and spring months' flows were approximately 5,000 to 6,000 cubic feet per second. In drier late summer and fall months, flows could get as low as 150 cubic feet per second. Soulé researched water rights claims to all tributaries of the San Joaquin River watershed to see how they matched up with flows in the river. Actual flows from the 1895-1909 period averaged about 2.02 million acre-feet, according to state records. (State Water Resources Board 1951: Table 62) He visited the recorders' offices for Stanislaus, Merced, and Fresno counties and itemized 315 claims to San Joaquin River waters totaling 36,571,471 miners inches of flow (there are 50 miners inches to a cubic foot per second). This converts to 731,429 cubic feet per second. Stretched out over a year (Soulé did not specify the seasons for which the claims were made), this translated into an annual claim of water rights of 529.9 million acre-feet of water, over 260 times greater than average flow of the San Joaquin River in that period. For an eight-month irrigation season of about 246 days, such flows would amount to 356.9 million acre-feet, nearly 180 times greater than San Joaquin River flows. These, Soulé contended, were the "definite claims," ones that had well-defined diversion points and amounts claimed. Six separate individuals claimed "all the water flowing in the San Joaquin River," a definite claim, if exaggerated. His summary for the San Joaquin did not include claims to the Fresno and Chowchilla rivers, which are much smaller watersheds, but the grandiosity continued there. On the Fresno River, some 670,799 miner's inches were the subject of 50 claims (about 13,416 cubic feet per second or 9.7 million acre-feet a year), and on the Chowchilla just 14 claims aggregated to 31,008 cubic feet per second (or about 22.5 million acre-feet annually). (Soulé 1901: 222, 232)

Clouded titles in water have been allowed to fester since before Professor Soulé began studying the problem in 1900. Failure by the State of California to quiet titles to water since assuming authority

No comments

- n/a -

for appropriative water rights in 1914 contributes untold expectations for benefit streams that fuel controversy in California water resources planning and development ever since.

C-WIN is not a lone contemporary voice on the problem of paper water. In September 2008, State Water Resources Control Board staff informed the Delta Vision Blue Ribbon Task Force about water rights, use, and flows in the Delta watershed. It stated in part:

- The "total face value of the approximately 6,300 active water right permits and licenses within the Delta managed by the State Water Board, including the already assigned portion of state filings, is approximately 245 million AFA [acre-feet annually]." Our organizations note that this 245 million acre-feet of face value in water rights was permitted by the Board and its predecessors in the Central Valley watershed (including imports from watersheds like that of the Trinity River). (State Water Resources Control Board 2008)

- Face value "does not include pre-1914 and riparian water rights." Riparian water rights, in the absence of some form of watershed adjudication, are usually unquantified but nonetheless require real, wet water. (State Water Resources Control Board 2008) And,

- That "the total face value of the unassigned portion of state filings for consumptive use (excluding state filings for the beneficial use of power) within the Delta watershed is approximately 60 million [acre-feet annually]." These are claims the State has filed to reserve water for further expansion of the State Water Project. (State Water Resources Control Board 2008; see also Appendix C.)

Other matters exacerbate the paper water problem:

- The SWRCB does not know how much water is actually used (and by whom) since state law has yet to require full accounting of either surface or ground water use.

- The SWRCB does not know the extent of paramount riparian or senior pre-1914 water rights either.

- Climate change is likely to alter the timing and reduce the volume of runoff into California's rim dams and overall state and federal water systems. (Knowles and Cayan 2002) It is also likely to decrease natural groundwater recharge as well, which would further reduce runoff volumes where river reaches benefit from groundwater inflows.

- Increased cold water pools and groundwater support from gaining streams will be needed to maintain water temperatures below rim dams according to estimates by the SWRCB and Department of Fish and Game of the increased inflow and outflow necessary to protect rivers and the Delta public trust resources. (California Department of Fish and Game 2010: 51, Table 5)

Given these constraints, the obligation to achieve a public trust balancing of water supply reliability with fish and ecosystem survival cannot rest on maintenance of existing levels of supply from either Delta exports or the rim dams on all major Central Valley tributaries in the Delta watershed. The State Water Resources Control Board must use its water rights authority in the service of meeting these water quality challenges on behalf of public trust resources.

The Delta Watermaster acknowledges the problem of paper water in a recent report on the State Water Resources Control Board's role in the Delta Stewardship Council's Delta Plan process (Wilson 2011). He expresses concern, however, that "the face value of water rights is not a sufficient

No comments

- n/a -

measure of water that can be used to determine the over-allocation of water in the [Delta] watershed." He cites four main reasons for his concern:

- The face value of many water rights are for nonconsumptive uses, such as hydropower.
  - **C-WIN Response:** As much as possible, water availability analysis should factor out water rights claims that are primarily devoted to nonconsumptive uses and hydropower generation in particular. C-WIN's analysis factors out all single-purpose hydropower generation water rights claims, whether pre- or post-1914. Where multiple purpose of use claims include hydropower generation, we assume these rights are still primarily consumptive use claims, especially when irrigation is one of the other purposes of use for which claims are made. Hydropower generation is considered incidental to the other consumptive uses.

- The face value represents a maximum possible water diversion, which is far greater than what is actually used;
  - **C-WIN Response:** We agree that face value often represents a maximum possible diversion (and/or storage amount). We also agree that it may be far greater than what is actually used in many cases. But C-WIN's review of water right claims shows that some rivers' claims far exceed maximum unimpaired flows and even reservoir capacity on that river. (The Trinity River is a good example of this.) This is less a criticism of face value than an acknowledgement of paper water by the Delta Watermaster. Nor does it justify continuation of the practice by the State Water Resources Control Board. Since the maximum possible flow (and use) can occur only relatively rarely in California's hydrology, C-WIN suggests that this extra increment of claims be eliminated because it will occur in the future with even less frequency than now occurs. Reliable rights are only meaningful when they can be exercised with relative frequency.

- Permit/license terms, such as those for protection of instream uses, further reduce below the face value the amount of water that can be diverted;
  - **C-WIN Response:** The State Water Resources Control Board needs to continue having some standard method for quantifying the value of water rights as property. This is the only way that increments of title to water as property can be described and titles cleared or quieted in the event of dispute. Moreover, quantified water rights are the only way to conduct reality-based water resources planning and development. This extends to employing a standard method for quantifying and measuring instream flows that benefit public trust resources. If the Board and Delta Watermaster are to enforce instream flows, they must quantify instream flow commitments and ensure that they are fulfilled *prior* to the exercise of permitted or licensed water rights claims.

- Water, when applied, is typically not consumed up to the full face value and the same water (return flow) is often used multiple times as it runs downstream.
  - **C-WIN Response:** While C-WIN acknowledges the reality of return flow in diversion of water for consumptive irrigation uses, there is no consistently available data that measures the volume and occurrence of return flow to rivers. Some estimates, both recent (California Department of Water Resources 2005: water balances for Sacramento and San Joaquin River Basins) and historical (Wiel 1928: 259) put return flow at between 60 and 65 percent of originally diverted volumes. Of course, the reality of return flow, however, means that river flow can decrease by as much as a third of diversion quantities each time it is applied; the more frequently water is diverted to consumptive use, the sooner surface flows are depleted in the immediate

No comments

- n/a -

> river reach downstream. Return flows do not reach the river from which they were diverted instantaneously. Once diverted there occurs a time lag between the diversion and its application, and when water actually returns to the river, and even then, it may only reach the river in small increments, depending on the surface return flow and/or subsurface transmissivity getting back to the river. Meanwhile, the diverted water is gone from the river, thereby depleting its flow until some later time and lower location. If return flow is truly important to determining water availability and avoiding boundary disputes and clouded water titles, then California needs to invest in getting data from each watershed that quantifies the volume, timing, and duration of return flow, instead of ignoring it. (State Water Resources Control Board 1983: 9-10)

C-WIN's methodology recognizes each of these facets of "face value" or face amount of water rights. Unfortunately, the Delta Watermaster's remarks do not clarify whatever else it is that face value quantities in water rights are supposed to positively describe. If the quantities in water rights are not relevant to face value, then on what basis can separable, stable, and reliable rights to water use be analyzed and judged? The Watermaster acknowledges that "while actual water use may be only a fraction of the face value of water rights, the state's water supplies have been over-allocated in many areas."[2] (Delta Watermaster 2011b: 5) C-WIN shows in this testimony that it is possible to use the "data" of water rights in combination with data on flows and diversions to generate a consistent and meaningful picture of the problem of overallocation of water supplies and rights in the San Joaquin River Basin. Our water availability analysis illustrates the usefulness of having *some idea* of the magnitude of the paper water problem as compared with having *no idea*. All of California needs better data on all facets of the problem of paper water.

Tables 1 and 2 provide static (snapshot) views of total water rights in the Trinity, San Joaquin River and Sacramento River Basins. Total water rights reported in these two tables are for consumptive uses. Hydropower generation water rights have been excluded from this analysis.

In Table 1, average annual unimpaired flow for the San Joaquin River Basin is about 6.2 million acre-feet compared with 32.7 million acre-feet of consumptive water rights claims. The ratio of total claims to average unimpaired flow for the San Joaquin Basin is 5.3 acre-feet of consumptive use claims to every acre-foot of unimpaired flow in the Basin. About 49 percent of total consumptive water claims are by riparian and pre-1914 claimants, while 51 percent is by post-1914 claimants (that is, permits and licenses) regulated by the State Water Resources Control Board.

Specifically on the major tributaries of the San Joaquin River Basin, the ratio of total consumptive use claims to unimpaired flow ranges from about 5.6 on the Stanislaus to 6.3 acre-feet of claims to every unimpaired acre-foot of flow on the San Joaquin River (including valley floor and upper watershed claims).

In Table 2, average annual unimpaired flow in the Sacramento Valley (essentially, average Sacramento River inflow to the Delta) is about 21.6 million acre-feet. Consumptive water rights claims are estimated at about 120.6 million acre-feet. The ratio of total consumptive use claims to averge unimpaired flow in the Sacramento River Basin is about 5.6 acre-feet of claims per acre-foot of unimpaired flow. Ratios of claims to unimpaired flow to range from 2.2 on the Yuba River to 6.8 on the Trinity River.

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[2] The Delta Watermaster suggests that for the Delta the process for determination of fully appropriated streams from the Water Code Sections 1205 through 1207 be used (p. 5).

No comments

- n/a -

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Table 1
Consumptive (Irrigation) Water Rights Summary for San Joaquin River Basin

Flows and Consumptive Water Rights	Thousands of Acre-Feet				
	Stanislaus River	Tuolumne River	Merced River	San Joaquin	Basin Total
Average Annual Unimpaired Flow	957	1,851	956	1,728	6,181
Total Consumptive Water Right Claims	5,318	11,015	5,495	10,828	32,656
Ratio of Total Claims to Unimpaired Flow	5.56	5.95	5.75	6.27	5.28
Total Riparian & Pre-1914 Claims	1,401	8,185	4,525	2,014	16,125
Ratio of Riparian & Pre-1914 Claims to Unimpaired Flow	1.46	4.42	4.73	1.17	2.61
Total Post-1914 Claims	3,917	2,831	970	8,814	16,532
Ratio of Post-1914 Claims to Unimpaired Flow	4.09	1.53	1.01	5.10	2.67

Sources: State Water Resources Control Board (e-WRIMS); Public Record Act responses from various public water and irrigation districts; California Water Impact Network. Sum of major tributaries' unimpaired flow does not equal Valley total due to omission of other watersheds from the table.

Table 2
Consumptive (Irrigation) Water Rights Summary for Trinity and Sacramento River Basins

Flows and Consumptive Water Rights	Thousands of Acre-Feet				
	Trinity River	Feather River	Yuba River	American River	Sacramento Valley Total
Average Annual Unimpaired Flow	1,283	4,370	2,287	2,621	21,619
Total Consumptive Water Right Claims	8,725	15,717	5,093	9,847	120,571
Ratio of Total Claims to Unimpaired Flow	6.80	3.60	2.23	3.76	5.58
Total Riparian & Pre-1914 Claims	134	3,855	92	286	47,883
Ratio of Riparian & Pre-1914 Claims to Unimpaired Flow	0.10	0.88	0.04	0.11	2.21
Total Post-1914 Claims	8,591	11,863	3,596	9,561	72,688
Ratio of Post-1914 Claims to Unimpaired Flow	6.70	2.71	1.57	3.65	3.36

Sources: California Department of Water Resources, 2007; State Water Resources Control Board (e-WRIMS); Public Record Act responses from various public water and irrigation districts; California Water Impact Network. Sum of major tributaries' unimpaired flow does not equal Valley total due to omission of other watersheds from the table. Trinity River is included because a large portion of its runoff is exported to the Sacramento River via federal Central Valley Project facilities.

No comments

- n/a -

On a basin-wide basis, riparian and pre-1914 water claims account for about 40 percent of total consumptive use claims of 120.7 million acre-feet, and post-1914 claims (permits and licenses) in the Sacramento River Basin amount to about 60 percent of total consumptive use claims.

The largest water claims on Sacramento River Basin tributaries belong to the Feather River and the American River. The mainstem Sacramento (which is incorporated into the total for the Valley) includes the Pit and McCloud rivers and numerous small creeks that enter it from the east and west. C-WIN estimate that the largest component of pre-1914 water rights claims is held by the Glenn-Colusa Irrigation District. This District claims 26 million acre-feet in rights to divert directly from the Sacramento, as well as another 12 million acre-feet in rights from west side creeks.

On the Trinity River, the US Bureau of Reclamation is a significant claimant of post-1914 water rights, and given the small amount of riparian and pre-1914 water rights claims on the Trinity, the Bureau's Trinity River rights are reliable, as conditioned and limited by the Trinity River Record of Decision. (US Department of the Interior 2000) The Trinity's ratio of total consumptive claims to average unimpaired flow is 6.8 acre-feet of claims to every acre-foot of unimpaired flow.

There is another, more dynamic approach that we also include in this testimony to characterize excess claims to water use relative to flows. This planning-level analysis of water availability incorporates into the model hydrologic variability, instream flow requirements and publicly available water rights priorities on the divertable flows that remain in the system.

Applying Water Availability Analysis

In Tables 3A and 3B and accompanying charts, we present results of applying both a diversion cap (derived from the State Board's 2010 Delta flow determinations) and the water rights priority system in the manner that the State Water Resources Control Board is legally authorized to proceed. The unimpaired flow hydrology for this analysis was obtained from the California Department of Water Resources (2007). This analysis proceeds from the basic water rights premises that:

1) Instream flows needed to meet water quality and flow objectives have top priority.
2) When applying water rights, riparian rights are paramount, followed by—
3) Pre-1914 water rights claim water based on seniority date, followed by—
4) Any water left over is provided to junior water rights holders, in order of priority date (whether pre-1914 rights or post-1914 permits and licenses).

Detailed model results, water rights, and flow data employed in the analysis are found in Appendix D. Assumptions embedded in the method are itemized in Appendix E of this report.

To apply the water rights priority system in the context of providing new Delta inflows from the major tributaries, C-WIN's analysis builds in a range of flows from the 10th through 90th percentiles of the 82-year unimpaired flow hydrology available from the California Department of Water Resources (2007). 25th, 50th (median), and 75th percentile (quartile) flows are also considered. C-WIN's analysis summarizes total regulated period unimpaired flow, the Delta inflow contribution, and calculates a "diversion cap." (See Appendices D.1, D.2, and E.)

Water rights priorities are then assigned to allocate the diversion cap flows for the regulation period to paramount riparian and senior water right holders first. Detailed tables of our model results are provided in Appendix D.1 for the Trinity and the major Sacramento and San Joaquin River Basin tributaries. On the major tributaries, there are generally few significant water rights holders, and relatively small blocs of riparians may be known and allocated flows prior to pre-1914

No comments

- n/a -

Table 3A
Summary of Water Availability Analysis Results Incorporating Water Rights Claims for Major Tributaries of the San Joaquin River Basin

River/ Instream Flow Objective	Annual Total		
	Riparians and Senior Pre-1914 Right Holders	**Major Water Right Claimants**	**Other Junior Major Claimants**
Stanislaus	**Various, including Tuolumne Utilities District**	**Oakdale & South San Joaquin Irrigation Districts**	**US Bureau of Reclamation**
40% Diversion Cap	29 TAF in all percentile flows.	198 to 758 TAF in all percentile flows.	81 to 250 TAF in the 50th to 90th percentile flows.
Tuolumne	**Various, including Tuolumne Utilities District**	**Turlock Irrigation District, Modesto Irrigation District**	**City & County of San Francisco**
40% Diversion Cap	23 TAF across all percentile flows.	408 to 1,662 TAF across all percentile flows.	95 TAF in only the 90th percentile flows.
Merced	**Various, including Gallo interests**	**Merced Irrigation District**	**Not applicable**
40% Diversion Cap	218 to 283 TAF across all percentile flows.	5 to 594 TAF from 40th to 90th percentile flows, about 14% of all claims.	Not applicable
San Joaquin	**Below Friant Dam, and along Fresno Slough**	**San Joaquin River Exchange Contractors**	**US Bureau of Reclamation**
40% Diversion Cap	172 TAF in all percentile flows.	248 to 817 TAF in all percentile flows.	89 to 413 TAF in 75th to 90th percentile flows.

Sources: California Department of Water Resources, 2007; State Water Resources Control Board, 2010, 2012; other primary and secondary sources compiled by the California Water Impact Network. See Appendix D for details of data and supporting model results.

right holders. Pre-1914 water right claims tend to comprise the majority, or in most cases exceed the unimpaired flows in most (and in some cases, all) decile flows reported in the analysis.

No comments

- n/a -

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Table 3B
Summary of Water Availability Analysis Results Incorporating Water Rights Claims for the Trinity River and the Major Tributaries of the Sacramento River Basin

River/ Instream Flow Objective	Annual Total		
	Riparians and Senior Pre-1914 Right Holders	Major Water Right Claimants	Other Junior Major Claimants
Trinity	**Various, small claimants**	**US Bureau of Reclamation**	**Not applicable**
25% Diversion Cap	134 TAF in all percentile flows.	77 to 454 TAF across all percentile flows.	Not applicable.
Sacramento River above Feather River Confluence	**Various, including Anderson-Cottonwood ID and Glenn Colusa ID**	**Early Post-1914 to early 1927 claimants**	**CVP and Feather River Project Filings from 1927 through 1961**
25% Diversion Cap	2,094 to 5,983 TAF ranging across all percentile flows.	0 TAF across range of all percentile flows.	0 TAF across range of all percentile flows.
Feather River	**Western Canal WD and Joint Water Districts, adjudication decrees**	**South Feather and Thermalito 1920s Rights**	**DWR 1927, 1951, and 1956 Claims**
25% Diversion Cap	729 to 1,972 TAF ranging across all percentile flows.	4 to 34 TAF from 20th to 90th percentile flows.	7 to 236 TAF in all percentile flows.
Yuba River	**Various, including Nevada ID, City of Nevada City**	**Nevada ID and Yuba Co WD 1920s Rights**	**Yuba County Water Agency 1927 Claims**
25% Diversion Cap	258 to 1,004 TAF ranging across all percentile flows.	10 to 12 TAF only at 25th to 80th percentile flows.	20 to 81 TAF among 50th to 80th percentile flows.
Bear River	**Various, including Nevada ID**	**Camp Far West and Nevada ID Claims**	**South Sutter Water District Claims**
25% Diversion Cap	26 to 92 TAF ranging across all percentile flows.	1 to 54 TAF across all percentile flows.	4 to 9 TAF from 50th to 90th percentile flows.
American River	**Various, including San Juan Water District, Nevada ID and City of Sacramento Post-1914 Claims**	**Georgetown Divide PUD and Placer County Water Agency**	**US Bureau of Reclamation**
25% Diversion Cap	291 to 1,006 TAF ranging across all percentile flows.	8 to 183 TAF from 50th from all percentile flows.	9 to 139 TAF in all percentile flows.

Sources: California Department of Water Resources 2007; State Water Resources Control Board 2010 and 2012; other primary and secondary sources compiled by the California Water Impact Network. See Appendix D for details of data and supporting model results.

No comments

- n/a -

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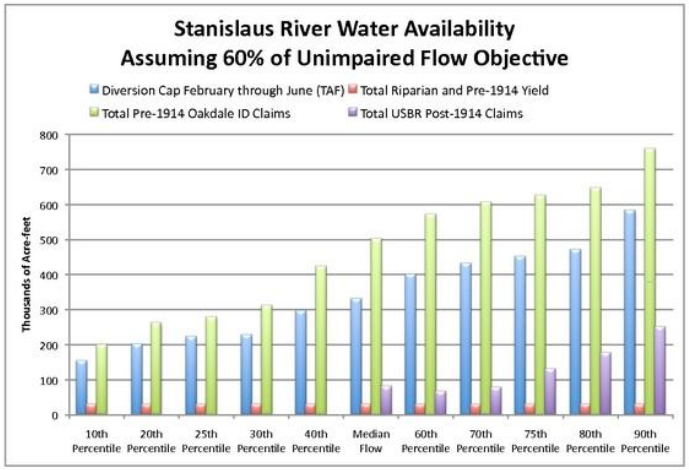

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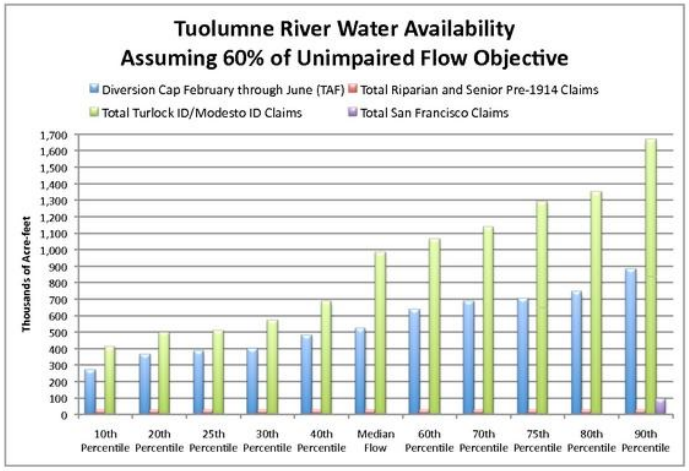

No comments

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Water Availability Analysis
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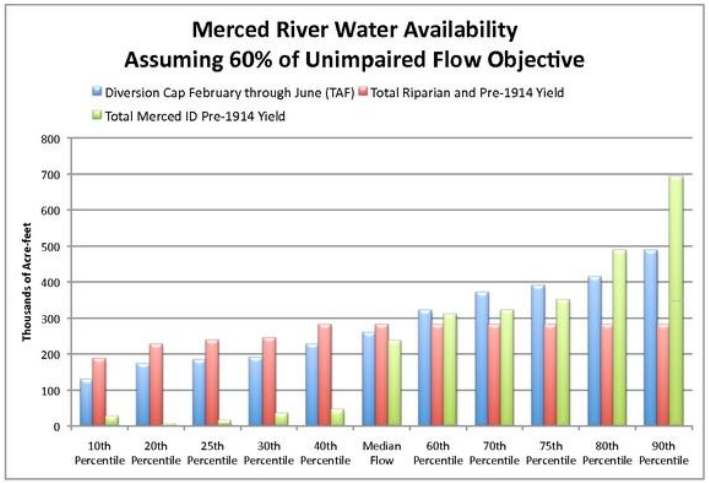

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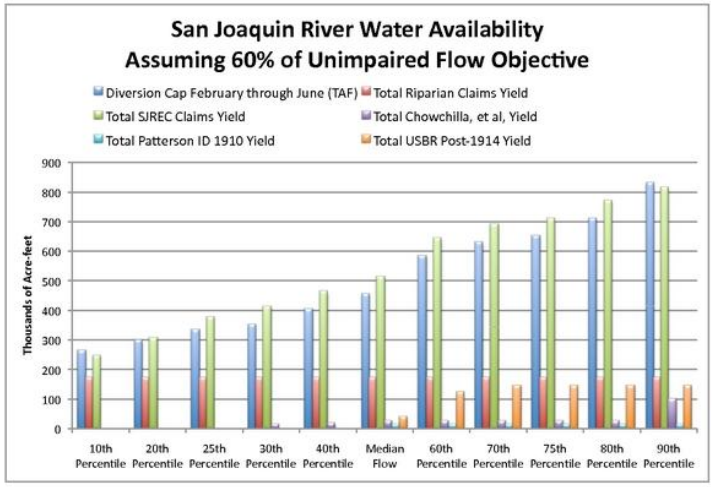

No comments

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Stanislaus River (Figure 1)

Implications: Under strict application of both the 40 percent diversion cap and the water rights priority system in the Stanislaus River watershed, the US Bureau of Reclamation's water rights for New Melones Reservoir yields only a small fraction of Bureau claims in actual supplies.

Tuolumne River (Figure 2)

Implications: Under strict application of both the 40 percent diversion cap and the water rights priority system, the City and County of San Francisco would have reliable rights to water only in the wettest 10 percent of flows.

Merced River (Figure 3)

Implications: Under strict application of the water rights priority system to the 40 percent diversion cap, Merced Irrigation District's pre-1914 water rights exceed its post-1914 claims significantly, but are junior to a large amount of riparian and senior pre-1914 right holders.

San Joaquin River (Figure 4)

Implications: Only the small riparian allocations along the upper San Joaquin River would have fully reliable flows. The Exchange Contractors would have full claims on flows about 30 percent of the time (at the 70th percentile flows and above). The Bureau of Reclamation would not receive allocations except in the wettest 30 percent of years at all, and would receive its full allocation no more than about 10 percent of the time.

Trinity River (Figure 5)

Implications: Riparian and pre-1914 water right holders on this river system are few. The Bureau's post-1914 water rights to develop Trinity Reservoir and Lewiston Dam, and the hydropower complex linked to Keswick Dam along Clear Creek are the dominant water rights on the Trinity River. As noted in Table 2, however, the consumptive use rights alone appear to be quite excessive relative to Trinity River's unimpaired flow hydrology.[3]

Sacramento River Above Feather River Confluence (Figure 6)

Implications: Because of large pre-1914 water rights claims by Glenn-Colusa Irrigation District along the Sacramento River, no water would be available to the US Bureau of Reclamation, except from Trinity River exports. Strict application of this pattern of water rights claims would dramatically reduce water available for export from the Sacramento River Basin and potentially undermine the San Joaquin River Exchange Contract.

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[3] Our analysis applies to the Trinity the Board's 75 percent of unimpaired flow determination for November through June. This flow determination exceeds those of the 2000 Trinity Restoration Record of Decision. (US Department of the Interior 2000)

No comments

- n/a -

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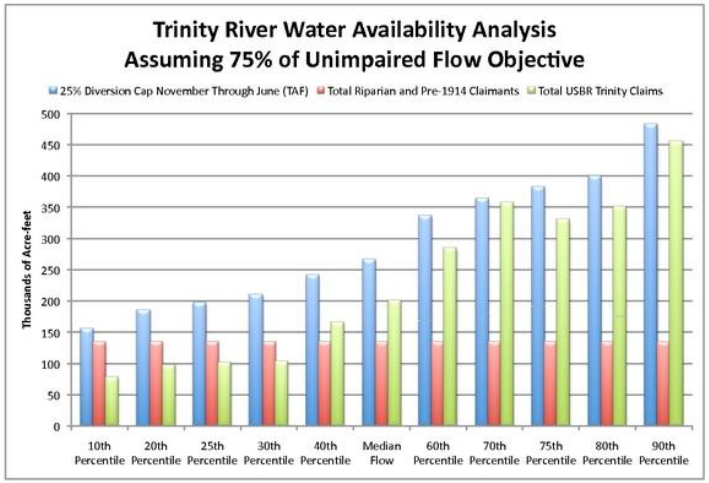

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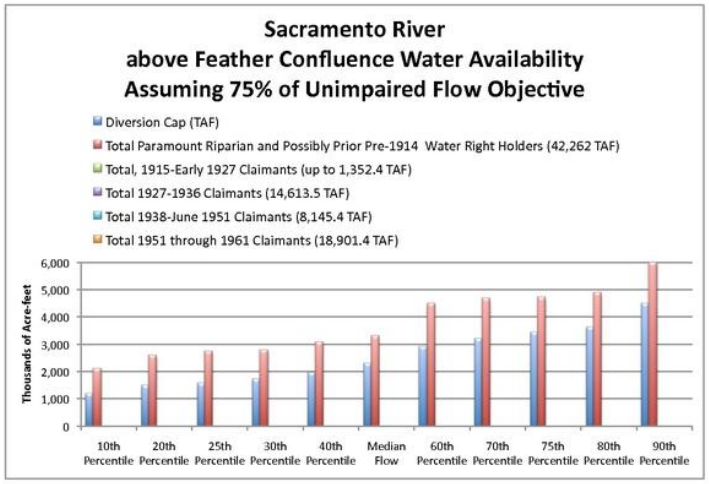

No comments

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Feather River (Figure 7)

Implications: The Department of Water Resources' 1927, 1951, and 1956 water rights claims for the Feather River Project (now the State Water Project) would receive almost no water under a 25 percent diversion cap scenario. In drier years, even at relaxed diversion cap scenarios, DWR would receive only very small amounts. This is due to senior pre-1914 water rights claimants such as the Joint Water Districts[4] and Western Canal Water District, whose rights predate the cultivation of rice in the Butte County region, and were adjudicated in 1923. DWR's claims amount to about 10.4 million acre-feet (MAF) on the Feather River alone for consumptive uses.

Yuba River (Figure 8)

Implications: Nevada Irrigation District and Yuba County Water District, through their pre-1914 claims and 1920s water rights claims, would have senior claims to Yuba River flows. Full operation of these claims would nearly eliminate Yuba County Water Agency diversions under a 25 percent diversion cap scenario.

Bear River (Figure 9)

Implications: Because of senior water rights claims by Nevada Irrigation District and Camp Far West Irrigation District, South Sutter Water District would see its supplies reduced significantly relative to its claimed rights under a 25 percent diversion cap scenario.

American River (Figure 10)

Implications: The US Bureau of Reclamation's Central Valley Project facilities along the American River would receive very little water supplies from operation of the water rights priority system under a 25 percent diversion cap, despite having claimed up to 5.35 million acre-feet.

Discussion

Assuming that the State Water Board adopts the 75 percent unimpaired flow determination for the upstream tributaries of the Sacramento River Basin, the 60 percent of unimpaired flow determination for the San Joaquin River Basin, and that the water rights priority system is applied, it becomes evident that several significant water rights claimants that are junior in priority contribute dramatically to the problem of paper water: They have been promised water far in excess of flow conditions available to them in most years.

Table 4 summarizes the major water rights claimants whose titles to water in the Central Valley watershed tributaries should be considered clouded, whose property "boundaries" are in dispute.

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[4] The Joint Water Districts include Butte Water District, Biggs-West Gridley Water District, Richvale Irrigation District, and Sutter Extension Water District, the successors to pre-1914 water rights accumulated by the Sutter Butte Canal Company.

No comments

- n/a -

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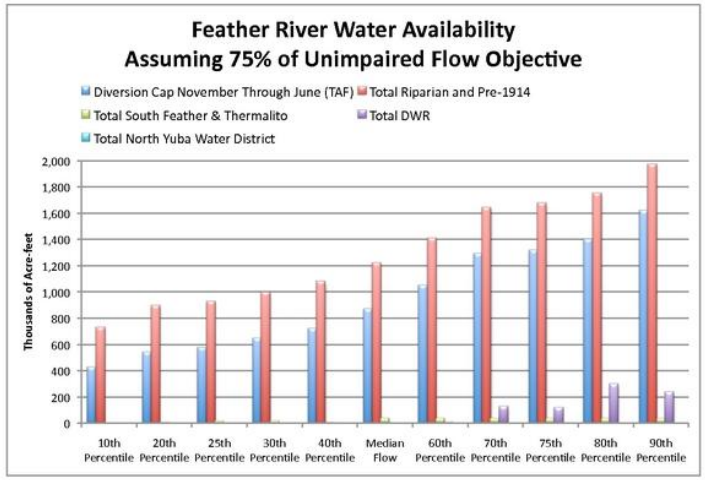

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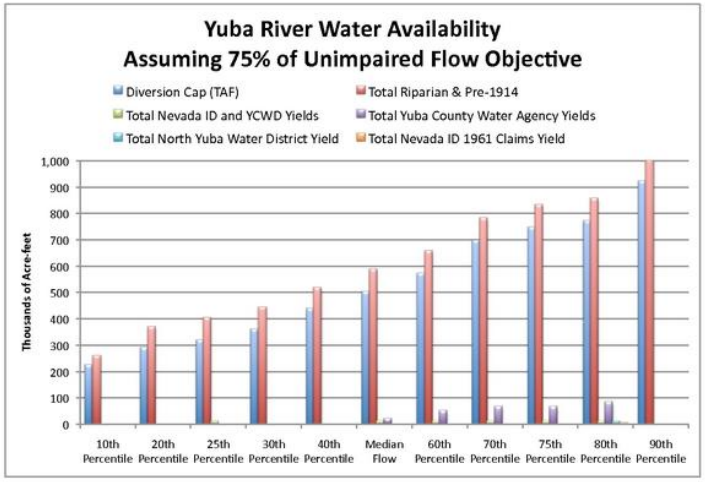

No comments

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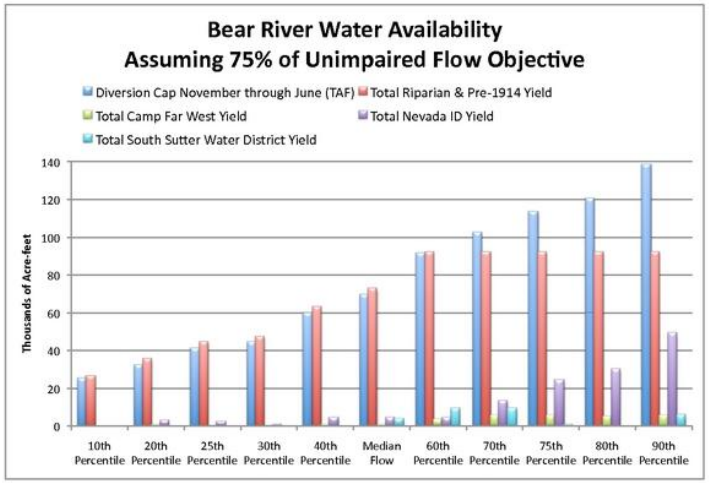
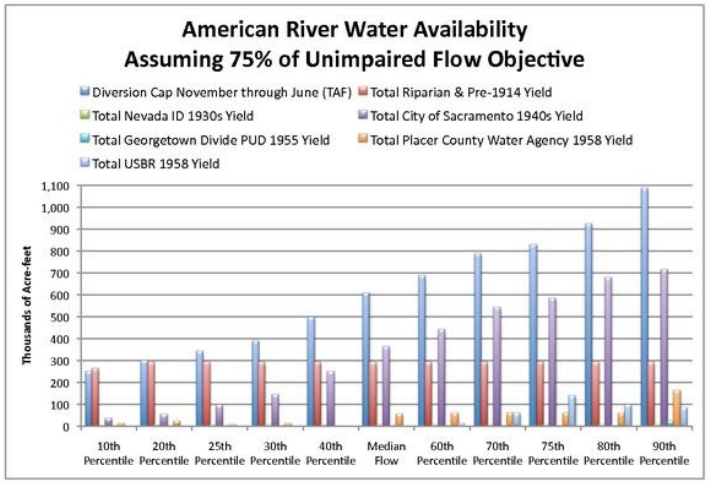


Figure 9, above. Figure 10, below.



No comments

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Table 4
Summary of Watershed Consumptive Water Rights Claimants by Reliability (Based on Legal Priority) of Claims

Watershed	Claimants with Highly Reliable Rights	Claimants with Potentially Clouded Titles to Water
Stanislaus River	Various claimants covered by Stanislaus River decree of 1929; Oakdale ID, South San Joaquin ID	US Bureau of Reclamation (New Melones)
Tuolumne River	Tuolumne Utilities District, Turlock Irrigation District, Modesto Irrigation District	City and County of San Francisco (1901 through 1911 rights)
Merced River	Gallo, various riparian and pre-1914 parties to early Merced River decrees	Merced Irrigation District (post-1914 rights)
San Joaquin River	Paramount riparian claimants, San Joaquin River Exchange Contractors, Chowcilla WD, Tranquillity & James IDs, Patterson ID	US Bureau of Reclamation (post-1916 rights)
Trinity River	Various small riparian and pre-1914 claimants, US Bureau of Reclamation	US Bureau of Reclamation (has overstated water claims compared with actual basin hydrology)
Sacramento River (including west and east creeks, Pit and McCloud Rivers)	Various small riparian and pre-1914 claimants, claimants among adjudicated watersheds in Pit River region, Anderson-Cottonwood Irrigation District, Glenn-Colusa Irrigation District	US Bureau of Reclamation (Shasta Lake)
Feather River	Upper watershed adjudicated claimants, Joint Water Districts, Western Canal WD	California Department of Water Resources (Lake Oroville)
Yuba River	Browns Valley ID, Nevada ID, Yuba County WD	Yuba County Water Agency (1927 rights), Nevada ID (1930s rights), and North Yuba Water District (1958 rights)
Bear River	Nevada ID, Camp Far West ID	South Sutter Water District (1952 and 1981 rights)
American River	City of Folsom, San Juan WD, Georgetown Divide PUD, El Dorado ID, Nevada ID, Placer County Water Agency, City of Sacramento	US Bureau of Reclamation (Folsom Lake), Foresthill PUD

Sources: California Department of Water Resources; State Water Resources Control Board; California Water Impact Network.

By adopting its public trust Delta inflow determinations as flow objectives in the Bay-Delta Plan for each major tributary, and applying water rights priorities—in that order—the State Water Resources Control Board can use its authority to eliminate paper water (water claims that do not have a basis in water rights law) in the Bay-Delta Estuary's Central Valley watershed. The California Constitution reminds us that no one in California has a right to use or divert water wastefully or unreasonably. The state's public trust responsibility requires protection of the waters of the state for the benefit of all beneficial users, not just water rights holders. The state's water quality control planning obligations carry out this responsibility. It also helps the state meet its public trust

No comments

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obligations as well. The doctrine of prior appropriation requires that senior water right holders be served before junior water right holders. The water quality control planning process and the water rights priority system on the major tributaries of the Sacramento and San Joaquin River Basins should be used as tools for eliminating paper water—that is, for quieting water titles, and ending trespasses and boundary disputes that compromise public trust resources—from the Bay-Delta Estuary's Central Valley watershed.

Paths for Aligning Water Rights with All Other Beneficial Uses and River Flows

We see three primary paths by which the State Water Resources Control Board can align water rights with all other beneficial uses and river flows:

- Water quality control plan implementation,
- Fully-appropriated streams declaration and Term 91, and
- Court adjudication.

Water Quality Control Plan Implementation. The State Water Resources Control Board has approved a Delta inflow determination for the San Joaquin River at Vernalis of 60 percent of unimpaired flow during the February through June period. For the Sacramento the Board approved a 75 percent of unimpaired flow determination for the November through June period. In doing so, the Board would implicitly place a cap on total diversions for each major tributary of 40 percent of unimpaired flow for the San Joaquin River and 25 percent of unimpaired flow for the Sacramento River Basin. These objectives would result in instream flows that are substantially greater in most years than current instream flow requirements now provide. In our water availability analysis, we also apply the Sacramento River Basin 75 percent objective rather than the Trinity Record of Decision flow objectives to the water availability analysis for the Trinity River. (US Department of the Interior 2000: 12)

Key water rights holders in these basins possess riparian and pre-1914 water rights that exist prior to the regulatory powers of the State Water Resources Control Board. On the question of implementing water quality control plans and adhering to state water rights law, the issue has arisen of the Board's jurisdiction over those water rights that the Board did not originally consent to.

Attorney Tim O'Laughlin, representing the San Joaquin River Group Authority (SJRGA), has asked the State Water Resources Control Board to "identify the legal theory or approach it will use at the implementation proceeding in order to obtain the necessary flows to meet the additional flow requirements identified" in the Board's flow studies. Without that legal theory or approach, O'Laughlin argues, the State Water Resources Control Board will be unable to complete economic or other impacts analysis in its Substitute Environmental Document on the San Joaquin River Flow and South Delta salinity objectives. He further contended in February 2011 that the Board is operating according to *some* kind of theory since it

> blatantly **suggests** that additional flows will come from the Stanislaus, Tuolumne, and Merced Rivers. [State Water Resources Control Board 2011c, pp. 78, 81, and 85-89] This foreshadowing demonstrates that the SWRCB not only believes that, regardless of the Vernalis flow alternative eventually adopted, it will be able to obtain flow from all the tributaries, but that it intends to do so. That approach, however, completely ignores the existence of the water right priority system. (See, e.g., *Pleasant Valley Canal Company v. Borror* (1998) 61 Cal.App.4th 742, 770; *City of*

No comments

- n/a -

> *Barstow v. Mojave Water Agency* (2000) 23 Cal. 4th 1224, 1243; see also *El Dorado Irrigation District v. State Water Resources Control Board* (2006) 142 Cal. App.4th 937, 961). As the SJRGA has pointed out to the SWRCB on numerous occasions, any approach to allocating responsibility for new Vernalis flow requirements must incorporate the water rights priority system. That said, the SJRGA recognizes that strict application of the water right priority system does not produce straightforward results such that the water required to meet the selected Vernalis flow alternative would come from a particular waterway or tributary, or that such water would roughly be divided equally or proportionally among such waterways and tributaries. (O'Laughlin 2011a: 1-2; emphasis in original)

O'Laughlin, on behalf of SJRGA, asserts that the Board has no jurisdiction to regulate pre-1914 appropriative water rights or riparian rights, regardless of any legal theory the Board intends to use in the implementation phase. If responsibility for new Vernalis flow requirements is determined solely based on the water rights priority system, writes O'Laughlin, "junior water right holders will be required to reduce or completely cease their water use before senior appropriators will be required to reduce theirs" as required in California's doctrine of prior appropriation. (O'Laughlin 2011a)

He wrote to the Board subsequently in June 2011 about its jurisdiction in the Bay-Delta proceedings. There he stated, "It now appears that the [Substitute Environmental Document] is being prepared solely on the basis of percentage of natural flow, without regard to the nature or priority of the water rights affected, and will therefore be the subject of immediate litigation." (He is here apparently referring to the Board's proposed use of a percentage of unimpaired flow as the basis for limiting diversions.) O'Laughlin also reiterated in this letter to the Board that it

> does not have jurisdiction over pre-1914 appropriative water rights for any reason, including the implementation of water quality objectives adopted pursuant to the State Water Resources Control Board's authority under Porter-Cologne. Given the prevalence of pre-1914 appropriative rights held in the San Joaquin River Basin, and the scope of the percentage of natural flow that the [Board] is considering, it is almost certain that there will be times and conditions where the [Board] will not be able to implement a percentage of natural flow. It is arbitrary and capricious for the [Board] to continue to consider a percentage of natural flow as one of its objectives without knowing how often, if ever, it will be able to require such percentages be met. (O'Laughlin 2011b)

O'Laughlin argues that the Board's flow objective results may not be achievable if, for example, flow is 100 cfs and the Board applies a 60 percent instream flow criterion to this waterway while pre-1914 water right holders may claim 80 percent of the flow in the stream. In that case, the Board, contends O'Laughlin, "would not be able to obtain the full 60 percent flow it desired." O'Laughlin contends that this not only renders the Delta flow criterion infeasible, it means that evaluation of criterion alternatives under the California Environmental Quality Act in the Substitute Environmental Document will also be infeasible and the SED thus inadequate.

Of course, contrary to the Racanelli decision, O'Laughlin elevates the water rights priority system to paramount status in California water and environmental law. It is plain from a review of state water case law that water rights priorities, while important, are not paramount considerations when the Board takes up the protection of beneficial uses of water. As Justice Racanelli stated, water quality control planning must concern itself with the regulation of *beneficial uses*, not water rights strictly speaking. Beneficial uses include, and go well beyond, water rights and their relative priorities. (See sidebar, page 26.) The Racanelli decision made clear that the State Water Resources Control Board has authority to implement its water quality control plan by regulating all beneficial uses. Adjusting quantities in water rights is within its authority.

No comments

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Moreover, the Board retains authority to regulate pre-1914 water rights under its constitutional authority to prohibit waste and unreasonable use of water. The Legislature provided in the California Water Code key sections that do not limit the Board's authority to investigate rivers and streams in the service of the state's constitutional provisions (emphases added).

Beneficial Uses Served in the Bay-Delta Water Quality Control Plan:

- **Municipal and Domestic Supply**
- **Industrial Service Supply**
- **Industrial Process Supply**
- **Agricultural Supply**
- **Ground Water Recharge**
- **Navigation**
- **Water Contact Recreation**
- **Non-Contact Water Recreation**
- **Shellfish Harvesting**
- **Commercial and Sport Fishing**
- **Warm Freshwater Habitat**
- **Cold Freshwater Habitat**
- **Migration of Aquatic Organisms**
- **Spawning, Reproduction, and/or Early Development**
- **Estuarine Habitat**
- **Wildlife Habitat**
- **Rare, Threatened, or Endangered Species**

Source: State Water Resources Control Board 2006: 8-9.

275. *The department and board shall take all appropriate proceedings or actions* before executive, legislative, or judicial agencies *to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water in this state.*

...

1050. This division is hereby declared to be in furtherance of the policy contained in Section 2 of Article X of the California Constitution and in all respects for the welfare and benefit of the people of the state, for the improvement of their prosperity and their living conditions, and *the board and the department shall be regarded as performing a governmental function in carrying out the provisions of this division.*

1051. The board for the purpose of this division may:
(a) *Investigate all streams, stream systems, portions of stream systems, lakes, or other bodies of water.*
(b) Take testimony in regard to the rights to water or the use of water thereon or therein.
(c) *Ascertain whether or not water heretofore filed upon or attempted to be appropriated is appropriated under the laws of this State.*

...

1052. (a) The *diversion or use of water subject to this division other than as authorized in this division is a trespass.*
(b) Civil liability may be administratively imposed by the board pursuant to Section 1055 for a trespass as defined in this section in an amount not to exceed five hundred dollars ($500) for each day in which the trespass occurs.
(c) The Attorney General, upon request of the board, shall institute in the superior court in and for any county wherein the diversion or use is threatened, is occurring, or has occurred appropriate action for the issuance of injunctive relief as may be warranted by way of temporary restraining order, preliminary injunction, or permanent injunction.
(d) Any person or entity committing a trespass as defined in this section may be liable for a sum not to exceed five hundred dollars ($500) for each day in which the trespass occurs. The Attorney General, upon request of the board, shall petition the superior court to impose, assess, and recover any sums pursuant to this subdivision. In determining the appropriate amount, the court shall take into consideration all relevant circumstances, including, but not limited to, the

No comments

- n/a -

extent of harm caused by the violation, the nature and persistence of the violation, the length of time over which the violation occurs, and the corrective action, if any, taken by the violator.

(e) All funds recovered pursuant to this section shall be deposited in the Water Rights Fund established pursuant to Section 1550.

(f) The remedies prescribed in this section are cumulative and not alternative.

...

1825. It is the intent of the Legislature that *the state should take vigorous action* to enforce the terms and conditions of permits licenses, certifications, and registrations to appropriate water, to enforce state board orders and decisions, and *to prevent the unlawful diversion of water.*

...

2501. The board may determine, in the proceedings provided for in this chapter, all rights to water of a stream system whether based upon appropriation, riparian right, or other basis of right.

Nothing in these sections of the Water Code prevents the Board from investigating pre-1914 water rights and eliminating illegal diversions should they be found. Water Code Section 275, appears to extend this authority of the Board to determining whether any water use is wasteful or unreasonable, or any method of use, or method of diversion is wasteful or unreasonable.

These sections provided authority for the Board to investigate pre-1914 and riparian water rights in the Delta recently. In these investigations, the Board has issued water rights orders that in at least one instance adjusted the rights of a riparian water right holder. (Wilson 2012) Mr. O'Laughlin is surely aware of this authority. On behalf of the San Joaquin River Group Authority, his comments on the Board's 2008-2012 strategic work plan helped initiate the Delta water rights investigations in 2008. He cited California Water Code Section 1825 to support the San Joaquin River Group Authority's recommendation that the Board investigate Delta riparian and pre-1914 water rights. (San Joaquin River Group Authority 2008: 64)

When the Board moves to adjust diversion amounts in the Delta's major tributaries. The Board should apply a diversion cap during the regulated period applicable to each tributary (including the Upper San Joaquin River; see Appendix B) and then allocate diversions according to water rights priority. C-WIN analyzes operation of the water rights priority system in the following river profiles.

Our testimony analyzes water availability using water rights priorities as a way of identifying the legal method for allocating responsibility for Delta inflows that are fully protective of public trust resources in the Delta.

The Board announced in two notices (dated February 13, 2009, and April 1, 2011, the latter containing revisions to the earlier Notice) its intent to revise the Bay Delta Water Quality Control Plan of 2006. This plan traces its lineage to the 1995 Bay Delta Water Quality Control Plan and the Bay-Delta Accord. The San Joaquin River flow and South Delta salinity objective process is likely to be a step in the right direction away from these failed plans. The well-documented failures of this misguided loyalty include:

- Anadromous fishery declines throughout the Central Valley watershed of the Delta estuary.
- Declines of pelagic (open water) aquatic ecosystem regimes throughout the Delta
- Continued listing of endangered species, including salmon, steelhead, Delta smelt, longfin smelt, Sacramento splittail, and green sturgeon.
- Chronic violations from 2005 through 2009 of south Delta salinity objectives in both the Bay-Delta Water Quality Control Plan and Water Rights Decision 1641 that are intended to protect agricultural beneficial uses in this part of the Delta.

No comments

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- Historic record Delta pumped exports between 2000 and 2006, peaking at nearly 6.4 million acre-feet. (More recently, 2011 exports reached 6.7 million acre-feet.)

From the two NOPs, it appears the Board prepares to incorporate flow objectives for major tributaries of the San Joaquin River: the Stanislaus, the Tuolumne, and the Merced rivers. It appears to us the Board intends to require fair share flow contributions from each of these important rivers to flows of the mainstem San Joaquin as inflow to the Delta as measured at Vernalis. Our organizations welcome this prospect in concept, and support the Board's efforts toward this goal, despite legal, ecological, and engineering challenges ahead.

The 1986 Delta Water Cases decision (also named as the "Racanelli decision" for its author, presiding Justice John Racanelli of the Third District Court of Appeals in California) bears review because it defines the Board's water quality planning duties for the Delta and its watershed. (California Appeals Court, Third District 1986) When it comes to the Board's role in undertaking its duty to fulfill its water quality planning function, the Racanelli court stated:

> In its *water quality* role of setting the level of water quality protection, the Board's task is not to protect water rights, but to protect 'beneficial uses.' The Board is obligated to adopt a water quality control plan consistent with the overall statewide interest in water quality [citation to California Water Code §13240] which will ensure 'the reasonable protection of *beneficial uses*' (§13241, emphasis added). Its legislated mission is to protect the 'quality of all the waters of the state...for use and enjoyment by the people of the state." (§ 13000, 1st para., emphasis added.) (California Appeals Court, Third District 1986: 178)

Thus, protection of beneficial uses must be the Board's paramount goal in this process. Beneficial uses make up "all competing demands for water" which must receive Board attention during public trust balancing and analysis. Water rights are among the Board's implementation tools for achieving the protection of beneficial uses in California's Central Valley watershed and Delta estuary, not strictly ends in themselves in this context.

Justice Racanelli wrote that the State Water Resources Control Board has a dual role of regulating both water quality and adjudicating water rights. The Racanelli court stated:

> In performing its dual role, including development of water quality objectives, the Board is directed to consider not only the availability of unappropriated water...but also *all* competing demands for water in determining what is a reasonable level of water quality protection. (California Appeals Court, Third District 1986: 179-180)

The Delta Water Cases came about because the Board construed its scope for water quality planning too narrowly, focusing on the major stakeholders in the Delta: the Bureau, the Department of Water Resources, and their respective contractors. The Board erred in doing so, the Racanelli court stated.

> ...the Board must consider 'past, present, and probable future beneficial uses of water'...as well as 'water quality conditions that could reasonably be achieved through the coordinated control of *all* factors which affect water quality in the area'. Unfortunately, the Board neglected to do so. (California Appeals Court, Third District 1986: 180)

That was 26 years ago. As we will indicate below, C-WIN is deeply concerned that the Board may still neglect significant, realistic alternatives that will be essential to fulfilling its water quality planning role for solving problems in the Bay-Delta estuary and the larger Central Valley watershed.

No comments

- n/a -

Fortunately, the Board can avoid such neglect. Justice Racanelli wrote that the Board "need only take *the larger view of the water resources* in arriving at a reasonable estimate of all water uses, an activity well within its water rights function to determine the availability of unappropriated water." And he added, "We think a similar *global perspective* is essential to fulfill the Board's water quality planning obligations." (California Appeals Court, Third District 1986, emphasis added) Justice Racanelli stated later that the Board compromised its role in previous water quality control plans when it defined its scope for action too narrowly "in terms of enforceable water rights. In fact," the judge wrote, "the Board's water quality obligations are not so limited."

> ...in order to fulfill adequately its water quality planning obligations, we believe the Board cannot ignore other actions which could be taken to achieve Delta water quality, such as remedial actions to curtail excess diversions and pollution by other water users. (California Appeals Court, Third District 1986: 182)

The Board's "paramount duty" remains to "provide 'reasonable protection' to beneficial uses, considering all the demands made upon the water." Finally, Justice Racanelli concludes about the Board's water quality planning powers:

> Thus, we do not believe that difficulty in enforcement justifies a bypass of the legislative imperative to establish water quality objectives which in the judgment of the Board will ensure reasonable protection of beneficial uses. (California Appeals Court, Third District 1986: 182)

C-WIN believes that a credible water quality control plan for the Bay Delta estuary must take what Racanelli deemed the "global perspective" in order to redress the ecological collapse and cumulative salinization and pollution resulting from the Board's water quality planning efforts to date. The 1994 Bay-Delta Accord's water quality control planning pendulum swung too far in favor of water right holders and water contractors, and their respective beneficial uses. The Board's duty now is to credibly balance all of the beneficial uses of water in the estuary so that public trust resources are protected, and so that reasonable uses and methods of diversion of water are employed by all water users.

In addition to the water quality planning obligations that Justice Racanelli eloquently addressed, recent state legislation provides additional authority to the State Water Resources Control Board. Using this added authority, the Board can better protect water quality and beneficial uses in the Bay-Delta Estuary and the Central Valley watershed. We point to two new laws enacted in 2009.

The State Water Resources Control Board has already fulfilled its obligation under California Water Code Section 85086(c) and (e) to prepare a public trust assessment of the Bay-Delta flow criteria needed to protect fish and wildlife beneficial uses. While not a "balancing" analysis required under public trust doctrine, the Board's *Delta Flow Criteria Report* provides valuable scientific analysis and findings that must be used to help the Board fulfill its water quality planning responsibilities and achieve protective public trust resource outcomes in the Bay-Delta estuary. The report employed the best available science in arriving at its findings. (State Water Resources Control Board 2010b)

The same legislative package also changed the California Water Code to recognize the need to reduce reliance on the Delta as a source of water for California:

> 85021. The policy of the State of California is to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment

No comments

- n/a -

in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.[5]

These new laws provide the Board with additional legal and political tools aiding the protection of all beneficial uses, particularly fish and wildlife beneficial uses whose protection has been neglected for decades.

The Water Code's Fully Appropriated Stream Provisions and Term 91. The Board will need to revise its 1998 water rights order concerning fully appropriated streams, and revisit its application of Term 91 curtailment of post-1978 water rights permittees. Our water availability analysis helps show where key seasonal and priority thresholds may occur under the Board's new Delta inflow objectives.

California's Water Code implicitly acknowledges the potential for over-appropriation to occur and provides a process by which the State Water Resources Control Board may take steps to avoid or prevent excessive water promises. The Board can declare streams to be fully-appropriated on a month by month basis in every watershed of California under Sections 1205 through 1207. Its statutory language is reproduced in Appendix F to this testimony.

Section 1205(b) provides that a declaration that a stream system is fully appropriated shall contain a finding that the supply of water in the stream system is fully applied to beneficial uses where the Board finds that previous water rights decisions have determined that no water remains available for appropriation. According to Section 1206(a) once a stream system is declared fully appropriated by the Board, the Board shall not accept for filing any application for a permit to appropriate water from the stream system described in the declaration, and may cancel an application pending on that date. Section 1206(b) states that the the Board may provide for exceptions to application filings under specified conditions, which may limit the purpose of use, the instantaneous rate of diversion, the season of diversion or the amount of water diverted annually.

Past State Water Resources Control Boards have declared fully-appropriated streams in California. (State Water Resources Control Board 1989; 1991; and 1998) The Board's most recent 1998 declaration included major reaches of all tributaries to the Sacramento and San Joaquin River Basins as fully appropriated, including the Trinity River. (State Water Resources Control Board 1998: Exhibit A)

The Board has also designated as fully appropriated some rivers and streams that are adjudicated or have reaches designated for protection under state and federal wild and scenic river legislation. Major portions of the Trinity, Middle Fork of the Feather, the Tuolumne, and the Merced are designated as wild and scenic rivers. Wild and scenic rivers are off-limits to appropriations year-round. Other rivers and streams are fully-appropriated primarily during irrigation season. Appendix G summarizes selected critical reaches of the Bay-Delta Estuary's Central Valley Watershed that are designated as fully-appropriated by the State Water Resources Control Board.

The Board's Full Appropriation Declaration blurs the distinction between water rights claims and water usage by claimants. Commendably, the Board has identified reaches of streams that are off-limits to new permanent applications to appropriate water. C-WIN identified several streams where it appears that the Board has excluded riparian and pre-1914 water rights in formulating its declaration. This appears to be the case on the Sacramento mainstem, the Tuolumne, the Merced, and the Yuba. On these rivers, substantial periods of the year are still officially open under the

[5] California Water Code §85021, passed November 2009.

No comments

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Board's declaration to applications to appropriate. Substantial amounts of pre-1914 water rights do not appear to be considered in the Board's determination that a stream is fully appropriated.

Section 1205(b) does require that the Board's declaration "shall contain a finding that the supply of water in the stream system is being fully applied to *beneficial uses* where the board finds that previous water rights decisions have determined that no water remains available for appropriation." (For a list of all Bay-Delta beneficial uses, see sidebar, page 26, above.) Note that the full-appropriation declaration legislation states that the supply of water is "being fully applied to beneficial uses" and not merely to the claims of water right holders.

There is no explicit analysis in the 1998 declaration by the State Water Resources Control Board of full application of water to beneficial uses as a direct consequence of citing its water rights decisions. This means that the full appropriation declarations are likely incomplete, albeit from a different standpoint. The Board may have construed Water Code Section 1205(b) as requiring the Board to rely on its archive of water rights decision, appropriately enough. But Water Code Section 1205(b) does not expressly limit the Board to use only water rights decisions, adjudications, and other determinative documents to justify these findings as evidenced by the Board's additional reliance on wild and scenic river designations. Its approved 2010 flow objectives for the Sacramento and San Joaquin River basin (while legislated to be informational and predecisional in Water Code Section 85086(c)(1)), could also be used to support findings of full appropriation for the Sacramento River, the San Joaquin River, and their other major tributaries. Instream flows serve natural beneficial uses as surely as water rights claims serve economic uses. Accounting for these instream flows as part of full appropriation declarations would increase the periods of full appropriation to include November through June throughout the Sacramento Basin, and February through June in the San Joaquin Basin, given the magnitude of water rights claims we have identified.

Moreover, Board decisions like Water Rights Decision 1594 (D-1594) acknowledge the Board's duty to account for all beneficial uses, such as those protected by the Board's Delta water quality and flow objectives.

C-WIN's planning-level water availability analysis allocates unimpaired flow hydrology, among instream flow objectives first, followed by water rights in order of priority status for the Sacramento and San Joaquin River basins. This planning-level method of water availability analysis demonstrates that the waters of the Sacramento and San Joaquin River Basin, from a planning standpoint, should indeed be declared fully appropriated. The full spectrum of beneficial uses is fully accounted for in allocating the Basins' flows to full protection of instream beneficial uses as well as those of all water rights claimants in California's water rights priority system. Moreover, this water availability analysis uses instream flow determinations that the Board itself endorsed in 2010 as Delta protective of public trust resources. It also indicates which major claimants have either poorly reliable or no water rights once all beneficial uses are accounted for.

A problem with the State Water Resources Control Board's fully-appropriated declaration involves its reliance on Water Right Decision 1594 (D-1594) from 1984. D-1594 authorizes the Board to place into permits (whose priority dates come after August 16, 1978) a new permit condition (called Term 91) notifying all permittees of its intent to curtail diversions of water right permittees. Curtailment occurs when flow and water quality conditions in the Delta demand that reservoir releases are needed to enable the California Department of Water Resources and the US Bureau of Reclamation to meet Delta water quality standards established by the Board. August 16, 1978, is significant as the date on which the Board adopted Water Right Decision 1485. This decision made the Bureau and the Department responsible for meeting water quality objectives in the Delta.

No comments

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Water Availability Analysis
Workshop 3 Testimony, Bay Delta Plan
Submitted by California Water Impact Network,
California Sportfishing Protection Alliance, and AquAlliance

D-1594 expressly addresses water availability for appropriation (diversion) in the Bay-Delta Estuary's Central Valley watershed by subordinating junior appropriative water rights to adherence to Delta water quality objectives. D-1594 is cited by the State Water Board as the water right decision authority for including the Sacramento-San Joaquin Delta in the 1998 fully-appropriated streams water right order. This decision reaffirms the Board's reserved jurisdiction to revisit the season of diversion of water right permittees in the Bay-Delta Estuary watershed, and it establishes with standard permit Term 91 its authority to curtail diversions by post-1978 diverters so that storage releases by the Bureau and the Department can meet Delta water quality objectives.

In this decision, the Board states:

> The availability of water for appropriative water right permittees is affected by the quantity needed to satisfy holders of prior rights and the quantity necessary for protection of other beneficial uses. (State Water Resources Control Board 1983: 2)

In the process leading up to D-1594, the Board initiated a process to conduct a planning-level water availability analysis. Unfortunately, it abandoned that analysis:

> Staff had originally proposed a comprehensive analysis of water supply and demand which attempted to identify and quantify water usage by all diverters below the foothill reservoirs within the Delta watershed. [SWRCB Exhibit. 1, pp. 19-20] This approach was discontinued [apparently in April 1983, according to reporter's transcript dated April 11, 1983, p. 14, lines 16-20] due to the lack of adequate data for factors such as return flow, groundwater accretions, unmeasured tributary inflow, riparian use, appropriative use, and Delta consumptive use. (State Water Resources Control Board 1983: 9-10)

D-1594 states at least twice that application of Term 91 to post-1978 permittees is an "interim solution" or an "interim measure." Nearly 30 years later, the Board still employs Term 91's method of calculating water availability. D-1594 commits the Board to occasionally requiring the post-1978 permittees in the Delta's extensive watershed to curtail deliveries when flows are insufficient to meet Delta water quality objectives and protect the Delta's beneficial uses.

Our planning-level water availability analysis focuses on water rights claims compared to historical hydrology. As we earlier showed, it finds there are far more water right diversion claims than there are flows in the Bay-Delta Estuary's Central Valley watershed (including the Trinity River claims of the Bureau). Our water availability analysis incorporates Board-approved instream flow determination the Board approved as fully protective of public trust resources in the Bay-Delta Estuary and its watershed. Its results suggest that *making Delta water quality and flow objectives fully protective of public trust resources will require moving the priority date of Term 80 permittees far earlier than 1978 for determining when and for whom Term 91 diversion curtailments would occur*. This is necessary because the State Water Resources Control Board (2010) found that current Delta flow objectives on the mainstem and tributaries of the two basins, including the Vernalis Adaptive Management Plan on the San Joaquin River, are insufficiently protective of the Delta's fish and wildlife beneficial uses. (State Water Resources Control Board 2010: 9-10) Conversely, this means that Term 91 *currently* applies Delta water quality objectives that are well known to be ineffective at protecting public trust resources in the Delta.

C-WIN believes it will be necessary for the State Water Resources Control Board to revisit Term 91 and D-1594's method of estimating water availability in the Bay-Delta Estuary's Central Valley watershed when implementing new Delta inflow (instream flow) objectives for the Sacramento and San Joaquin River Basins and their major tributaries upstream of the Delta. For the same reason, the Board's 1998 water rights order must also be revisited to update and expand the seasons where

No comments

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appropriations would be prohibited as a matter of protecting all beneficial uses in compliance with Water Code Section 1205 through 1207. The Board should include these actions in the Bay-Delta Plan's implementation program.

In sum: the Board has acknowledged that existing Delta water quality and flow objectives for the Bay-Delta Estuary are inadequate. (State Water Resources Control Board 2000: 5) However, the Board *assumes* these water quality and flow objectives when it enforces Term 91 on post-1978 water rights permittees. Improving these objectives will mean the Board must curtail diversions by water right permittees (also probably licensees) with priority dates *earlier* than August 16, 1978, in order for Board-required Delta water quality and flow objectives to perform their functions protecting Delta watershed public trust resources. As part of its Phase III process to implement the Bay-Delta Plan, the Board must take testimony on how to determine this earlier priority date.

In all types of hydrology and using the Sacramento River Basin flow determination of 75 percent of unimpaired flow from November through June, C-WIN's water availability analysis suggests that for the Sacramento River Basin above the Feather River confluence, and the Feather River basin itself, the earliest date for curtailment should be December 19, 1914. On the Yuba and the Bear Rivers, the date of curtailment could be somewhat later, ranging from 1924 on the Yuba to 1941 on the Bear. On the American River, the earliest date should coincide with the priority date of Placer County Water Agency's 1958 water rights.

In all types of hydrology and applying the San Joaquin River Basin flow determination of 60 percent of unimpaired flow from February through June, C-WIN's water availability analysis suggests that for the Stanislaus and Merced Rivers, the Term 91 curtailment date should be December 19, 1914. On the Tuolumne River, the Term 91 curtailment date should be 1871. On the upper San Joaquin River, our analysis suggests that Term 91 curtailment dates should be on or before the dates of the Bureau of Reclamation's permits for Friant Dam and Millerton Lake in 1916. (See Appendix D.1 for Water Availability Analysis model results.)

The Board has acknowledged that current Delta water quality and flow objectives do not protect Delta fish and wildlife beneficial uses adequately. The Board must decrease the seasons of diversion for the Delta and its major tributaries of the Sacramento and San Joaquin River Basin watersheds, because the Board is obligated under the Public Trust Doctrine to protect all beneficial uses in the Delta. To implement this obligation, the Board must also revisit its Fully-Appropriated Streams Declaration and push back the priority date used to conduct diversion curtailments under Term 91.

Court Adjudication. Still another path that may be used is that of adjudication by a court of competing water rights claims in a watershed. It may take years of painstaking testimony and argumentation by attorneys and (usually) engineers. But the present situation of extreme uncertainty and unreliability, clouded water titles, trespassing on the public trust, and related boundary disputes of many surface and groundwater water rights throughout the Bay-Delta Estuary's Central Valley watershed argues for its consideration.

In the 1930s and 1940s, staff within the Department of the Interior and the old State Water Rights Board advocated an adjudication of water rights prior to construction of the Central Valley Project. Both Governor Earl Warren and State Water Rights Board Chairman Henry Holsinger testified during the Clair Engle's Congressional hearings in 1951 that a complete adjudication of water rights on the Sacramento River should have occurred prior to the completion of the Central Valley Project. In fact, the Engle committee concluded that, "[t]hat for all practical purposes, the developed water supplies of the Sacramento River are overcommitted and oversubscribed." This was prior to approval and construction of the State Water Project. That project was predicated on obtaining some 5,000,000 acre- feet of water annually from north coastal streams (Figure 11). With the

No comments

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exception of about 1 million acre-feet of Trinity River flows to the Central Valley Project service area, this "surplus" of surface water to the Delta system never arrived. Adjustments to the State Water Project should have been made earlier, but were not. The logical result is that the Delta's native aquatic ecosystems have collapsed.

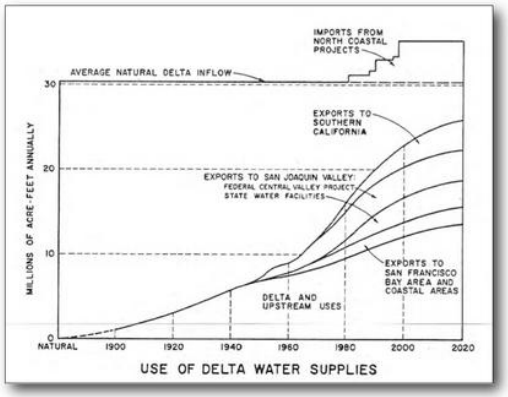

Figure 11
Source: California Department of Water Resources, 1960: 13.

A reliable source of surplus water for the State Water Project and the Central Valley Project eludes the Department and the Bureau, so far. Because surface water imports from north coast watersheds were precluded by wild and scenic river designations the Department and the Bureau have instead tried to establish a "water market" to transfer water from northern California across the Delta as an interim strategy for increasing water supplies in dry years for low-priority water service contractors south of the Delta. C-WIN, CSPA and AquAlliance see this as a grave threat to the regional aquifers of the Sacramento Valley from the Delta to Redding.

This threat is manifest in "groundwater substitution transfers." In such water transfers, surface water rights are transferred by "willing sellers" to the Department or the Bureau. The agencies facilitate the transportation of the water in the deal to the buyer south of the Delta using their export pumps near Tracy. To continue producing their crop however, the seller replaces or substitutes the surface water supply with water pumped from underground. The seller is thus able to achieve a net profit from the gross revenues from selling surface water rights, less the cost of pumping water from below ground, and still can sell a crop after harvest.

Such transactions however assume that groundwater may be treated simply as an individual's property under their land. Such a legal theory runs straight into the reality of groundwater in the Central Valley watershed being a regional commons, a shared resource, particularly among all individual landowners of the Sacramento Valley who overlie its extensive aquifers. One landowner or a set of landowners in one general location may cause a region-wide cone of depression by pumping a lot of groundwater to replace surface water they sold to someone south of the Delta. Such intensive pumping can damage the wells of neighbors near to and far from the scene of the original pumping. Many of the Valley's rivers are well known as "gaining" streams—that is, surface flows are actually enhanced upslope by accretions from groundwater sources. Too much groundwater pumping lower down in the aquifers for the "surplus" benefitting only the State Water Project and the Central Valley Project could drastically lower water tables upslope and reduce river flow permanently if allowed to become "the new normal." Potentially permanent injuries to many beneficial users of water in the Sacramento Valley would result.

No comments

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A glimpse of this prospect occurred in 1994 when the Department sponsored a drought water bank program. The program resulted in damage to a municipal well and to individual wells in Durham and Cherokee areas of Butte County. More recently, the Department and the Bureau have since 2002 repeatedly sought "willing sellers" to offer surface water among the numerous public and private Sacramento Valley water right holders in Sacramento, Yolo, Sutter, Butte, Glenn, and Colusa counties. The State Water Resources Control Board in 1996 engaged in proceedings to determine the responsibility of Sacramento River Basin diverters to meet water quality standards in the Bay-Delta Estuary. The Board had completed phases 1 through 7 of the proceeding that led in 2000 to adoption of Water Rights Decision 1641 (D-1641). Phase 8 of that proceeding was to focus on the Sacramento River and its tributaries. In Phase 8, the Department of Water Resources and the Bureau of Reclamation, as operators of the state and federal export projects, claimed that certain water right holders in the Sacramento Valley must cease diversions or release water from storage to help meet water quality standards in the Delta. Sacramento Valley water users claimed that their water use has not contributed to any water quality problems in the delta, and, as senior water right holders and water users within the watershed and counties of origin, they are not responsible for meeting these standards. To avoid both litigation and independent regulatory action by the State Water Resources Control Board, water diverters throughout the Sacramento River Basin executed an agreement in April 2001. (Northern California Water Association, 2001) As a result of the Sacramento Valley Water Management Agreement, the Phase 8 process was dismissed by the State Water Resources Control Board. (State Water Resources Control Board 2001)

The Department and the Bureau have encouraged planning approaches to regional water management to facilitate water transfers, such as those in this partial list:

- The Department of Water Resources undertook a draft and final Program Environmental Impact Report in 1993 on a drought water bank, but to our knowledge has never certified this document.
- The Sacramento Valley Water Management Agreement, signed in 2002, but which ten years on still lacks a programmatic environmental review document. It expired December 31, 2010.
- The 2000 Governor's Advisory Drought Planning Panel Report, Critical Water Shortage Contingency Plan, which also promised a program environmental document on a drought response water transfer program, but was never undertaken.
- The Sacramento Valley Integrated Regional Water Management Plan of 2006, overseen by a joint powers authority of numerous water agencies in the Valley.
- DWR's last Drought Water Bank in 2009 sought authorization for over 100,000 acre-feet of temporary transfers of water, though only 16,000 acre-feet were eventually supplied to Southern California buyers.
- The Northern Sacramento Valley Integrated Regional Water Management Plan, now in development.
- The Delta Stewardship Council's Delta Plan, whose planning scope includes the entire Sacramento Valley and assumes a groundwater surplus is necessary for meeting Delta export water demands. The Council has also expressed support for water transfers using groundwater substitution.
- The Bay Delta Conservation Plan, which would provide coverage from a 50-year habitat conservation plan for Governor Brown's recently announced Peripheral Tunnels Project. This project has no identified water source, other than acknowledgement by the Bureau of Reclamation that it would reroute existing surface flows around the Delta from the Sacramento River Basin. (Vlamis et al 2012)

C-WIN, CSPA, AquAlliance, and other knowledgeable experts are concerned that long term impacts of regional use of groundwater to substitute for transferred surface supplies will accelerate the depletion of the Valley's groundwater supplies. There are significant gaps in scientists' grasp of how

No comments

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the aquifer system recharges; how surface flows and groundwater systems interact in the Valley's creeks and rivers; how supplies contained within upper and lower aquifers interact; how the aquifers respond in the long-term to increasingly intense demands on them, even during wetter years. And the regional effect of declines in groundwater levels on river and creek flows and riparian corridor species and wetland ecosystems has never been adequately explored. These are beneficial uses upstream along the major tributaries of the Sacramento River Basin that must also be considered part of the public trust responsibilities of the State Water Resources Control Board in its Bay-Delta Plan. (Vlamis et al 2012)

State and federal water planners assume that surface and groundwater flows will always be there to support this hoped-for surplus. Based on that assumption they continue each winter and spring to plan the next water transfer program that relies on and encourages groundwater substitution transfers. This assumption has been built into the Department and the Bureau's chief water supply and operations planning tool, CalSIM II. When surface water supplies for riparian and appropriative water right holders are exhausted in model runs through CalSIM II, the model's automatic response is to add pumped groundwater to make up for any deficit to water demands in the model. (Draper and Bourez 2004: slide 20; Close et al 2003: 26-27; California Department of Water Resources and US Bureau of Reclamation 2004: Appendix A) Sacramento Valley groundwater activity is explicitly modeled to include "minimum groundwater pumping" for those land uses that rely exclusively on groundwater in the Valley. (California Department of Water Resources and US Bureau of Reclamation et al 2004: Appendix A) San Joaquin Valley groundwater is not modeled. (Close et al 2003) This can result in low estimates of salinity reaching the south Delta. (San Joaquin Valley CalSIM II External Review 2006: 45) Upper bounds on potential pumping from aquifers in the Sacramento Valley are undefined. According to Close et al:

> This does not represent reality, since, if CalSIM II is used for statewide planning, it would allow pumping of vast quantities of water for export to southern parts of the state, something which agency staff [i.e. California Bay-Delta Authority Science Program and the Association of Bay Area Governments] claim is unrealistic. Realistic upper bounds to pumping from any of the aquifers represented in the model need to be developed and implemented. (Close et al 2003: 26-27)

The Department and the Bureau responded that CalSIM II does explicitly model the "impact on groundwater storage of each sub-basin." They state that CalSIM II runs that result in groundwater pumping over and above the natural and artificial recharge and which causes depletion of the basin will cause CalSIM II to no longer run. They also state, however, that CalSIM II "does not include local ground water inventories" but instead relies on a historically-modeled calibration of approximated inventories. They state further that "no groundwater is exported from the overlying watershed (except in the form of surface water return flow or tailwater that results from irrigation using groundwater)." (California Department of Water Resources and US Bureau of Reclamation 2004: A-1) Thus, CalSIM II assumes that groundwater "backstops"surface water rights holders and their needs for supplies, when in reality groundwater now backstops river flows (and all associated beneficial uses associated with those flows). It is small comfort that CalSIM II ceases to work when a basin is depleted from the program's operations; more to the point, it fails to assume, let alone build in a rational groundwater management strategy of sustained yield.

CalSIM II's reliance on groundwater to meet overall water demand when surface supplies must not be the de facto water supply development strategy for the state of California when supplies run low. When supplies run low—as they are forecasted to as climate change affects the American West—the state and its responsible and lead agencies must increase other means of stretching water supplies. This can be done through water recycling, reuse, conservation, and a range of urban, industrial, and agricultural efficiency measures.

No comments

- n/a -

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No comments

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No comments

- n/a -

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No comments

- n/a -

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No comments

- n/a -

Appendix A
River Flow Regulation to the Bay-Delta Estuary

In 1992, the Board proposed in a draft Bay-Delta water right decision regulating flows to the Delta from the San Joaquin River Basin by apportioning responsibility for Delta inflows according to the size of major reservoirs on the Basin's major tributary streams. This draft decision was withdrawn by order of then-governor Pete Wilson. While the Board considers regulating inflows from the San Joaquin River tributaries once again, many years of delay have elapsed: This section recounts and evaluates the Board's record regulating inflows to the Delta from the San Joaquin River Basin.

After backing away from its "global" approach to regulating inflow to the Delta from the San Joaquin River in 1993, the State Water Resources Control Board instead chose to continue regulating Delta conditions in part by regulating flow and water quality at Vernalis. In Water Rights Decision 1641 (D-1641), the Board assigned responsibility for meeting the Vernalis water quality standards to the California Department of Water Resources and the US Bureau of Reclamation and added interior Delta salinity objective monitoring sites to evaluate compliance by the Department and the Bureau. The Department has no regulating reservoirs of its own on San Joaquin River Basin rivers, so it fell to the Bureau to provide most of the flows to Vernalis from the Basin to meet the Board's objectives there. The bulk of the flows the Bureau has available for this purpose come from its New Melones Dam and Reservoir facility on the Stanislaus River. This strategy has been largely unsuccessful for the Bureau, the Department and the Board. Migratory fish populations and open water fish populations endemic to the Delta have crashed over the last decade since D-1641 was implemented. An experiment to provide helpful spring flows for migratory salmon, called the Vernalis Adaptive Management Plan, has achieved only limited results (Review Panel, 2010).

Table 13 summarizes the State Water Resources Control Board's present river flow objectives set for compliance at Vernalis and Rio Vista. These flow criteria were adopted as part of its Water Right Decision 1641 (D-1641) in 2000. Under D-1641, the Board currently regulates flows on the San Joaquin River at Vernalis during two main periods of the year: February 1 through June 30, and throughout the month of October. Within the February to June period, there are two regimes as well. One flow regime is in place from February 1 through April 14 and then again from May 16 through the end of June. The second flow regime occurs generally from April 15 to May 15, a 31-day period in which spring pulse flows are required to increase over the early and late spring periods. The spring pulse flow is intended to aid young salmon smolts migrating to the ocean by improving their chances of survival as they pass through the Delta. Minimum flow criteria in this spring regime vary depending on the water year type, and the water year type is generally finally forecasted by May 1. Note that these flow rates are a monthly average, which allows for great variability as long as the average is maintained throughout the 30-day running average during these flow regimes.

October minimum flows must be 1,000 cubic feet per second or greater using a 30-day running average. This is a period of time when adult fall-run Chinook salmon return from the ocean to migrate upstream and spawn in their natal streams. Again, as with the February through June regime, the use of a 30-day running average allows upstream water right holders wide latitude in providing flows that meet the Vernalis flow standard for October as long as the 30 day running average during October is not less than 1,000 cubic feet per second of flow.

Instead of implementing D-1641 San Joaquin River flow objectives to benefit fish and wildlife, the State Water Resources Control Board approved the San Joaquin River Agreement under which the major water right holders of the San Joaquin River Basin agreed to provide spring pulse flows

No comments

- n/a -

Table 13
State Water Resources Control Board
D-1641 Flow Regulations at Vernalis

Compliance Location	Water Year Type	Time Period	Minimum Monthly Average Flow Rate (cfs)
Sacramento River at Rio Vista	All	September	3,000
	W, AN, BN, D	October	4,000
	Critically Dry	October	3,000
	W, AN, BN, D	Nov-Dec	4,500
	Critically Dry	Nov-Dec	3,500
San Joaquin River at Airport Way Bridge, Vernalis	W, AN	Feb-Apr 14 and May 16-Jun	2,130 or 3,420
	BN, D		1,420 or 2,280
	C		710 or 1,140
	W	Apr 15 to May 15	7,330 or 8,620
	AN		5,730 or 7,020
	BN		4,620 or 5,480
	D		4,020 or 4,880
	C		3,110 or 3,540
	All	October	1,000

Source: State Water Resources Control Board, 2000.
Key to Water Year Types: W = Wet; AN = Above Normal; BN = Below Normal; D = Dry; C = Critically Dry.

intended to benefit outmigrating salmon smolts.[1] The Board agreed to its provisions as a voluntary approach to achieve the objectives. In exchange for providing these spring pulse flows totaling up to 110,000 acre-feet, the Agreement called upon the state and federal pumps in the south Delta to limit their export rates to certain specified levels. The Agreement further called upon the state, federal and San Joaquin River Group Authority member agencies to participate in an annual experimental study of the effects of these pulse flows on salmon smolt survival and other ecological indicators in the San Joaquin River in the Vernalis area. That study was called the Vernalis Adaptive Management Plan (VAMP).

The State Water Resources Control Board hoped that by using VAMP to implement its D-1641 flow criteria for the San Joaquin River at Vernalis, the scientific study would find salmon smolt survival is closely related to the humanly manageable actions of river flow, export limits at the pumps, and maintaining a barrier at the head of Old River to direct smolts toward Suisun Bay and the Pacific Ocean via the most direct and safest route. The Board also hoped that increased smolt survival would contribute to increased salmon escapement (that is, fish leaving the ocean in late summer and early fall to spawn in the fall).

[1] The parties to the agreement included California Departments of Water Resources and Fish and Game; United States Department of the Interior agencies Reclamation and Fish and Wildlife; and member agencies of the San Joaquin River Group Authority: South San Joaquin and Oakdale irrigation districts on the Stanislaus River; Modesto and Turlock irrigation districts on the Tuolumne; Merced Irrigation District on the Merced River; and Central California Irrigation District, Firebaugh Canal Water District, Columbia Canal Company, and San Luis Canal Company on the upper San Joaquin River. Other parties included state and federal water contractors south of the Delta export pumps, and two environmental community parties: the Natural Heritage Institute and the Bay Institute of San Francisco.

No comments

- n/a -

The VAMP seeks to test the hypothesis that increasing San Joaquin River flows, sharply limiting Delta export pumping during the spring pulse flow period, and blocking fish access to Old River (which leads to the state and federal export pumps) will increase survival rates of young salmon juveniles and smolts migrating through the Delta to the Pacific Ocean (San Joaquin River Group Authority, 2000: Section 2.5).

The 110,000 acre-feet of water from these agencies was intended for use in reaching "target flows" under VAMP at Vernalis that increased flow in the San Joaquin at Vernalis over defined

Table 14
Vernalis Adaptive Management Plan Target Flows

Existing Flow (cfs)	Single Step Target Flow (cfs)	Double-Step Target Flow (cfs)
0 to 1,999	2,000	3,200
2,000 to 3,199	3,200	4,450
3,200 to 4,449	4,450	5,700
4,450 to 5,699	5,700	7,000
5,700 to 6,999	7,000	Existing Flow
7,000 or greater	Existing flow	Existing flow

Source: San Joaquin River Agreement, 2000, Articles 5.5 and 5.6.

Table 15
VAMP Flows Summary, 2000-2010
(cubic feet per second, except where noted otherwise)

Year	VAMP Target Flow Period	Target flow Condition	VAMP Target Flow	Actual Mean Flow	Existing Flow	VAMP Supplementing Flows (AF)	Delta Export Target	Actual Delta Exports
2000	4/15-5/15	Double-step	5,700	5,869	4,800	77,680	2,250	2,155
2001	4/20-5/20	Single-step	4,450	4,224	2,909	78,650	1,500	1,420
2002	4/15-5/15	Single-step	3,200	3,301	2,757	33,430	1,500	1,430
2003	4/15-5/15	Single-step	3,200	3,235	2,290	58,065	1,500	1,446
2004	4/15-5/15	Single-step	3,200	3,155	2,088	65,591	1,500	1,331
2005	5/1-5/31	na[a]	>7,000	10,390	10,390	0	2,250	2,986[b]
2006	5/1-5/31	na[a]	>7,000	26.220 to 24,262 [c]	26,020	0	1,500 to 6,000	1,599 to 5,748[c]
2007	4/22-5/22	Single-step	3,200	3,263	2,721	33,330	1,500	1,486
2008	4/22-5/22	Single-step	3,200	3,163	1,939	75,250	1,500	1,520
2009	4/19-5/19	Off-ramp	na	2,260	2,260	0	na	1,990
2010	4/25-5/25	Single-step	4,450	5,140	4,830	23,980	1,500	1,515
			Average VAMP Supplementing Flows			**40,543**	**Acre-feet**	

Source: San Joaquin River Group Authority 2011: Table 2-8; California Water Impact Network. Notes: [a] Existing flow greater than maximum VAMP Target Flow of 7,000 cfs; [b] May 1 through 25 average was 2,260 cfs; exports were increased starting May 26 in conjunction with increasing existing flow; May 26 through 31 average was 6,012 cfs; [c] "First fish release-recapture period"/"Second fish release-recapture period"; "na" means not available or not applicable.

No comments

- n/a -

"existing flows" that would occur in the River in the absence of the VAMP flows. The VAMP flows were intended to be released during the spring pulse flow period coinciding with the State Water Resources Control Board's flow criteria period of April 15 through May 15 (or a reasonable 31-day period thereabouts based on the presence or absence of migrating salmon). The Agreement employs the State Board's water year classification scheme as an indicator for determining target flows. Wet years would have an indicator of 5, decreasing by one to Critical years having an indicator of 1. Double step target flows could be invoked under VAMP in situations where the sum of present plus current water year indicators added to 7 or greater. When that occurred, a "double step" target flow, showed in Table 14, would become the new target flow.

The Agreement also limits Central Valley Project and State Water Project export pumping during this same mid-April to mid-May period. Combined export rates for the pumps would be limited to no more than 1,500 cubic feet per second when Vernalis target flows are between 2,000 and 4,450 cubic feet per second. When the target flow reach 5,700 cubic feet per second, combined export rates are limited to no more than 2,250 cubic feet per second. And when target flows reach 7,000 cubic feet per second, the pumping plants are limited either to 1,500 or 3,000 cubic feet per second (San Joaquin River Group Authority, 2000: Article 6.4). The rationale for this "either/or" export rate at the high VAMP target flow is explained in Appendix A of the Agreement as a matter of safety and operational capacity of installing the barrier at the head of Old River and minimum pumping capacity of the export pumps, as well as the intent of the US Fish and Wildlife biological opinion that export rates in this period be less than 50 percent of the required Vernalis standard. Hence, the export pumping rate at a target flow of 7,000 cubic feet per second would be able to go as high as 3,000 cfs (San Joaquin River Group Authority, 2000, Appendix A, p. 3).

At present, VAMP is a 12-year study. Through 2010, double step target flows have been invoked once (San Joaquin River Group Authority [SJRGA], 2011: Table 2-8). Table 15 below summarizes VAMP flow activity from 2000 to 2010 (SJRGA, 2011). This table shows that over the course of the VAMP experiments through 2010, average supplemental VAMP flow contributions have averaged just 40,543 acre-feet per year, about 37 percent of the maximum annual commitment by SJRGA agencies of 110,000 acre-feet for VAMP.

Previous studies have shown that salmon smolt survival could be enhanced if increased flows were directed primarily down the mainstem of the San Joaquin River below Vernalis past Stockton (Review Panel, 2010). To facilitate fish using that route, the San Joaquin River Agreement called upon the Department of Water Resources to install a fish barrier at the head of Old River (which is a direct route for San Joaquin River water to the state and federal export pumps near Old River at the export pumps where fish can be all too easily entrained and killed).

In the event that more water than the 110,000 acre-feet was needed to meet target flows, the US Bureau of Reclamation and the California Department of Water Resources could approach the agencies making up the San Joaquin River Group Authority as willing sellers of additional water. As Table 15 reveals, neither the Bureau nor the Department needed to purchase additional water for VAMP flows, since no VAMP flows exceeded 110,000 acre-feet.

VAMP results have largely been inconclusive because there have been only a narrow range of flows subject to VAMP researchers. The State Water Resources Control Board permitted the VAMP experiment to proceed in D-1641 for over a decade. Table 16 compares spring pulse flow range criteria set by the State Board in D-1641 with mean (average) VAMP flows. For years with VAMP results (of which there were only 8 of 11 total), only four years yielded VAMP results that actually complied with D-1641 flow criteria at Vernalis (2000, 2001, 2007, and 2008). Four other VAMP flow years were *beneath* the D-1641 flow criteria, and did not comply with the Board's adopted objective. It appears that VAMP as a regulatory experiment performs adequately only half the time when it can be invoked. Of the three years with no VAMP flow results, two were wet years (2005 and 2006) where high flows on the San Joaquin overwhelmed the need to regulate or experiment. The

No comments

- n/a -

remaining year (2009) was considered an "off-ramp" year (that is, a dry year following two critically dry years). VAMP and Agreement requirements were in part short-circuited by prolonged dry weather in order to protect upstream water supply reliability. It appears from these results that VAMP and the San Joaquin River Agreement have failed to "provide the environmental benefits in the lower San Joaquin River and Delta at a level of protection equivalent to the San Joaquin River portion of the 1995 WQCP for the duration of this Agreement (SJRGA, 2000: Section 2.5.3)." In effect, protective flows for Delta public trust resources such as Chinook salmon populations have been delayed for the sake of seeking greater scientific certainty.

Table 16
Comparison of D-1641 Spring Pulse Flow Criteria and Mean Actual VAMP Flows, 2000-2010 (Years with VAMP Results Only)

Year	San Joaquin River Basin Water Year Type	Spring Pulse Flow Range Criteria, D-1641 (cubic feet per second)	Mean Actual VAMP Flows (cubic feet per second)
2000	Above Normal	5,730 or 7,020	5,869
2001	Dry	4,020 or 4,880	4,224
2002	**Dry**	**4,020 or 4,880**	**3,301**
2003	**Below Normal**	**4,620 or 5,480**	**3,235**
2004	**Dry**	**4,020 or 4,880**	**3,155**
2007	Critically Dry	3,110 or 3,540	3,263
2008	Critically Dry	3,110 or 3,540	3,163
2010	**Above Normal**	**5,730 or 7,020**	**5,140**

Source: SJRGA, 2011; State Water Resources Control Board, 2000; California Water Impact Network. **Years in bold did not comply with minimum D-1641 flow criteria.**

No comments

- n/a -

Appendix B
Omission of the Upper San Joaquin River from the Bay-Delta Plan

The Board proposes different flow objectives for the Sacramento and San Joaquin Rivers. C-WIN and CSPA applaud the State Water Resources Control Board's decision to include the major tributaries of the San Joaquin River Basin (specifically, the Stanislaus, the Tuolumne, and Merced rivers) and of the Sacramento River Basin (the Trinity [via Central Valley Project facilities], Pit, Feather, Yuba, Bear, and American) in its proposed analysis of San Joaquin River flow requirements and the scope of the Bay-Delta Plan. The Upper San Joaquin River (above its confluence with the Merced River) is excluded from the Plan by the Board. The Board has not provided adequate rationale to justify excluding the Upper San Joaquin River from the "project area" for purposes of environmental evaluation of proposed San Joaquin River flow criteria. The State Water Resources Control Board wants to use the criterion of "salmon-bearing tributaries" to justify excluding the upper San Joaquin River. The Board then states in a footnote:

> Currently, the San Joaquin River does not support salmon runs upstream of the Merced River confluence (upper San Joaquin River). However, pursuant to the San Joaquin River Restoration Program (SJRRP), spring-run Chinook salmon are planned to be reintroduced to the upper San Joaquin River no later than December 31, 2012. Flows needed to support this reintroduction are being determined and provided through the SJRRP. During the next review of the Bay-Delta Plan, the State Water Board will consider information made available through the SJRRP process, and any other pertinent sources of information, in evaluating the need for any additional flows from the upper San Joaquin River Basin to contribute to the narrative San Joaquin River flow objective. State Water Resources Control Board 2011a: Map on page 1 and narrative on page 3 of Attachment 2)

In essence, if it adheres to this reasoning during this process, the State Water Resources Control Board would allow the SJRRP to determine what those flows are to be, and would allow the SJRRP to dictate the Board's time schedule for Basin-wide flow objective-setting and implementation. This provides incentive to minimize the upper San Joaquin River's contribution to overall basin flows to benefit the Delta. It will put greater pressure on the water right holders on the tributaries of the San Joaquin to provide additional flows. In its Water Rights Orders 2010-0029 and 2009-0058-DWR, the Board authorized interim schedules for "experimental flows" sought by the parties to the San Joaquin River Restoration Program and settlement agreement. At minimum, these interim flows should be incorporated into the project description, so that it is clear that upper San Joaquin River flows will contribute to solving flow and water quality problems in the Delta. In addition, there needs to be a basic description in the Substitute Environmental Document of how future contributions from the upper San Joaquin River will contribute to improving the health of the Bay-Delta estuary. This can be expressed in the form of project alternatives, but it must not be deferred.

No comments

- n/a -

Appendix C
Definitions and Terminology

This report relies on several definitions and terminology that readers should grasp as they read. Here too is the method C-WIN employs to describe water rights in the San Joaquin River Basin.

The geographic scope of the "San Joaquin River Basin" used in this report is that portion of the basin that extends from the measurement of flows on the San Joaquin River near Vernalis all the way upstream on both sides of the river to the headwaters of the river and its tributary creeks and streams in the Coast Range and Sierra Nevada; and including the "major tributaries" of the San Joaquin: the Stanislaus River, the Tuolumne River, and the Merced River all the way to their headwaters in the Sierra Nevada. See Figure C-1.

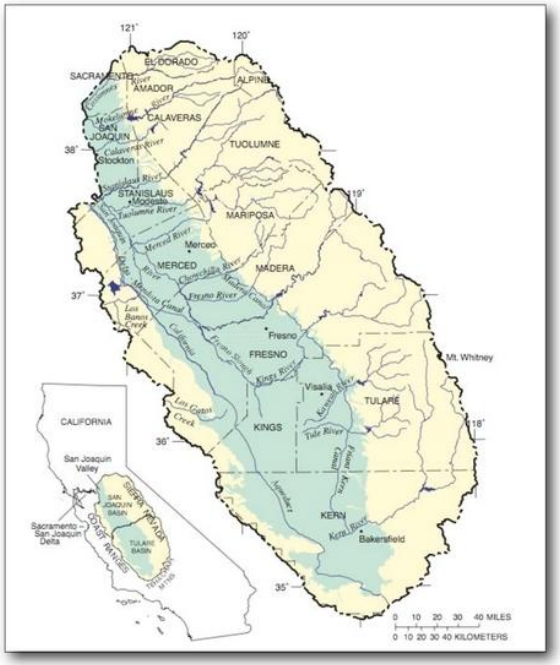

Figure C-1: Location of San Joaquin River Basin in the San Joaquin Valley, and the major rivers in the Basin. Green shading denotes the outline of the Valley floor. Source: Gronberg et al 1998.

The geographic scope of the "Sacramento River Basin" used in this report is that portion of the basin that extends from that portion of the basin that extends from the measurement of flows on the San Joaquin River at Rio Vista all the way upstream on both sides of the river to the headwaters of the river and its tributary creeks and streams in the southern Cascade range, up the McCloud River, the Pit River to their headwaters, and including east creeks (such as Deer, Butte, Battle, and others), the west creeks (such as Cottonwood, Clear, Putah, Stony, Cache and others), and the major tributary rivers including the Feather, Yuba, Bear, and American rivers all the way to their headwaters in the Coast Range (for the east and west creeks) and the Sierra Nevada. See Figure C-2.

No comments

- n/a -

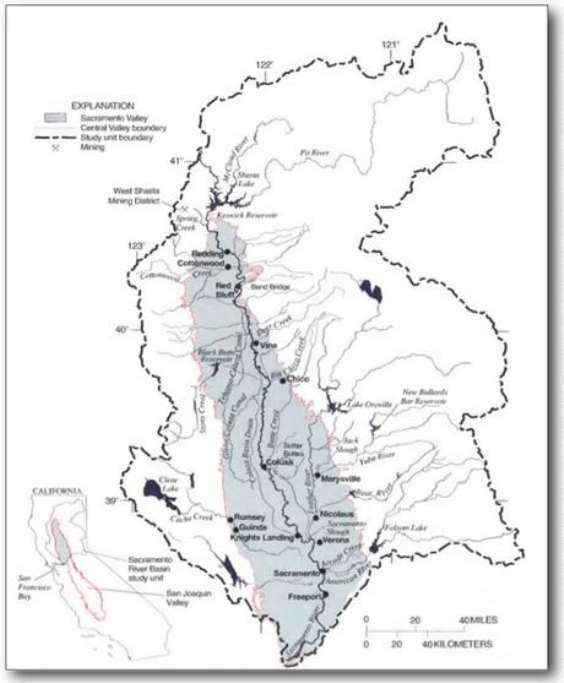

Figure C-2: Location of Sacramento Valley floor in the Sacramento River Basin. Source: Domagalski et al 1998.

Two common measures of water amounts are "acre-feet (AF)" and "cubic feet per second (cfs)." An acre-foot is 325,851 gallons of water, and is a measure of the *volume* of water, or about the amount of water that two families of four in California consume in a year. (There are 7.48052 gallons to a cubic foot, and 43,560 cubic feet in an acre-foot.) Cubic feet per second measures the *rate of flow* of a volume of water: a cubic foot of water that flows past a given point within a second of time passing. Since there are 43,560 square feet to an acre, 3600 seconds in an hour and 24 hours in a day and 365.25 days in an average year, one cubic foot per second flowing yields about 1.98 acre-feet per day in volume, or about 724.46 acre-feet in a year's time. For perspective, the San Joaquin River Basin's "unimpaired flow" has been estimated by the California Department of Water Resources to average ***about*** 6.18 million acre-feet per year. The average annual natural or unimpaired flow of the Upper San Joaquin River (above its confluence with the Merced River) is about 1.8 million acre-feet.

"Unimpaired flow" is one of several phrases (such as "full natural flow", "natural flow", and "natural runoff") used by the California Department of Water Resources to approximate "what would have occurred" on California streams "had man not altered the flow of water in the basin." (California Department of Water Resources, 2006: 5). Estimation of unimpaired flow by the Department typically assumes the current configuration of contemporary altered rivers, dams, levees, and the absence of former wetlands, floodplains and other features of rivers that may no longer exist. In some instances, it is possible that "natural flow," other things being equal might be less than "unimpaired flow" in a situation where wetlands and floodplains were reconstructed. These features of rivers tend to absorb water or at a minimum slow the rate of flow. For this report, unimpaired flows are used for the description and analysis of natural Basin hydrology, but the reader should keep in mind that, other things being equal, restoration of more natural conditions in the Basin might yield flows somewhat lower than those characterized by unimpaired conditions.

No comments

- n/a -

The State Water Resources Control Board employs a measure of water rights it calls "face amount" or "face value" that it applies to the rights it administers. Typically, descriptions of water rights have three basic components that describe the quantity of the right:

- "Direct diversion rates" (usually measured in cubic feet per second, or older rights may be stated in "miners inches")
- "Collection to storage" or "contribution to storage" which is the amount of water that may be cumulated in a reservoir.
- "Season" during which the diversions and collections are permitted to occur under the water right. For a season that is "January 1 to December 31 inclusive"

To estimate the face amount, the direct diversion rate is converted to cubic feet per day (that is, 3600 seconds in an hour multiplied by 24 hours in a day), then multiplied by the number of days contained in the diversion season to derive a maximum volume (in cubic feet) for the entire diversion season. That amount is divided by 43,560 square feet per acre, to arrive at the acre-footage volume for the diversion season. If a storage amount (in acre-feet) is included in the water right, it is either substituted because it represents a cap on the entire collection to storage for the year, or is added to the diversion volume to arrive at the total face amount. The water right terms and conditions in state-issued permits and licenses usually say whether the collection to storage is capped or not.

Additional geographic components of water rights are used to pinpoint both where the diversion and/or storage occur and where the water so diverted/stored is to be used. These are the "point of diversion" and the "place of use." This information is presented frequently in terms of the American "township and range system." The base map meridian in the San Joaquin River Basin is always the Mount Diablo Base and Meridian ("MDB&M"). For some rights, a familiar water facility is stated.

Finally, the water rights also state what the "purpose of use" for the water is intended: most often in the San Joaquin River Basin the purposes of use are for "irrigation" or "power generation" (meaning the generation of hydroelectricity by running water through power plant turbines). Other uses may include fish and wildlife, recreation, municipal, and industrial uses.

Water Rights and Water Law in California

The use of water is first and foremost a matter of owning rights to its *use*. In our capitalist economy, this means use of water is a form of property right. This kind of property right is known as a *usufruct*. *Black's Law Dictionary* defines a usufruct as:

> "a right for a certain period to use and enjoy the fruits of another's property without damaging or diminishing it, but allowing for any natural deterioration in the property over time." (Garner 2010)

A usufruct, according to the Oxford English Dictionary, "is a right to use another's property short of the destruction or waste of its substance." (Pearsall 1999) As water lawyers Arthur Littleworth and Eric Garner wrote, "Water rights are usufructuary, a right to the use of water, not a right to own it." (Littleworth and Garner 2007: 27) The 20th century California water law authority, Wells Hutchin, wrote: "Water flowing in a natural stream is not the subject of private ownership," and cites the California Supreme Court's earliest water rights decision which stated in part, "the right of property in water is *usufructuary*, and consists not so much of the fluid itself as the advantage of its use. (Hutchins 1956: 36; *Eddy v. Simpson* 3 Calif 249 (1853), 252)"

No comments

- n/a -

The history of water rights in California has long been contentious. The state legislature beginning at statehood never passed a law that established California's water rights system. Instead, it was cobbled together by the court system on a case-by-case basis. In all cases, water rights in California give their owner a right to use, but not to horde or otherwise possess water; all uses must be reasonable. The question, of course, is "what is reasonable?"

Riparian Rights

Prior to statehood, California's territorial legislature adopted the English Common Law for its legal code. This action implied that landowners had riparian rights to water, consistent with the common law, when they owned property abutting a stream. ***Riparian rights*** are predominant in California and are held by those who own parcels of land that abut a flowing stream or spring. (Analogously, land owners may possess "overlying rights" to pump water from the ground for use on their property.) Riparian water rights are "part and parcel of the land" and are held in common with other riparian land owners along the same stream. A map of the streams of California gives an impression of the large number of potential riparian water right holders there are in California (Figure C-3). Riparian water rights are not quantified. But right holders along a stream share the river in common. They may make explicit agreement with neighbors divert water subject to reasonable use. Riparian water right holders may irrigate their lands immediately adjacent to the river, and their drainage must be returned to the river. They may have small ponds, under California state law, for purposes of managing their irrigation efforts, watering livestock, and incidental domestic uses. Riparian rights are the predominant water right in California and riparian diverters have priority to divert for use before prior appropriators do. Unlike appropriative water rights (see below), riparian water rights cannot

Figure C-3
Source: U.S. Geological Survey.

No comments

- n/a -

be lost to the right holder from disuse. However, in specific circumstances such rights may be severed from land, usually having to do with land subdivision.

Appropriative Water Rights

Appropriative water rights are the other major form of water rights in California. Under the doctrine of prior appropriation, right holders gain the right to use a specific quantity of water from a stream, and no more. They may move that water out of the watershed. In California, this right arose in the Sierra Nevada mining districts in the 1850s, though the right's doctrine was known in the humid eastern United States where it facilitated American accommodation of mill-wheel technology to water law (Steinberg 1991; Horwitz 1977: 34-40). It follows the logic of mining claims: the miner who was first in time had the prior right not only to the mining claim but to the water in the adjacent stream needed to work the claim. "First in time, first in right," is the familiar adage for this right. Appropriators may divert their supplies only in order of the dates of their claims. The earlier the claim in time, the more senior the right. In dry years such a right has a more reliable water supply than rights with later dates of claim. Rights later in time are considered to be more junior, and have lower reliability of actual supply in dry years.

Appropriative rights have another important aspect: the water right must be *diligently exercised* year-in and year-out. The water must be applied to beneficial use under the right or else the right can be lost. "Use it or lose it," is another familiar adage for appropriative water rights. Once someone obtains the right, they must develop the facilities to divert, transport and store the water in a diligent manner, and once those facilities are completed, the water must be demonstrably used to the extent the right allows, or the right to use may be reduced or lost. Generally, long-distance canals, dams, and hydropower plants are the subjects of appropriative water rights. But it is also true that small ditches to parcels non-riparian in their location may rely on appropriative water rights to divert water to a ditch that irrigates some acreage, provides private domestic use, facilitates a mining claim, or runs a small hydroelectric generator.

Prescriptive Rights

Prescriptive rights come into play when one water user uses water adversely to the rights of another. They may divert water for years without discovery or objection by a neighboring user. In California, if that usage continues for five years or longer, that use may be demonstrated in court to have ripened into a legitimate right through the prescriptor's adverse use against the other existing right holder(s). This right has come into play in some instances in the San Joaquin River Basin, most notably involving rights held by San Francisco, and rights that came to be acquired by the US Bureau of Reclamation on the upper San Joaquin River .

State Water Rights Regulation

There are other water rights in California besides these. Groundwater is the subject of overlying rights. These rights are analogous to riparian rights because land owners may drill wells to pump groundwater for use on their properties. And like riparian rights, their overlying rights are held in correlation to the rights of neighbors over the same underground reservoir (or "aquifer") of water. In other words, both riparian and overlying rights holders use water from their sources in common with those of other adjacent land owners. Their rights are not quantified, but receive a percent share of the yield of the river or aquifer. Groundwater rights are not described in this report, but are very important to the history and use of water throughout the San Joaquin Valley. Groundwater has never been formally regulated by a state-level administrative agency. But some groundwater basins are regulated under supervision of court-appointed watermasters.

No comments

- n/a -

Until 1914, California water rights were obtained either by purchasing riparian land or by posting a noticed claim at the site of the intended river diversion or dam site, and then recording that claim within a specified time at the local County Recorder's office. Beginning December 19, 1914, the start date for California's formal administrative system of water rights regulation approved by referendum, appropriative water rights may only be obtained by filing an application with the state water rights board. Today, that regulatory authority is vested in the Division of Water Rights of the State Water Resources Control Board. Applications are prioritized by the date on which they are filed with the Division, and have been since December 19, 1914.

However, the Water Commission Act only committed California to regulate appropriative water rights moving forward from December 19, 1914. Riparian and appropriative rights (now known as "pre-1914" water rights) created before this date are unregulated from the new water rights administration. While unregulated, the State Water Resources is empowered to investigate these prior water rights (both riparian and pre-1914). There is disagreement about how far the Board's authority reaches in adjusting rights that might, for example, come into conflict with post-1914 water rights.

Legally speaking, stream flows are first available to riparian diverters, and any surplus determined by the State Water Resources Control Board is then available for appropriation by other water rights applicants. In deciding whether to permit a new water right on a stream, the State Water Resources Control Board performs a water availability analysis that determines whether such a surplus is available for new appropriations.

Exceptional Water Rights: The State Filings

Before taking up analysis of "paper water" in the San Joaquin River Basin in detail, it is necessary to present background and context for where the tremendous quantities of federal Bureau of Reclamation water rights originated.

California, on one hand, has a rather complex water rights system, what some scholars and attorneys call the "California Doctrine" (e.g., Holsinger 1936). Riparian right holders (owners of riparian lands) generally have paramount (but unquantified) claim to a correlative (i.e., "pro rata" fair share) of waters of a stream or lake, followed by appropriators who made their claims prior to 1914 and who perfect their quantified flow and storage rights by diligent completion of their facilities and diversion for use. The next class of water right holders are those who applied for rights to appropriate and use water through California's permit system that began in December 1914. These right holders are regulated by the State Water Resources Control Board today. Riparian and pre-1914 right holders are exempt from the Board's permit process.

Because of the California Doctrine and the state's water rights permit and license system, priority of application of water to use has long been the established system for determining whose rights get served and whose don't during droughts. One of the more difficult problems for state water policy, in the 1920s, became how the state could acquire water rights for a project of statewide scope when claims, permits, and licenses for water rights (especially the system for *acquiring* water rights) cumulated as the state's economy developed through time. How could the state gather the rights it needed to move forward with statewide coordinated water development? The staet was clearly a late-comer to obtain water rights for a state-sponsored system, and its rights were likely to face larger cutbacks during droughts than those with more senior rights on the same river systems.

When the Water Code was adopted by the State Legislature in 1914, it included (and still includes) Sections 104 and 105, which state:

No comments

- n/a -

> **Section 104.** It is hereby declared that the people of the State have a paramount interest in the use of all the water of the State and that the State shall determine what water of the State, surface and underground, can be converted to public use or controlled for public protection.
>
> **Section 105.** It is hereby declared that the protection of the public interest in the development of the water resources of the State is of vital concern to the people of the State and that the State shall determine in what way the water of the State, both surface and underground, should be developed for the greatest public benefit.

These provisions provide a policy rationale, if not the tools, for the State to intervene in the cumulating claims of water rights (essentially private rights) on behalf of the public interest in coordinated water development. Provoked by growing perceptions of shortage around the fast-developing state, which were aggravated by drought and litigation in the early 1920s[1], the State of California came up with its first statewide plan to develop and reallocate water to meet the state's water problems. In 1925, state planners realized they had to address how water rights could be obtained without injury to vested rights. The California Water Project Authority describes the problem this way in 1951:

> With respect to the protection of water rights and water requirements in carrying out such a plan of coordinated development, [a 1925 report to the Legislature on California's water resources] contains the following statement...:
>
> > The whole discussion of the diversion of surplus waters from the Sacramento River into the San Joaquin Valley, must be predicated upon the institution of a coordinated development in both valleys that gives full protection against present or future loss to the owners of vested rights and to present users of water as well as to those potential users whose lands lie tributary to streams from which exportations of water are proposed. (California Water Project Authority, 1951: 21-23)

A 1926 California Supreme Court decision once again upholding riparian over appropriative rights made the water rights issue for statewide development even more immediate. In 1927, a Legislative committee studying the "coordinated plan of development" recommended the legislature "*at once* take the necessary steps, either through its proper officials or by legislation, to file on or withdraw from filing by private parties the water rights to be utilized and required for the consummation of the coordinated plan. (California Water Project Authority, 1951: 23; italics added)"

The Legislature passed the Feigenbaum Act, Chapter 286, Statutes of 1927[2] to authorize the California Department of Finance to file applications for water rights "for any water which in its judgment is or may be required in the development and completion of the whole or any part of a general or coordinated plan looking toward the development, utilization, or conservation of the water resources of the State."[3] The Act gave the State the power to literally but fictitiously *stop time* for the purpose of filing applications for water rights on behalf of the state water plan:

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[1] The case of *Town of Antioch v. Williams Irrigation District*, the first Delta water case that attempted to address low Delta inflows and tidal salinity intrusion, was filed during dry conditions in 1920, and decided by the California Supreme Court in 1922.

[2] Today, portions of its provisions live on in Water Code sections 10500 and 10504, while other sections of the Feigenbaum Act were subsequently repealed in 1953. The Feigenbaum Act is also mentioned in Jackson and Mikesell, (1979: 29).

[3] Water Code §10500, quoted in California Water Project Authority (1951: 28).

No comments

- n/a -

> Section 10501. Any application filed by the Department of Finance within nine months after July 29, 1927, has priority as of that date and such priority shall be retained over any application made by others subsequent application made by others subsequent to that date in conflict therewith, regardless of any requirements or provisions for water or the use thereof, until October 1, 1955.
>
> Section 10502. Any priority under this part may be maintained and extended by further legislative enactment.[4]

The Feigenbaum Act further empowered the Department of Finance to "release from priority or assign any portion of any appropriation filed by it under this part when the the release or assignment is for the purpose of development not in conflict with such general or coordinated plan." While benefiting from a special state-filed priority date under the Act, assignees would still be obligated to proceed with their water development plans with due diligence. Assignees of these applications could include state agencies, commissions, and departments, as well as the United States of America or any of its departments or agencies.[5]

Subsequent legislation also enables counties and watersheds of origin to benefit from such state filing assignments. State filings provide the State of California with the water rights-equivalent of a "wild card" (within some limits) that can reserve, withdraw or otherwise control the waters of any California river or stream so that they may be incorporated into either the State Water Project or the Central Valley Project, either for export or to benefit areas of origin—until or unless that state filing right is revoked by the State Water Resources Control Board.

State Filings for San Joaquin River Basin Water Rights

According to State Water Resources Control Board records, there have been 26 state filings on rivers and creeks of the San Joaquin River Basin since enactment of the Feigenbaum Act in 1927.[6] They are listed in Appendix J. The filings include claims for creeks and tributaries of the Stanislaus, Merced, and San Joaquin Rivers. No state filings appear to exist for the Tuolumne River.

In the San Joaquin River Basin, state filings were assigned to the US Bureau of Reclamation to develop Friant Dam, its associated Madera and Friant-Kern Canals, and New Melones Dam and Reservoir on the Stanislaus River. State filing Application 5638 was assigned to the Bureau to supplement earlier, insufficient water rights applications for the Friant Dam site filed in 1916 and 1919.

The rest of the state filings are as yet unassigned and therefore technically (if not politically) still in play with regard to coordinated statewide water development and/or area of origin claims. For example, Application 5949 (priority date of July 30, 1927) on the south fork of the Stanislaus River has been the subject of requests for assignment by Pacific Gas & Electric Company (beginning in 1951) and by Tuolumne Regional Water District (1980s). Neither request for assignment was acted on by the State, deferring action until some sort of coordinated plan of development was further

---

[4] These sections were repealed in 1953.

[5] Water Code § 10504, quoted in California Water Project Authority (1951). This provision remains in effect today.

[6] According to eWRIMS, the State Water Board's online water rights application database, there are 185 active state filings. San Joaquin River Basin state filings amount to about 14 percent of all state filings at this time. Excel file accessed and downloaded 12 November 2010 and updated in July 2011. They may be found by searching on both California Department of Finance and State Water Resources Control Board.

No comments

- n/a -

along. Meanwhile, 184 other state filings throughout California have similar status as Application 5649.

Additional file research at the State Water Resources Control Board Records Room would be necessary to determine the current status of these and other state filing applications.

Reasonable Use of Water

Even before Californians amended their constitution in 1928, legal precedents set by California courts required that water use among riparians had to be reasonable, and water use between appropriators had to be reasonable. Appropriators also were accountable to riparians for reasonable use. Major political conflict arose about water rights though because California law contained no requirement that the water use of riparians with respect to appropriators had to be reasonable. Then, in 1928, California voters approved an amendment to the California Constitution that required all water use in California by any water right holder (riparians included) had to be reasonable and not wasteful.[7] The California Constitution stresses that "the right to water...does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water." Where riparian rights were once entitled to the "full natural flow" of the stream to which the rights attached, the California Constitution now limits attachment of the riparian right to "no more than so much of the flow thereof as may be required or used consistently with this section, for the purposes for which such lands are, or may be made adaptable, in view of such reasonable and beneficial uses" without "depriving any riparian owner of the reasonable use of water of the stream...or as depriving any appropriator of water to which the appropriator is lawfully entitled."

The question remains under this doctrine: what uses, methods of use, and methods of diversion represent are reasonable, and how does that translate into more efficient allocation and use of water so that waste of water and significant environmental impacts of water development are avoided or at least mitigated? In case law, the answer is a matter of the facts involved.

The new Delta Watermaster, Craig M. Wilson, whose office was created by the water reform legislation of 2009, calls the Reasonable Use Doctrine "the cornerstone of California's complex water rights laws. All water use must be reasonable and beneficial regardless of the type of underlying water right. No one has an enforceable property interest in the unreasonable use of water. (Wilson, 2011: 3)"

[7] Article X, Section 2 of the California Constitution.

No comments

- n/a -

No comments

- n/a -

Appendix D

Supporting Data and Analyses

Contents

D.1 Water Availability Analysis Spreadsheet Models

D.2 Unimpaired Flow Hydrology

D.3 Adjudication Decree Quantification

D.4 Consumptive Statements of Diversion and Use

D.5 Other Pre-1914 Consumptive Water Rights

D.6 Post-1914 Consumptive Water Rights

D.7 Sacramento River Post-1914 Water Rights Priorities

No comments

- n/a -

Appendix D

Section D.1
Water Availability Analysis Spreadsheet Models

Trinity River Water Rights Yield Analysis

Tributary Inflow Criteria	Diversion Cap
75%	25% of unimpaired flow
60%	40% of unimpaired flow
50%	50% of unimpaired flow
40%	60% of unimpaired flow
	94% average regulated period share of flow during water year

75% Inflow Criterion Scenario	Water Year Flow Percentile										
	10th Percentile	20th Percentile	25th Percentile	30th Percentile	40th Percentile	Median Flow	60th Percentile	70th Percentile	75th Percentile	80th Percentile	90th Percentile
Total Annual Unimpaired Flow (TAF)	679	789	824	866	1,025	1,133	1,424	1,582	1,611	1,683	2,035
November through June Unimpaired Flow (TAF)	624	743	785	838	968	1,064	1,341	1,455	1,529	1,599	1,930
Delta Inflow Criterion (75% of UF, TAF)	468	557	589	629	726	798	1,006	1,091	1,147	1,199	1,448
Diversion Cap (TAF)	156	186	196	210	242	266	335	364	382	400	483
Riparian and Pre-1914 Claimants (134.1 TAF)	126	126	126	126	126	126	126	126	126	126	126
USBR 1927 Trinity Claim (3,349.9 TAF)	30	60	70	84	116	140	209	238	256	274	357
USBR 1959 Trinity Claim (3,030.8 TAF)	0	0	0	0	0	0	0	0	0	0	0
USBR 2002 Trinity Claim (2,203.1 TAF)	0	0	0	0	0	0	0	0	0	0	0
Remaining Flows, July-October	55	46	39	27	57	69	82	127	82	85	105
Riparian and Pre-1914 Claimants (134.1 TAF)	8	8	8	8	8	8	8	8	8	8	8
USBR 1927 Trinity Claim (3,349.9 TAF)	47	37	31	19	49	61	74	119	74	77	97
USBR 1959 Trinity Claim (3,030.8 TAF)	0	0	0	0	0	0	0	0	0	0	0
USBR 2002 Trinity Claim (2,203.1 TAF)	0	0	0	0	0	0	0	0	0	0	0
Total Riparian and Pre-1914 Claimants	134	134	134	134	134	134	134	134	134	134	134
Total USBR Trinity Claims	77	97	101	103	165	201	284	357	330	350	454

No comments

- n/a -

Feather River Water Rights Yield Analysis

	Tributary Inflow Criteria	Diversion Cap									
	75%	25% of unimpaired flow									
	60%	40% of unimpaired flow									
	50%	50% of unimpaired flow									
	40%	60% of unimpaired flow									
		90% average regulated period share of flow during water year									
75% Inflow Criterion	**10th Percentile**	**20th Percentile**	**25th Percentile**	**30th Percentile**	**40th Percentile**	**Median Flow**	**60th Percentile**	**70th Percentile**	**75th Percentile**	**80th Percentile**	**90th Percentile**
Total Annual Unimpaired Flow (TAF)	2,007	2,511	2,638	2,932	3,251	3,854	4,596	5,673	5,767	6,268	7,095
November through June Unimpaired Flow (TAF)	1,705	2,150	2,270	2,562	2,893	3,466	4,201	5,160	5,260	5,583	6,470
Delta Inflow Criterion (75% of UF, TAF)	1,278	1,613	1,703	1,921	2,170	2,600	3,151	3,870	3,945	4,187	4,852
Diversion Cap (TAF)	426	538	568	640	723	867	1,050	1,290	1,315	1,396	1,617
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (Total 3,493 TAF)	426	538	568	640	723	867	1,050	1,290	1,315	1,396	1,617
South Feather WPA and Thermalito Water & Sewer 1920s Rights (331.8 TAF)	0	0	0	0	0	0	0	0	0	0	0
DWR 1927, 1951, and 1956 Rights (10,447.2 TAF)	0	0	0	0	0	0	0	0	0	0	0
North Yuba Water District 1958 Rights (624 TAF)	0	0	0	0	0	0	0	0	0	0	0
DWR 1967 Right (83 TAF)	0	0	0	0	0	0	0	0	0	0	0
Remaining Flow July-October (TAF)	303	360	368	371	359	388	395	513	507	685	625
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (Total 3,493 TAF)	303	355	355	355	355	355	355	355	355	355	355
South Feather WPA and Thermalito Water & Sewer 1920s Rights (331.8 TAF)	0	6	13	16	4	33	34	34	34	34	34
DWR 1927, 1951, and 1956 Rights (10,447.2 TAF)	0	0	0	0	0	0	7	124	118	297	236
North Yuba Water District 1958 Rights (624 TAF)	0	0	0	0	0	0	0	0	0	0	0
DWR 1967 Right (83 TAF)	0	0	0	0	0	0	0	0	0	0	0
Total Riparian and Pre-1914	729	892	922	995	1,078	1,221	1,405	1,645	1,670	1,750	1,972
Total South Feather & Thermalito	0	6	13	16	4	33	34	34	34	34	34
Total DWR	0	0	0	0	0	0	7	124	118	297	236
Total North Yuba Water District	0	0	0	0	0	0	0	0	0	0	0

No comments

- n/a -

Yuba River Water Rights Yield Analysis

Tributary Inflow Criteria	Diversion Cap
75%	25% of unimpaired flow
60%	40% of unimpaired flow
50%	50% of unimpaired flow
40%	60% of unimpaired flow

94% average regulated period share of flow during water year

75% Inflow Criterion	10th Percentile	20th Percentile	25th Percentile	30th Percentile	40th Percentile	Median Flow	60th Percentile	70th Percentile	75th Percentile	80th Percentile	90th Percentile
Total Annual Unimpaired Flow (TAF)	921	1,231	1,363	1,521	1,826	2,123	2,428	2,949	3,164	3,284	3,765
November through June Unimpaired Flow (TAF)	884	1,151	1,268	1,438	1,746	2,006	2,280	2,780	2,993	3,079	3,681
Delta Inflow Criterion (75% of UF, TAF)	663	863	951	1,078	1,310	1,505	1,710	2,085	2,245	2,310	2,761
Diversion Cap (TAF)	221	288	317	359	437	502	570	695	748	770	920
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (1,497 TAF)	221	288	317	359	437	502	570	695	748	770	920
Nevada ID and Yuba County Water District 1920s Rights (212.6 TAF)	-	-	-	-	-	-	-	-	-	-	-
Yuba County Water Agency 1927 Right (1,159 TAF)	-	-	-	-	-	-	-	-	-	-	-
Nevada ID 1930s Rights (212.8 TAF)	-	-	-	-	-	-	-	-	-	-	-
North Yuba Water District 1958 Rights (145.1 TAF)	-	-	-	-	-	-	-	-	-	-	-
Nevada ID 1961 Right (101.2 TAF)	-	-	-	-	-	-	-	-	-	-	-
Yuba County Water Agency 1966 Rights (760 TAF)	-	-	-	-	-	-	-	-	-	-	-
Remaining Flow July-October (TAF)	37	80	95	83	80	117	148	169	171	204	84
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (1,497 TAF)	37	80	85	83	80	85	85	85	85	85	84
Nevada ID and Yuba County Water District 1920s Rights (212.6 TAF)	-	-	10	-	-	12	12	12	12	12	-
Yuba County Water Agency 1927 Right (1,159 TAF)	-	-	-	-	-	20	51	66	66	66	-
Nevada ID 1930s Rights (212.8 TAF)	-	-	-	-	-	-	-	6	8	12	-
North Yuba Water District 1958 Rights (145.1 TAF)	-	-	-	-	-	-	-	-	-	8	-
Nevada ID 1961 Right (101.2 TAF)	-	-	-	-	-	-	-	-	-	6	-
Yuba County Water Agency 1966 Rights (760 TAF)	-	-	-	-	-	-	-	-	-	15	-
Total Riparian & Pre-1914	258	368	402	442	516	587	655	780	833	855	1,004
Total Nevada ID and YCWD Yields	0	0	10	0	0	12	12	12	12	12	0
Total Yuba County Water Agency Yields	0	0	0	0	0	20	51	66	66	81	0
Total North Yuba Water District Yield	0	0	0	0	0	0	0	0	0	8	0
Total Nevada ID Yield	0	0	0	0	0	0	0	0	0	6	0

No comments

- n/a -

Blair River Water Rights Yield Analysis

Tributary Inflow Criteria	Diversion Cap
75%	25% of unimpaired flow
60%	40% of unimpaired flow
50%	50% of unimpaired flow
40%	60% of unimpaired flow
	97% average regulated period share of flow during water year

75% Inflow Criterion	10th Percentile	20th Percentile	25th Percentile	30th Percentile	40th Percentile	Median Flow	60th Percentile	70th Percentile	75th Percentile	80th Percentile	90th Percentile
Total Unimpaired Flow (TAF)	102	137	171	181	247	290	384	434	462	489	567
November through June Unimpaired Flow (TAF)	102	130	165	177	239	278	365	410	453	482	553
Delta Inflow Criterion (75% of UF, TAF)	76	98	124	132	179	209	274	308	340	361	415
Diversion Cap (TAF)	25	33	41	44	60	70	91	103	113	120	138
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (92.1 TAF)	25	33	41	44	60	70	89	89	89	89	89
Camp Far West 1918 Right (4.8 TAF)	0	0	0	0	0	0	2	5	5	5	5
Nevada ID 1921 Rights (77.5 TAF)	0	0	0	0	0	0	0	9	20	27	45
Camp Far West 1922 and 1924 Rights (8.6 TAF)	0	0	0	0	0	0	0	0	0	0	0
Nevada ID 1929 Right (50.9 TAF)	0	0	0	0	0	0	0	0	0	0	0
Camp Far West 1941 Right (5 TAF)	0	0	0	0	0	0	0	0	0	0	0
South Sutter Water District 1952 Right (139.5 TAF)	0	0	0	0	0	0	0	0	0	0	0
Lake of the Pines 1966 Right (4.2 TAF)	0	0	0	0	0	0	0	0	0	0	0
South Sutter Water District 1981 Right (130.7 TAF)	0	0	0	0	0	0	0	0	0	0	0
Remaining Flow July-October (TAF)	1	7	6	4	8	12	18	24	9	7	14
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (92.1 TAF)	1	3	3	3	3	3	3	3	3	3	3
Camp Far West 1918 Right (4.8 TAF)	0	0	0	0	0	0	0	0	0	0	0
Nevada ID 1921 Rights (77.5 TAF)	0	3	2	1	3	3	3	3	3	3	3
Camp Far West 1922 and 1924 Rights (8.6 TAF)	0	0	0	0	0	0	0	0	0	0	0
Nevada ID 1929 Right (50.9 TAF)	0	0	0	0	2	2	2	2	2	0	2
Camp Far West 1941 Right (5 TAF)	0	0	0	0	0	0	0	0	0	0	0
South Sutter Water District 1952 Right (139.5 TAF)	0	0	0	0	0	4	5	5	1	0	5
Lake of the Pines 1966 Right (4.2 TAF)	0	0	0	0	0	0	0	0	0	0	0
South Sutter Water District 1981 Right (130.7 TAF)	0	0	0	0	0	0	5	5	0	0	1
Total Riparian & Pre-1914 Yield	26	36	44	47	63	73	92	92	92	92	92
Total Camp Far West Yield	0	0	0	0	1	1	3	5	5	5	5
Total Nevada ID Yield	0	3	2	1	4	4	4	13	24	30	49
Total South Sutter Water District Yield	0	0	0	0	0	4	9	9	1	0	6
Total Lake of the Pines Yield	0	0	0	0	0	0	0	0	0	0	0

No comments

- n/a -

American River Water Rights Yield Analysis

	Tributary Inflow Criteria	Diversion Cap									
	75%	25% of unimpaired flow									
	60%	40% of unimpaired flow									
	50%	50% of unimpaired flow									
	40%	60% of unimpaired flow									
		95% average regulated period share of flow during water year									
75% Instream Flow Criterion	**10th Percentile**	**20th Percentile**	**25th Percentile**	**30th Percentile**	**40th Percentile**	**Median Flow**	**60th Percentile**	**70th Percentile**	**75th Percentile**	**80th Percentile**	**90th Percentile**
Total Annual Unimpaired Flow (TAF)	1,041	1,252	1,416	1,613	2,023	2,521	2,844	3,300	3,554	3,886	4,525
November through June Unimpaired Flow (TAF)	984	1,188	1,363	1,556	1,983	2,422	2,731	3,140	3,311	3,687	4,340
Delta Inflow Criterion (75% of UF, TAF)	738	891	1,022	1,167	1,487	1,817	2,048	2,355	2,483	2,766	3,255
Diversion Cap (TAF)	246	297	341	389	496	606	683	785	828	922	1,085
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (286 TAF)	246	273	273	273	273	273	273	273	273	273	273
Nevada ID 1930s Rights (5.0 TAF)	0	5	5	5	5	5	5	5	5	5	5
City of Sacramento 1940s Rights (715.2 TAF)	0	19	63	111	218	328	405	507	550	644	683
Georgetown Divide 1955 Rights (20.4 TAF)	0	0	0	0	0	0	0	0	0	0	19
Placer County Water Agency 1958 Rights (1,291 TAF)	0	0	0	0	0	0	0	0	0	0	105
USBR 1958 Rights (5,347.8 TAF)	0	0	0	0	0	0	0	0	0	0	0
City of Sacramento 1958 Rights (95.1 TAF)	0	0	0	0	0	0	0	0	0	0	0
Foresthill PUD 1964 Rights (24.1 TAF)	0	0	0	0	0	0	0	0	0	0	0
El Dorado ID 1992 Rights (47.9 TAF)	0	0	0	0	0	0	0	0	0	0	0
Remaining Flow July-October (TAF)	57	64	53	57	40	99	113	160	243	198	185
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (286 TAF)	13	13	13	13	13	13	13	13	13	13	13
Nevada ID 1930s Rights (5.0 TAF)	0	0	0	0	0	0	0	0	0	0	0
City of Sacramento 1940s Rights (715.2 TAF)	32	32	32	32	26	32	32	32	32	32	32
Georgetown Divide 1955 Rights (20.4 TAF)	1	1	1	1	0	1	1	1	1	1	1
Placer County Water Agency 1958 Rights (1,291 TAF)	11	18	7	11	0	53	58	58	58	58	58
USBR 1958 Rights (5,347.8 TAF)	0	0	0	0	0	0	9	55	139	94	80
City of Sacramento 1958 Rights (95.1 TAF)	0	0	0	0	0	0	0	0	0	0	0
Foresthill PUD 1964 Rights (24.1 TAF)	0	0	0	0	0	0	0	0	0	0	0
El Dorado ID 1992 Rights (47.9 TAF)	0	0	0	0	0	0	0	0	0	0	0
Total Riparian & Pre-1914 Yield	259	286	286	286	286	286	286	286	286	286	286
Total Nevada ID Yield	0	5	5	5	5	5	5	5	5	5	5
Total City of Sacramento Yield	32	51	95	143	244	360	437	539	582	676	715
Total Georgetown Divide PUD Yield	1	1	1	1	0	1	1	1	1	1	20
Total Placer County Water Agency Yield	11	18	7	11	0	53	58	58	58	58	163
Total USBR Yield	0	0	0	0	0	0	9	55	139	94	80
Total Foresthill PUD Yield	0	0	0	0	0	0	0	0	0	0	0
Total El Dorado ID Yield	0	0	0	0	0	0	0	0	0	0	0

No comments

- n/a -

Sacramento River at Feather River Confluence Water Rights Yield Analysis

Tributary Inflow Criteria	Diversion Cap
75%	25% of unimpaired flow
60%	40% of unimpaired flow
50%	50% of unimpaired flow
40%	60% of unimpaired flow
	87% average regulated period share of flow during water year

	Water Year Flow Percentile										
75% Inflow Criterion Scenario	**10th Percentile**	**20th Percentile**	**25th Percentile**	**30th Percentile**	**40th Percentile**	**Median Flow**	**60th Percentile**	**70th Percentile**	**75th Percentile**	**80th Percentile**	**90th Percentile**
Total Annual Unimpaired Flow (TAF)	5,572	6,984	7,371	7,877	8,860	10,162	13,046	14,151	14,945	15,697	19,369
November through June Unimpaired Flow (TAF)	4,638	5,876	6,170	6,806	7,721	9,163	11,451	12,658	13,688	14,434	17,849
Delta Inflow Criterion (75% of UF, TAF)	3,479	4,407	4,627	5,104	5,791	6,872	8,588	9,494	10,266	10,826	13,386
Diversion Cap (TAF)	1,160	1,469	1,542	1,701	1,930	2,291	2,863	3,165	3,422	3,609	4,462
Paramount Riparian and Prior Pre-1914 Water Right Holders (42,261.8 TAF)	1,160	1,469	1,542	1,701	1,930	2,291	2,863	3,165	3,422	3,609	4,462
Water Right Holders with Priorities 1915 to Early 1927 (1,352.4 TAF)	0	0	0	0	0	0	0	0	0	0	0
Early CVP Sacramento River State Filings, Other Claimants, 1927-1936 (11,263.6 TAF)	0	0	0	0	0	0	0	0	0	0	0
1938 CVP and Post-War Claimants through June 1951 (8,145.4 TAF)	0	0	0	0	0	0	0	0	0	0	0
1951 Feather River Project, CVP State Filings, Other Claimants through 1961 (18,901.4 TAF)	0	0	0	0	0	0	0	0	0	0	0
Remaining Flows, July-October (TAF)	934	1,107	1,201	1,071	1,129	999	1,595	1,493	1,257	1,263	1,520
Paramount Riparian and Prior Pre-1914 Water Right Holders (42,261.8 TAF)	934	1,107	1,201	1,071	1,129	999	1,595	1,493	1,257	1,263	1,520
Water Right Holders with Priorities 1915 to Early 1927 (1,352.4 TAF)	0	0	0	0	0	0	0	0	0	0	0
Early CVP Sacramento River State Filings, Other Claimants, 1927-1936 (11,263.6 TAF)	0	0	0	0	0	0	0	0	0	0	0
1938 CVP and Post-War Claimants through June 1951 (8,145.4 TAF)	0	0	0	0	0	0	0	0	0	0	0
1951 Feather River Project, CVP State Filings, Other Claimants through 1961 (18,901.4 TAF)	0	0	0	0	0	0	0	0	0	0	0
Total Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (1,433.7 TAF)	2,094	2,576	2,743	2,773	3,059	3,290	4,458	4,657	4,679	4,872	5,983
Total, 1915-Early 1927 Claimants (up to 1,352.4 TAF)	0	0	0	0	0	0	0	0	0	0	0
Total 1927-1936 Claimants (14,613.5 TAF)	0	0	0	0	0	0	0	0	0	0	0
Total 1938-June 1951 Claimants (8,145.4 TAF)	0	0	0	0	0	0	0	0	0	0	0
Total 1951 through 1961 Claimants (18,901.4 TAF)	0	0	0	0	0	0	0	0	0	0	0

No comments

- n/a -

Stanislaus River Water Rights Yield Analysis

	Tributary Inflow Criteria	Diversion Cap									
	60%	40% of unimpaired flow									
	50%	50% of unimpaired flow									
	40%	60% of unimpaired flow									
	30%	70% of unimpaired flow									
		85% Average of Regulated Period to Total Flow during Water Year									
60% Instream Flow Criterion	**10th Percentile**	**20th Percentile**	**25th Percentile**	**30th Percentile**	**40th Percentile**	**Median Flow**	**60th Percentile**	**70th Percentile**	**75th Percentile**	**80th Percentile**	**90th Percentile**
Total Annual Unimpaired Flow (TAF)	457	592	637	660	894	1,107	1,265	1,359	1,460	1,559	1,912
Feb-June Unimpaired Flow Level (TAF)	382	500	551	566	740	822	994	1,077	1,127	1,180	1,459
Delta Inflow Criterion (60% of UF, TAF)	229	300	330	340	444	493	596	646	676	708	875
Diversion Cap (TAF)	153	200	220	226	296	329	398	431	451	472	583
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (29.4 TAF)	25	25	25	25	25	25	25	25	25	25	25
Pre-1914 Oakdale ID Claims (1,371.4 TAF)	128	175	195	201	271	304	372	406	425	447	558
Total USBR Post-1914 Claims (3,400 TAF)	0	0	0	0	0	0	0	0	0	0	0
Remaining Flows, July through January	75	92	87	114	154	285	271	282	333	380	454
Paramount Riparian and Possibly Prior Pre-1914 Water Right Holders (29.4 TAF)	4	4	4	4	4	4	4	4	4	4	4
Pre-1914 Oakdale ID Claims (1,371.4 TAF)	70	88	82	110	150	199	199	199	199	199	199
Total USBR Post-1914 Claims (3,400 TAF)	0	0	0	0	0	81	67	79	129	176	250
Total Riparian and Pre-1914 Yield	29	29	29	29	29	29	29	29	29	29	29
Total Oakdale ID Claims	198	262	277	311	421	503	572	605	625	646	758
Total USBR Claims	0	0	0	0	0	81	67	79	129	176	250

Sources: DWR, SWRCB, C-WIN. Totals may not sum due to effects of rounding.

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No comments

- n/a -

Tuolumne River Water Rights Yield Analysis

	Tributary Inflow Criteria	Diversion Cap
	60%	40% of unimpaired flow
	50%	50% of unimpaired flow
	40%	60% of unimpaired flow
	30%	70% of unimpaired flow

76% Average of Regulated Period to Total Flow during Water Year

60% Instream Flow Criterion	10th Percentile	20th Percentile	25th Percentile	30th Percentile	40th Percentile	Median Flow	60th Percentile	70th Percentile	75th Percentile	80th Percentile	90th Percentile
Total Annual Unimpaired Flow (TAF)	836	1,053	1,107	1,183	1,416	1,786	2,030	2,181	2,363	2,483	3,093
Feb-June Unimpaired Flow Level (TAF)	675	898	961	984	1,189	1,299	1,578	1,704	1,755	1,852	2,188
Delta Inflow Criterion (60% of UF, TAF)	405	539	577	591	713	779	947	1,023	1,053	1,111	1,313
Diversion Cap (TAF)	270	359	384	394	475	520	631	682	702	741	875
Gallo Riparian and Tuolumne Utilities District Pre-1914 Claims (22.6 TAF)	17	17	17	17	17	17	17	17	17	17	17
Turlock ID/Modesto ID 1855 and 1871 Claims (3,382.1 TAF)	253	342	367	376	458	502	614	665	685	724	858
San Francisco 1901, 1902, and 1908 Claims (1,840.1 TAF)	0	0	0	0	0	0	0	0	0	0	0
Modesto ID 1908 Claim (40 TAF)	0	0	0	0	0	0	0	0	0	0	0
San Francisco 1908 through 1911 Claims (4,114.9 TAF)	0	0	0	0	0	0	0	0	0	0	0
Turlock ID 1911 Claim (100 TAF)	0	0	0	0	0	0	0	0	0	0	0
Remaining Flow, July-January	161	154	146	199	228	487	451	477	609	631	904
Gallo Riparian and Tuolumne Utilities District Pre-1914 Claims (22.6 TAF)	5	5	5	5	5	5	5	5	5	5	5
Turlock ID/Modesto ID 1855 and 1871 Claims (3,382.1 TAF)	155	149	141	193	222	482	446	471	603	626	804
San Francisco 1901, 1902, and 1908 Claims (1,840.1 TAF)	0	0	0	0	0	0	0	0	0	0	95
Modesto ID 1908 Claim (40 TAF)	0	0	0	0	0	0	0	0	0	0	0
San Francisco 1908 through 1911 Claims (4,114.9 TAF)	0	0	0	0	0	0	0	0	0	0	0
Turlock ID 1911 Claim (100 TAF)	0	0	0	0	0	0	0	0	0	0	0
Total Riparian and Senior Pre-1914 Claims	23	23	23	23	23	23	23	23	23	23	23
Total Turlock ID/Modesto ID Claims	408	491	508	570	680	984	1,060	1,136	1,288	1,349	1,662
Total San Francisco Claims	0	0	0	0	0	0	0	0	0	0	95

No comments

- n/a -

Merced River Water Rights Yield Analysis

Tributary Inflow Criteria	Diversion Cap
60%	40% of unimpaired flow
50%	50% of unimpaired flow
40%	60% of unimpaired flow
30%	70% of unimpaired flow

81% Average of Regulated Period to Total Flow during Water Year

60% Instream Flow Criterion	10th Percentile	20th Percentile	25th Percentile	30th Percentile	40th Percentile	Median Flow	60th Percentile	70th Percentile	75th Percentile	80th Percentile	90th Percentile
Total Annual Unimpaired Flow (TAF)	409	492	527	562	669	906	1,077	1,160	1,220	1,389	1,708
Jan-June Unimpaired Flow Level (TAF)	326	432	459	471	568	648	805	924	977	1,030	1,223
Delta Inflow Criterion (60% of UF, TAF)	196	259	275	283	341	389	483	554	586	618	734
Diversion Cap (TAF)	130	173	183	189	227	259	322	370	391	412	489
Decrees + Riparian Claims (282.7 TAF)	130	173	183	189	227	228	228	228	228	228	228
Merced ID Pre-1914 Claims + SDUs (4,193.3 TAF)	0	0	0	0	0	31	94	142	163	184	261
Remaining Flow, July-January	82	60	69	91	101	258	272	236	243	359	485
Decrees + Riparian Claims (282.7 TAF)	55	55	55	55	55	55	55	55	55	55	55
Merced ID Pre-1914 Claims + SDUs (4,193.3 TAF)	27	5	14	36	46	203	217	181	188	304	430
Total Riparian and Pre-1914 Yield	185	228	238	244	282	283	283	283	283	283	283
Total Merced ID Pre-1914 Yield	27	5	14	36	46	235	311	323	351	489	692

No comments

- n/a -

San Joaquin River Water Rights Yield Analysis

Tributary Inflow Criteria	Diversion Cap
60%	40% of unimpaired flow
50%	50% of unimpaired flow
40%	60% of unimpaired flow
30%	70% of unimpaired flow

77% Average of Regulated Period to Total Flow during Water Year

60% Instream Flow Criterion	10th Percentile	20th Percentile	25th Percentile	30th Percentile	40th Percentile	Median Flow	60th Percentile	70th Percentile	75th Percentile	80th Percentile	90th Percentile
Total Annual Unimpaired Flow (TAF)	813	928	1,052	1,128	1,257	1,449	1,854	2,047	2,195	2,322	3,018
Feb-June Unimpaired Flow Level (TAF)	656	749	839	881	1,007	1,137	1,458	1,572	1,623	1,779	2,075
Delta Inflow Criterion (60% of UF, TAF)	394	450	503	529	604	682	875	943	974	1,068	1,245
Diversion Cap (TAF)	262	300	335	353	403	455	583	629	649	712	830
Paramount Riparian Claims (171.7 TAF)	131	131	131	131	131	131	131	131	131	131	131
Pre-1914 San Joaquin River Exchange Contractors Claims (816.6 TAF)	131	168	204	221	271	323	452	497	518	580	625
Pre-1914 Chowchilla, Tranquility & James Claims (111.1 TAF)	0	0	0	0	0	0	0	0	0	0	74
Patterson ID 1910 Claims (60.2 TAF)	0	0	0	0	0	0	0	0	0	0	0
Post-1914 USBR Claims (623.2 TAF)	0	0	0	0	0	0	0	0	0	0	0
Remaining Flow, July-December	157	179	214	246	250	312	396	475	572	542	942
Paramount Riparian Claims (171.7 TAF)	40	40	40	40	40	40	40	40	40	40	40
Pre-1914 San Joaquin River Exchange Contractors Claims (816.6 TAF)	117	139	173	191	191	191	191	191	191	191	191
Pre-1914 Chowchilla, Tranquility & James Claims (111.1 TAF)	0	0	0	15	19	26	26	26	26	26	26
Patterson ID 1910 Claims (60.2 TAF)	0	0	0	0	0	14	14	14	14	14	14
Post-1914 USBR Claims (623.2 TAF)	0	0	0	0	0	40	124	146	146	146	146
Total Riparian Claims Yield	172	172	172	172	172	172	172	172	172	172	172
Total SJREC Claims Yield	248	307	377	413	463	515	643	689	709	772	817
Total Chowchilla, et al, Yield	0	0	0	15	19	26	26	26	26	26	100
Total Patterson ID Yield	0	0	0	0	0	14	14	14	14	14	14
Total USBR Yield	0	0	0	0	0	40	124	146	146	146	146

Sources: DWR, SWRCB, C-WIN. Totals May not sum due to effects of rounding.
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No comments

- n/a -

No comments

- n/a -

Appendix D

Section D.2
Unimpaired Flow Hydrology

No comments

- n/a -

Unimpaired Flow Hydrology for Trinity, Sacramento, and San Joaquin River Basins
(Thousands of Acre-Feet)

Indicator	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	Regulated Period Total	Regulated Period as % of Total Flow
														November Through June	
Trinity River at Lewiston															
Minimum Flow	0	4	7	10	14	19	37	27	7	2	0	0	200	176	85.9%
Maximum Flow	134	413	544	552	648	515	380	662	514	248	77	35	2,990	2,587	98.9%
Average Flow	17	52	102	130	153	181	209	249	129	40	13	8	1,283	1,205	94.0%
10th Percentile	3	10	18	26	46	80	111	111	42	11	4	1	679	624	90.7%
20th Percentile	7	13	24	34	59	100	141	150	59	17	6	3	789	743	92.4%
25th Percentile	8	15	28	43	76	114	147	160	63	19	7	4	824	785	92.9%
30th Percentile	9	17	36	47	83	134	160	178	77	20	7	4	866	838	93.3%
40th Percentile	10	22	43	69	111	147	185	201	86	24	9	6	1,025	968	93.9%
Median Flow	12	33	59	93	130	165	207	223	97	27	10	7	1,133	1,064	94.5%
60th Percentile	14	42	86	120	153	179	234	262	110	35	12	8	1,424	1,341	94.9%
70th Percentile	16	54	119	149	167	199	252	282	156	42	15	10	1,582	1,455	95.3%
75th Percentile	17	66	149	173	195	214	260	307	178	48	16	10	1,611	1,529	95.6%
80th Percentile	19	76	163	209	234	230	270	339	204	55	18	12	1,683	1,599	95.8%
90th Percentile	29	128	240	295	286	312	316	411	254	73	23	16	2,035	1,930	96.7%
Sacramento River to Feather Confluence (including Pit River,														November Through June	
Minimum Flow	201	223	259	284	321	352	290	284	238	203	177	184	3,825	2,633	68.8%
Maximum Flow	1,377	2,897	4,792	6,915	6,817	7,171	3,556	2,481	1,851	771	477	442	25,936	23,892	93.3%
Average Flow	356	594	1,210	1,778	1,944	1,838	1,380	955	564	363	302	299	11,583	10,263	86.9%
10th Percentile	243	265	322	449	554	728	610	459	327	265	220	219	5,572	4,638	81.4%
20th Percentile	258	313	421	576	758	983	786	578	386	283	241	242	6,984	5,876	83.3%
25th Percentile	271	324	480	653	911	1,079	808	605	403	295	254	250	7,371	6,170	84.3%
30th Percentile	287	341	509	693	1,017	1,186	835	646	418	302	266	266	7,877	6,806	85.3%
40th Percentile	308	379	624	931	1,221	1,360	985	752	456	319	280	274	8,860	7,721	86.5%
Median Flow	325	430	876	1,321	1,589	1,518	1,123	812	481	334	296	300	10,162	9,163	87.8%
60th Percentile	351	486	1,039	1,645	2,044	1,714	1,326	955	546	375	318	320	13,046	11,451	88.8%
70th Percentile	381	622	1,274	2,156	2,351	2,134	1,656	1,121	612	400	341	335	14,151	12,658	89.9%
75th Percentile	405	651	1,474	2,445	2,585	2,293	1,830	1,255	661	408	352	340	14,945	13,688	90.6%
80th Percentile	420	758	2,062	2,858	2,795	2,456	2,073	1,343	706	431	358	346	15,697	14,434	91.1%
90th Percentile	451	1,132	2,690	3,890	3,921	3,292	2,531	1,568	917	493	378	376	19,369	17,849	92.1%

Sources: California Department of Water Resources, 2007;
California Water Impact Network.

No comments

- n/a -

Unimpaired Flow Hydrology for Trinity, Sacramento, and San Joaquin River Basins
(Thousands of Acre-Feet)

Indicator	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	Regulated Period Total	Regulated Period as % of Total Flow
Feather River														November Through June	
Minimum Flow	53	57	62	69	89	92	100	101	64	63	58	46	995	733	73.7%
Maximum Flow	855	1,240	1,997	2,539	2,678	2,283	1,830	1,700	1,122	370	197	154	9,418	8,608	91.4%
Average Flow	106	191	376	497	555	663	682	638	324	151	100	87	4,370	3,926	89.8%
10th Percentile	63	73	96	132	181	279	307	216	109	86	67	59	2,007	1,705	84.9%
20th Percentile	70	92	119	155	220	369	379	316	159	98	74	65	2,511	2,150	85.6%
25th Percentile	73	100	126	160	247	396	416	361	176	106	81	72	2,638	2,270	86.1%
30th Percentile	77	107	139	184	303	415	471	402	186	113	84	73	2,932	2,562	87.4%
40th Percentile	82	121	168	263	366	465	528	444	220	119	91	78	3,251	2,893	89.0%
Median Flow	93	132	205	320	467	540	611	537	241	134	96	86	3,854	3,466	89.9%
60th Percentile	103	144	270	402	565	646	686	631	294	142	103	89	4,596	4,201	91.4%
70th Percentile	110	178	349	554	674	743	837	784	342	164	108	97	5,673	5,160	91.0%
75th Percentile	114	194	405	668	748	782	885	838	401	173	112	99	5,767	5,260	91.2%
80th Percentile	120	219	550	724	781	870	932	939	453	198	118	104	6,268	5,583	89.1%
90th Percentile	143	337	859	1,131	1,103	1,216	1,134	1,168	662	253	143	120	7,095	6,470	91.2%
Yuba River														November Through June	
Minimum Flow	0	13	17	20	29	35	58	78	17	6	0	0	370	324	87.6%
Maximum Flow	451	677	1,341	1,482	1,351	993	885	929	713	275	66	45	4,925	4,729	96.0%
Average Flow	32	90	200	266	293	330	362	411	206	56	23	19	2,287	2,157	94.3%
10th Percentile	13	21	33	47	84	148	189	161	44	15	9	10	921	884	96.0%
20th Percentile	17	29	43	63	127	199	231	229	75	21	12	13	1,231	1,151	93.5%
25th Percentile	17	31	48	82	143	213	249	265	89	25	13	13	1,363	1,268	93.0%
30th Percentile	19	35	57	100	155	218	263	282	107	27	14	15	1,521	1,438	94.5%
40th Percentile	22	39	74	133	186	244	307	330	127	34	18	17	1,826	1,746	95.6%
Median Flow	25	48	108	156	240	281	336	397	162	38	19	19	2,123	2,006	94.5%
60th Percentile	29	59	134	224	292	320	403	461	203	46	24	20	2,428	2,280	93.9%
70th Percentile	33	72	189	309	344	373	429	506	246	63	27	22	2,949	2,780	94.3%
75th Percentile	34	91	248	354	411	394	454	539	284	67	29	23	3,164	2,993	94.6%
80th Percentile	36	107	286	400	452	421	491	564	309	84	32	25	3,284	3,079	93.8%
90th Percentile	43	174	414	573	566	578	539	708	428	108	42	30	3,765	3,681	97.8%

Sources: California Department of Water Resources, 2007;
California Water Impact Network.

No comments

- n/a -

Unimpaired Flow Hydrology for Trinity, Sacramento, and San Joaquin River Basins
(Thousands of Acre-Feet)

Indicator	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	Regulated Period Total	Regulated Period as % of Total Flow
														November Through June	
Bear River															
Minimum Flow	0	0	0	0	2	1	0	0	0	0	0	0	13	9	69.2%
Maximum Flow	85	108	225	244	313	208	175	60	52	36	33	18	740	736	99.5%
Average Flow	4	14	41	62	69	61	38	17	7	3	2	2	320	309	96.6%
10th Percentile	0	1	6	9	14	16	7	4	0	0	0	0	102	102	99.2%
20th Percentile	0	3	10	13	21	26	13	6	2	0	0	0	137	130	95.2%
25th Percentile	1	4	12	15	25	31	14	8	3	0	0	0	171	165	96.8%
30th Percentile	1	5	14	19	27	35	18	10	3	1	0	0	181	177	97.7%
40th Percentile	2	6	18	30	35	41	22	12	4	2	0	1	247	239	96.7%
Median Flow	3	8	23	43	52	50	25	15	5	2	1	1	290	278	95.9%
60th Percentile	4	10	31	52	67	61	34	18	7	3	1	2	384	365	95.3%
70th Percentile	5	14	38	70	88	71	49	20	8	3	2	2	434	410	94.5%
75th Percentile	5	16	54	93	104	76	56	22	10	4	2	3	462	453	98.1%
80th Percentile	6	18	65	111	113	88	62	25	11	5	3	3	489	482	98.6%
90th Percentile	7	32	112	152	146	121	74	40	14	7	3	4	567	553	97.5%
														November Through June	
American River															
Minimum Flow	0	6	3	11	24	42	75	92	17	0	0	0	349	334	95.7%
Maximum Flow	335	985	1,509	1,988	1,866	1,172	1,254	1,136	942	382	90	61	6,380	5,842	91.6%
Average Flow	25	85	200	298	325	387	441	501	265	66	16	12	2,621	2,503	95.5%
10th Percentile	9	15	25	44	95	153	212	180	48	5	0	2	1,041	984	94.5%
20th Percentile	11	21	35	58	119	212	264	260	86	13	3	4	1,252	1,188	94.9%
25th Percentile	12	26	42	70	138	228	292	283	107	16	4	5	1,416	1,363	96.3%
30th Percentile	13	30	48	98	153	239	309	326	131	20	6	6	1,613	1,556	96.5%
40th Percentile	15	34	81	124	205	293	372	401	169	33	10	8	2,023	1,983	98.0%
Median Flow	17	44	99	159	257	341	417	487	222	42	13	10	2,521	2,422	96.1%
60th Percentile	19	53	128	255	317	382	462	553	282	62	17	12	2,844	2,731	96.0%
70th Percentile	22	63	164	353	361	440	528	627	352	84	19	14	3,300	3,140	95.2%
75th Percentile	26	77	184	421	425	449	554	653	375	88	21	15	3,554	3,311	93.2%
80th Percentile	29	90	276	486	513	528	589	692	422	96	25	17	3,886	3,687	94.9%
90th Percentile	36	161	458	635	696	665	657	901	516	134	34	21	4,525	4,340	95.9%

Sources: California Department of Water Resources, 2007;
California Water Impact Network.

No comments

- n/a -

Unimpaired Flow Hydrology for Trinity, Sacramento, and San Joaquin River Basins
(Thousands of Acre-Feet)

Indicator	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	Regulated Period Total	Regulated Period as % of Total Flow
														November Through June	
Sacramento Valley Total															
Minimum Flow	302	324	353	386	482	548	527	582	398	287	244	259	5,584	4,065	72.8%
Maximum Flow	3,185	5,129	9,730	12,592	13,050	11,922	7,687	5,762	4,257	1,701	794	670	48,368	44,187	91.4%
Average Flow	527	998	2,076	3,013	3,299	3,343	2,939	2,526	1,387	646	444	420	21,619	19,581	90.6%
10th Percentile	344	399	487	682	972	1,409	1,326	1,072	526	389	303	305	10,049	8,779	87.4%
20th Percentile	373	453	636	870	1,350	1,848	1,716	1,415	756	431	345	336	12,363	10,624	85.9%
25th Percentile	390	504	710	979	1,620	2,019	1,783	1,558	870	460	368	345	13,599	11,909	87.6%
30th Percentile	403	521	791	1,076	1,691	2,154	1,989	1,686	886	484	380	366	14,670	13,051	89.0%
40th Percentile	419	585	1,014	1,571	2,074	2,503	2,281	2,092	1,018	517	400	388	16,461	14,710	89.4%
Median Flow	462	660	1,303	2,094	2,705	2,639	2,737	2,258	1,143	569	419	414	19,436	17,687	91.0%
60th Percentile	510	820	1,609	2,722	3,387	3,163	3,000	2,550	1,312	610	463	442	23,670	21,209	89.6%
70th Percentile	539	954	2,059	3,671	3,882	3,796	3,397	2,986	1,471	715	488	475	27,725	25,397	91.6%
75th Percentile	573	1,052	2,456	4,160	4,512	4,069	3,653	3,287	1,776	750	508	485	28,202	26,048	92.4%
80th Percentile	594	1,236	3,492	4,803	5,008	4,442	4,216	3,640	1,921	798	552	510	30,108	27,965	92.9%
90th Percentile	681	1,977	4,271	6,604	6,460	5,715	5,008	4,537	2,519	1,025	590	534	35,614	33,016	92.7%
														February Through June	
Stanislaus River															
Minimum Flow	0	2	3	3	1	13	35	44	11	0	0	0	155	107	69.0%
Maximum Flow	88	366	412	659	532	415	433	595	632	286	77	38	2,950	3,266	110.7%
Average Flow	10	28	53	82	96	128	192	283	176	53	13	7	1,120	957	85.5%
10th Percentile	3	6	9	13	23	51	100	101	41	7	2	1	457	382	83.7%
20th Percentile	4	7	12	18	33	71	123	163	59	13	4	2	592	500	84.4%
25th Percentile	5	8	13	23	40	78	136	175	71	16	5	3	637	551	86.4%
30th Percentile	6	9	14	25	45	82	152	188	96	20	6	3	680	566	83.3%
40th Percentile	7	10	19	34	55	97	173	238	127	27	7	4	894	740	82.7%
Median Flow	8	14	25	42	72	105	192	281	167	36	9	5	1,107	822	74.3%
60th Percentile	10	17	32	59	98	124	207	322	193	51	11	5	1,265	994	78.6%
70th Percentile	11	23	45	88	108	143	227	355	223	63	14	7	1,359	1,077	79.2%
75th Percentile	12	27	50	104	115	154	246	375	240	72	17	8	1,460	1,127	77.2%
80th Percentile	12	31	58	117	130	161	254	390	248	83	19	10	1,559	1,180	75.7%
90th Percentile	16	48	124	179	195	233	275	439	331	111	26	13	1,912	1,459	76.3%

Sources: California Department of Water Resources, 2007;
California Water Impact Network.

No comments

- n/a -

Unimpaired Flow Hydrology for Trinity, Sacramento, and San Joaquin River Basins
(Thousands of Acre-Feet)

Indicator	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	Regulated Period Total	Regulated Period as % of Total Flow
Tuolumne River														February Through June	
Minimum Flow	0	1	4	5	8	23	79	106	17	10	0	0	384	330	85.9%
Maximum Flow	153	522	650	1,033	616	579	660	960	1,016	652	205	104	4,632	2,904	62.7%
Average Flow	17	48	88	125	147	191	274	446	353	123	26	12	1,851	1,411	76.2%
10th Percentile	4	8	13	22	42	86	162	214	90	17	3	1	836	675	80.8%
20th Percentile	5	9	20	33	60	117	186	294	137	22	6	3	1,053	898	85.3%
25th Percentile	6	12	24	40	64	125	195	326	158	28	8	3	1,107	961	86.8%
30th Percentile	7	14	27	43	70	129	221	347	222	36	10	4	1,183	984	83.2%
40th Percentile	9	17	35	56	88	146	248	380	291	57	14	5	1,416	1,189	83.9%
Median Flow	11	24	48	78	119	160	266	449	336	70	18	7	1,786	1,299	72.7%
60th Percentile	12	35	58	107	145	178	290	495	401	109	21	10	2,030	1,578	77.8%
70th Percentile	16	48	81	133	166	216	319	537	451	142	27	13	2,181	1,704	78.1%
75th Percentile	18	55	93	150	193	232	328	551	476	161	30	16	2,363	1,755	74.2%
80th Percentile	21	68	106	178	231	255	344	574	529	189	34	18	2,483	1,852	74.6%
90th Percentile	39	96	218	258	308	338	385	658	598	302	55	22	3,093	2,188	70.8%
Merced River														February Through June	
Minimum Flow	0	1	1	3	3	8	31	39	13	4	0	0	151	128	44.5%
Maximum Flow	51	259	373	634	362	370	429	565	656	352	97	47	2,786	1,837	93.6%
Average Flow	7	20	43	66	85	101	147	241	171	56	13	6	956	746	80.6%
10th Percentile	1	4	5	10	19	37	80	102	43	8	2	0	409	326	79.8%
20th Percentile	2	5	8	13	26	52	93	135	53	11	3	0	492	432	87.8%
25th Percentile	2	6	10	16	30	56	101	163	69	15	4	1	527	459	87.0%
30th Percentile	3	6	10	20	34	60	113	175	83	18	4	1	562	471	83.8%
40th Percentile	4	8	16	23	47	69	129	205	114	26	6	2	669	568	84.9%
Median Flow	5	9	22	37	55	82	142	246	147	33	8	4	906	648	71.5%
60th Percentile	6	14	28	48	73	96	158	268	171	45	11	5	1,077	805	74.8%
70th Percentile	7	18	34	66	104	115	171	290	208	52	13	6	1,160	924	79.7%
75th Percentile	9	21	42	82	118	131	181	309	227	62	15	7	1,220	977	80.1%
80th Percentile	11	22	52	95	148	152	192	321	261	79	17	8	1,389	1,030	74.1%
90th Percentile	16	41	100	159	201	167	216	387	335	122	31	12	1,708	1,223	71.6%

Sources: California Department of Water Resources, 2007;
California Water Impact Network.

No comments

- n/a -

Unimpaired Flow Hydrology for Trinity, Sacramento, and San Joaquin River Basins
(Thousands of Acre-Feet)

Indicator	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL	Regulated Period Total	Regulated Period as % of Total Flow
San Joaquin River														February Through June	
Minimum Flow	5	6	7	10	11	19	57	75	35	16	9	4	361	277	54.7%
Maximum Flow	126	247	461	735	472	485	613	1,096	1,166	752	280	170	4,642	2,896	88.3%
Average Flow	19	33	59	83	103	144	236	432	374	168	52	24	1,728	1,289	76.6%
10th Percentile	7	10	15	18	30	67	127	209	121	41	14	8	813	656	80.7%
20th Percentile	10	13	16	24	42	83	155	240	148	46	18	10	928	749	80.7%
25th Percentile	10	15	19	28	49	89	166	273	172	51	21	11	1,052	839	79.7%
30th Percentile	11	16	21	33	55	95	173	314	212	58	23	12	1,128	881	78.2%
40th Percentile	13	17	31	40	63	108	203	372	278	91	28	14	1,257	1,007	80.1%
Median Flow	16	22	36	48	76	119	234	419	325	115	34	15	1,449	1,137	78.5%
60th Percentile	19	26	43	67	99	134	249	464	373	145	42	18	1,854	1,458	78.7%
70th Percentile	21	33	54	82	113	162	279	509	476	181	51	22	2,047	1,572	76.8%
75th Percentile	24	37	62	95	134	174	289	543	500	213	63	27	2,195	1,623	73.9%
80th Percentile	25	42	73	112	163	201	308	594	581	266	73	33	2,322	1,779	76.6%
90th Percentile	34	66	114	168	208	232	350	704	642	364	125	42	3,018	2,075	68.8%
San Joaquin Valley Total														February Through June	
Minimum Flow	9	13	17	23	25	65	204	266	76	36	11	7	1,061	879	45.8%
Maximum Flow	426	1,535	2,213	3,813	2,315	2,603	2,578	3,563	3,792	2,151	731	346	18,977	12,250	90.8%
Average Flow	55	140	280	425	529	668	929	1,467	1,117	413	107	50	6,181	4,711	78.7%
10th Percentile	16	29	47	67	124	266	501	629	304	78	24	13	2,535	2,033	80.2%
20th Percentile	25	40	60	101	180	366	559	836	401	95	34	18	3,273	2,732	83.5%
25th Percentile	28	43	67	124	200	381	631	982	475	107	40	20	3,381	2,921	86.4%
30th Percentile	30	48	75	134	226	403	685	1,044	612	135	43	21	3,626	2,966	81.8%
40th Percentile	35	52	105	174	281	448	785	1,225	839	213	52	27	4,385	3,623	82.6%
Median Flow	39	69	140	222	370	520	901	1,404	970	251	68	31	5,896	4,187	71.0%
60th Percentile	47	98	198	357	488	625	954	1,639	1,157	346	92	38	6,559	5,069	77.3%
70th Percentile	56	130	244	419	614	726	1,084	1,732	1,394	447	106	44	7,393	5,752	77.8%
75th Percentile	63	147	268	481	763	826	1,135	1,880	1,496	489	121	58	7,934	5,947	74.9%
80th Percentile	72	187	330	616	875	971	1,154	1,925	1,653	623	132	67	8,667	6,347	73.2%
90th Percentile	95	271	615	977	1,224	1,147	1,462	2,451	2,070	948	243	84	11,004	7,891	71.7%

Sources: California Department of Water Resources, 2007;
California Water Impact Network.

No comments

- n/a -

Appendix D

Section D.3
Adjudication Decree Quantifications

Butte Creek Decree
Butte County Decree No. 18917
Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through October 15	198.00	days
March 1 through October 15	229.00	days

Claimants	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Total, cfs	Total, AF
Schedule 3, Foreign Water Rediversion Group													
Dayton Mutual Water Company	1,706.30	50	Parrott Ditch and Crouch Lateral	3.33	2,414.63							3.33	2,414.63
M & T Incorporated	3,620.00	50	Parrott Ditch and Edgar Slough	3.33	2,414.63	50.00	36,223.14					53.33	38,637.78
Parrott Investment Company	17,427.00	50	Parrott Ditch and Edgar Slough	3.33	2,414.63	50.00	36,223.14					53.33	38,637.78
Subtotal, Schedule 3, Foreign Water Rediversion Group	**22,843.30**			**10.00**	**7,243.90**	**100.00**	**72,446.28**	**0.00**	**0.00**	**0.00**	**0.00**	**110.00**	**79,690.18**
Schedule 4, Nonconsumptive Claimants on Butte Creek and Tributaries													
Harold B Rathwell	Power	27	Unnamed Spring	0.20	144.89							0.20	144.89
Almon E Smith	Mining	26	Ethel	1.90	1,376.48							1.90	1,376.48
David S Webb and Mary D Webb	Mining	13	Webb	0.15	108.67							0.15	108.67
Herbert W Whitten, Marjorie C Whitten, Olive M Young, George Mead, Anna Mead, T H Polk, and Lucia V Polk	Mining	26A, 26B, 28A	Eureka Middle, Eureka Pump, Eureka Little	3.45	2,499.40							3.45	2,499.40
Jack L Post	Mining	28	La Monte	12.90	9,345.57							12.90	9,345.57
Jack L Post	Mining	28B	Post Pump	0.85	615.79							0.85	615.79
W J McGann and Elizabeth T Cussick	Potable Domestic	36	Davis	0.50	362.23							0.50	362.23
Grace D Taylor	Potable Domestic	37	Thomas	0.50	362.23							0.50	362.23
L H McLain and C J McLain	Mining	45A, 45B	Butte Bell, McLain Sluice	0.90	652.02							0.90	652.02
Margaret A Smith	Mining	46	Smith	2.50	1,811.16							2.50	1,811.16
Pacific Gas & Electric Company	Power	45	Butte Creek	88.50	64,114.96							88.50	64,114.96
Pacific Gas & Electric Company	Power	47	Centerville Canal	179.50	130,041.07							179.50	130,041.07
Electric Mining Company	Power	49	Electric Mining Co	305.00	220,961.16							305.00	220,961.16
Subtotal, Schedule 4, Nonconsumptive Claimants on Butte Creek and Tributaries				**596.85**	**432,395.63**							596.85	432,395.63
Schedule 5, Little Butte Creek and Tributaries Claimants Group													
David S Webb and Mary D Webb	Domestic	13	Webb	0.10	72.45							0.10	72.45
Anna Spangler	1.00	13A	Spangler Pipe	0.20	144.89							0.20	144.89
Estate of Ernest Duensing	11.80	14	Duensing	0.25	181.12	0.25	98.18					0.50	279.30
Vandegrift Trust	87.00	20, 20A	Richardson, Richardson	3.00	2,173.39							3.00	2,173.39

No comments

- n/a -

Butte Creek Decree
Butte County Decree No. 18917
Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through October 15	198.00	days
March 1 through October 15	229.00	days

Claimants	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Total, cfs	Total, AF
Paradise Irrigation District	11,100.00	22, 23	Paradise ID, Nickerson		0.00	8.00	3,141.82					8.00	3,141.82
Harold B Rathwell	Domestic	27	Ripley Spring	0.20	144.89							0.20	144.89
S A Vandegrift	Domestic	23A	Vandegrift	0.50	362.23							0.50	362.23
Jack L Post	Domestic	28, 28B	La Monte, Post Pump	0.15	108.67							0.15	108.67
D A Hook, W S Hook, and Lillian M Hook	3.00	24A	Hook	0.10	72.45	0.10	39.27					0.20	111.72
S A Vandegrift	Domestic	24B	Hook	1.00	724.46							1.00	724.46
S A Vandegrift	Domestic	24D	Hook	1.00	724.46							1.00	724.46
Almon E Smith	Domestic	26	Ethel	0.10	72.45							0.10	72.45
Herbert W Whitten, Marjorie C Whitten, Olive M Young, George Mead, Anna Mead, T H Polk, and Lucia V Polk	Domestic	26A, 26B, 28A	Eureka Middle, Eureka Pump, Eureka Little	0.05	36.22							0.05	36.22
Ella G Evers	13.60	30	Todd (Evers)	1.00	724.46	1.00	392.73					2.00	1,117.19
H W Skillin and Alice Skillin	9.40	31	Burke		0.00	0.67	263.13	0.66	259.20			1.33	522.33
H D March and Henrietta March	14.40	31	Burke		0.00	0.67	263.13	0.66	259.20			1.33	522.33
Thurman and Wright	6.00	31	Burke		0.00	0.67	263.13	0.66	259.20			1.33	522.33
George E McLain and C J McLain	17.10	32	McLain	0.10	72.45	0.50	196.36			2.50	981.82	3.10	1,250.63
Subtotal, Schedule 5, Little Butte Creek and Tributaries Group	**11,263.30**			**7.75**	**5,614.59**	**11.86**	**4,657.75**	**1.98**	**777.60**	**2.50**	**981.82**	**24.09**	**12,031.75**
Schedule 6, Upper Butte Creek and Tributaries Claimants (above Little Butte Creek)													
John J Mahan and Wm J Doyle	21.30	6	Cirby Stephenson	0.20	144.89	0.30	117.82					0.50	262.71
E L Franks and Ida May Franks	103.40	7, 8	Upper, Stephenson Lower	0.20	144.89	1.80	706.91					2.00	851.80
L B Stephenson	25.00	8A, 8B, 8C	Abiotene	0.50	362.23	0.50	196.36					1.00	558.60
USDA Lassen Nat'l Forest	10.20	1, 3	Jonesville Bl 1 Pipes, Jones	0.25	181.12	0.25	98.18					0.50	279.30
F K Mickey and J H Minderman	112.00	3, 4	Jones, Mickey-Minderman	1.50	1,086.69	1.50	589.09					3.00	1,675.79
Edwin B Copeland	33.00	3	Jones	0.50	362.23	0.50	196.36					1.00	558.60
J H Lucas and Estate of Wm Johnson	38.30	5	Lucas-Jones	0.20	144.89	0.50	196.36					0.70	341.26
J H Lucas and Estate of Wm Johnson	150.00	5B	Colby Creek	0.50	362.23	1.50	589.09					2.00	951.32
J H Lucas and Estate of Wm Johnson	70.00	5A	Willow Creek	0.25	181.12	0.35	137.45					0.60	318.57
Anne Kennedy Anderson, Donald Mathewson, and Winifred M Kennedy	10.00	5A	Willow Creek	0.05	36.22	0.20	78.55					0.25	114.77
W J McGann and Elizabeth T Cusick	57.90	9A	McGann Springs, Davis	0.20	144.89	0.80	314.18					1.00	459.07

No comments

- n/a -

Butte Creek Decree
Butte County Decree No. 18917
Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through October 15	198.00	days
March 1 through October 15	229.00	days

Claimants	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Total, cfs	Total, AF
W J McGann and Elizabeth T Cusick	200.00	36	Davis	0.25	181.12	0.10	39.27					0.35	220.39
J H Lucas, G W Lucas, and C F Lucas	32.90	9, 9A	Lucas Springs, McGann Springs	0.20	144.89	0.60	235.64					0.80	380.53
J H Lucas, G W Lucas, and C F Lucas	30.00	36A	Lucas	0.20	144.89	0.50	196.36					0.70	341.26
Grace D Taylor	5.00	37	Thomas	0.25	181.12	0.25	98.18					0.50	279.30
Eleanor Preple Welch	Domestic	39	Welch Pipe	0.01	7.24							0.01	7.24
USDA Lassen Nat'l Forest	Domestic	44	Butte Meadows Pipes	0.10	72.45							0.10	72.45
Pacific Gas & Electric Company	Public Service	45	Butte Creek Canal	1.18	851.24							1.18	851.24
Pacific Gas & Electric Company	Domestic	45	Butte Creek Canal	0.33	235.45							0.33	235.45
Pacific Gas & Electric Company	Domestic	47	Centerville Canal	0.50	362.23							0.50	362.23
L H McLain and C J McLain	Domestic	45A, 45B	Butte Bell, McLain Sluice	0.10	72.45							0.10	72.45
Margaret A Smith	Domestic	46	Smith	0.03	21.73							0.03	21.73
Electric Mining Company	Domestic	49	Electric Mining Co	0.10	72.45							0.10	72.45
Subtotal Schedule 6, Upper Butte Creek and Tributaries Group	**899.00**			**7.59**	**5,498.67**	**9.65**	**3,789.82**	**0.00**	**0.00**	**0.00**	**0.00**	**17.24**	**9,288.49**

No comments

- n/a -

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Claimants	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Total, cfs	Total, AF
Schedule 7, Lower Butte Creek and Tributaries Claimants (Below Little Butte Creek)				First Priority, All Year (cfs)	First Priority, All Year (AF)	First Priority, Apr 1 - Oct 15 (cfs)	First Priority, Apr 1 - Oct 15 (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)		
Dayton Mutual Water Company		50	Parrott and Crouch Lateral	4.80	3,477.42	11.20	4,398.55					16.00	7,875.97
Donald Hale and Alice Hilby Hale	160.20	51	Hale	0.90	652.02	2.10	824.73					3.00	1,476.74
USDA Bureau of Plant Industry	154.50	53	Plant Garden Pump	0.60	434.68	1.40	549.82					2.00	984.50
Clarence S Entler	81.00	54	Compton-Entler	0.33	239.07	0.78	306.33					1.11	545.40
Mary E Roth	75.00	54	Compton-Entler	0.17	123.16	0.39	153.16					0.56	276.32
Bee P Compton	689.00	54	Compton-Entler	0.50	362.23	1.17	457.53					1.67	819.76
Bee P Compton	241.00	54	Compton-Entler	0.50	362.23	1.17	457.53					1.67	819.76
A F Lieurance and Lenore E Lieurance	527.10	55	Marybill	1.20	869.36	3.80	1,492.36					5.00	2,361.72
Parrott Investment Company	211.00	56	Colony Upper	0.60	434.68	1.40	549.82					2.00	984.50
Edwin A Carlson and Gladys Carlson	36.70	56	Colony Upper	0.14	101.42	0.34	133.53					0.48	234.95
D A Hook, W S Hook	30.00	56	Colony Upper	0.12	86.94	0.27	106.04					0.39	192.97
Elmo Jacks and Louise Jacks	24.90	56	Colony Upper	0.09	65.20	0.22	86.40					0.31	151.60
Samuel A Atkins and Barbara Ina Atkins	30.00	56	Colony Upper	0.11	79.69	0.26	102.11					0.37	181.80
Samuel A Atkins and Barbara Ina Atkins	34.00	58	Wakefield Pump	0.13	94.18	0.30	117.82					0.43	212.00
Durham Mutual Water Company, Ltd.	3,566.20	56, 59	Colony Upper, Colony Lower	12.00	8,693.55	32.70	12,842.18					44.70	21,535.74
The Federal Land Bank of Berkeley	156.50	57	Ollinger Pump	0.60	434.68	1.40	549.82					2.00	984.50
Varney F Wakefield	14.00	58	Wakefield Pump	0.05	36.22	0.13	51.05					0.18	87.28
Ralph J Baxter, C W Baxter, and F T Woell, and M B Woell	178.00	56	Colony Upper	0.60	434.68	1.40	549.82					2.00	984.50
Stephen Vernoga	47.30	56	Colony Upper	0.30	217.34	0.70	274.91					1.00	492.25
Corporation of America	20.00	56	Colony Upper	0.12	86.94	0.28	109.96					0.40	196.90
George Setka, Anna Setka, Joe Bebich, Same Bebich, and Steve Vlatkovich	96.70	56	Colony Upper	0.40	289.79	0.94	369.16					1.34	658.95
L E Wheelock and Nellie Wheelock	13.00	56	Colony Upper	0.08	57.96	0.18	70.69					0.26	128.65
George Brandt and Edna May Brandt	50.00	59B	Brandt Pump	0.12	86.94	0.27	106.04					0.39	192.97
Roy White	53.00	60A	Roy White Pump	0.20	144.89	0.46	180.65					0.66	325.55
E L Adams and Lou R Adams	1,191.20	56	Colony Upper					1.48	1,072.20			1.48	1,072.20
E L Adams and Lou R Adams	2,533.20	60	Adams					4.52	3,274.57			4.52	3,274.57
Ralph C Gorrill	2,282.00	61	Gorrill							1.00	724.46	1.00	724.46

No comments

- n/a -

Butte Creek Decree
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March 1 through October 15	229.00	days

Claimants	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Total, cfs	Total, AF
Herbert W Whitten and Marjorie C Whitten	665.30	56, 60	Colony Upper, Adams							0.75	543.35	0.75	543.35
E E White	541.60	62	White Pumps							1.00	724.46	1.00	724.46
Subtotal, Schedule 7, Lower Butte Creek and Tributaries Claimants Group	**13,702.40**			**24.66**	**17,865.25**	**63.25**	**24,840.00**	**6.00**	**4,346.78**	**2.75**	**1,992.27**	**96.66**	**49,044.30**
Additional Continuous Year-Round Usage Claimants - Special Class													
Lovie L Downs	Domestic, Stockwater, Irrigation	17	Downs Spring	0.03	21.73								
Frances B Mahilton, A C Musselman, George P Morse	Domestic, Stockwater, Irrigation	16A, 18	Hamilton Ditches	0.50	362.23								
Joe A Sagi	Domestic, Stockwater, Irrigation	24	Sagi Pipelines	0.15	108.67								
Merritt Musselman and Florence V Musselman	Domestic, Stockwater, Irrigation	18A	Musselman Springs Pipe Line	0.10	72.45								
Elsie Hume Mann	Domestic, Stockwater, Irrigation	35	Mann Spring Pipeline	0.02	14.49								
Fannie M McEnespy	Domestic, Stockwater, Irrigation	33, 34	McEnespy North, McEnespy Main Ditches	1.00	724.46								
Fannie M McEnespy	Domestic, Stockwater, Irrigation	34A	McEnespy Pipe Line and McEnespy Spring Channel	0.10	72.45								
S A Vandegrift	Domestic, Stockwater, Irrigation	24D	Vandegrift Spring Ditch	0.50	362.23								
S A Vandegrift	Domestic, Stockwater, Irrigation	24E	Michaels Ditch	0.15	108.67								
Anna Spangler	Domestic, Stockwater	13A	Spangler Pipe	0.05	36.22								
Estate of Ernest Duensing	Domestic, Stockwater, Irrigation	14A	Duensing Spring Ditch	0.15	108.67								
Vandegrift Trust	Domestic, Stockwater, Irrigation	21	Meadowbrook Ditch	1.00	724.46								
F E Whitlock	Domestic, Stockwater	24F, 25	Hupp Canal	0.20	144.89								

No comments

- n/a -

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Claimants	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Total, cfs	Total, AF
Roy L Pearson, Orval Pearson, Eunice A Cartwright, and Mildred Laughlin	Domestic, Stockwater	24F, 25	Hupp Canal	0.05	36.22								
A P Kundert	Domestic, Stockwater	24F, 25	Hupp Canal	0.05	36.22								
Subtotal, Additional Continuous Usage Claimants				**4.05**	**2,934.07**								
Additional Irrigation Season Usage Claimants - Special Class													
F E Whitlock	Irrigation	24F, 25	Hupp Canal	0.40	289.79								
Roy L Pearson, Orval Pearson, Eunice A Cartwright, and Mildred Laughlin	Irrigation	24F, 26	Hupp Canal	0.05	36.22								
A P Kundert	Irrigation	24F, 27	Hupp Canal	0.05	36.22								
The Diamond Match Company	Domestic, Stockwater, Industrial	10, 10A, 10B, 10C	Diamond Match System	2.00	1,448.93	Continuous							
Richard A Colgan Jr	Domestic, Commercial	40	Colgan Pipe Line	0.14	101.42	Continuous							
F K Mickey and J H Minderman	Domestic, Stockwater	2	Mickey-Minderman Pipe Line	0.07	50.71	Continuous							
Edwin B Copeland	Domestic, Stockwater	Riparian		0.20	144.89	Continuous							
J H Lucas	Domestic, Stockwater, Irrigation	Riparian		0.40	289.79	Continuous							
Carl Nelson Swartz and Esther M Swartz	Domestic, Stockwater, Irrigation	Riparian		0.15	108.67	Continuous							
E L Adams and Lou R Adams	Domestic, Stockwater	64, 65	Adams Hamlin Slough Ditch, Adams Hamlin Pump	0.82	594.06	Continuous	Riparian						
E L Adams and Lou R Adams	Irrigation	64, 65	Adams Hamlin Slough Ditch, Adams Hamlin Pump	3.00	916.36	May 1 - Oct 1							
E L Adams and Lou R Adams	Domestic, Stockwater	64, 65	Adams Hamlin Slough Ditch, Adams Hamlin Pump	1.00	724.46	Continuous	Riparian						

No comments

- n/a -

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Claimants	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Total, cfs	Total, AF
E L Adams and Lou R Adams	Irrigation	64, 65	Adams Hamlin Slough Ditch, Adams Hamlin Pump	3.58	1,093.53	May 1 - Oct 1							
Herbert W Whitten and Marjorie C Whitten	Domestic	64, 65	Adams Hamlin Slough Ditch, Adams Hamlin Pump	0.60	434.68	Continuous	Riparian						
Herbert W Whitten and Marjorie C Whitten	Irrigation	64, 65	Adams Hamlin Slough Ditch, Adams Hamlin Pump	3.00	916.36	May 1 - Oct 1							
Ralph C Gorrill	Domestic, Stockwater	66	Gorrill-Hamlin Ditch	1.00	724.46	Continuous	Riparian						
Ralph C Gorrill	Irrigation	66	Gorrill-Hamlin Ditch	14.00	2,138.18	Apr 15 - Jun 30							
E L Adams and Lou R Adams	Irrigation	64, 65	Adams Hamlin Slough Ditch, Adams Hamlin Pump	3.22	1,168.78	Apr 1 - Sep 30							
Herbert W Whitten and Marjorie C Whitten	Irrigation	64, 65	Adams Hamlin Slough Ditch, Adams Hamlin Pump	1.38	459.85	Apr 1 - Sep 15							
Ralph C Gorrill	Irrigation	66	Gorrill-Hamlin Ditch	6.70	1,209.32	Apr 1 - Jun 30							
Ralph C Gorrill	Irrig	66	Gorrill-Hamlin Ditch	21.70	3,314.18	Jul 1 - Sep 15							
Subtotal, Additional Irrigation Season Usage Claimants				**63.46**	**16,200.87**								
Surplus Class Rights Claimants													
Paradise Irrigation District	Irrigation	22	Magalia Reservoir	Little Butte Creek	9,500.00	Subject to completion of Permit 271							
Paradise Irrigation District	Domestic, Stockwater	22	Magalia Reservoir	Little Butte Creek	0.00	Continuous							
Ralph C Gorrill	Irrigation	61	Gorrill Ditch	14.00	2,526.94	Jul 1 - Sep 30							
E L Adams and Lou R Adams	Irrigation	56, 60	Colony Upper, Adams	9.80	3,557.16	Apr 1 - Sep 30							
Herbert W Whitten and Marjorie C Whitten	Irrigation	56, 60	Colony Upper, Adams	3.45	1,252.26	Apr 1 - Sep 30							

No comments

- n/a -

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Claimants	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Total, cfs	Total, AF
E L Adams and Lou R Adams	Irrigation	56, 60	Colony Upper, Adams	4.60	693.42	Apr 1 - Jun 15							
E L Adams and Lou R Adams	Irrigation	56, 60	Colony Upper, Adams	1.00	150.74	Apr 1 - Jun 15							
Herbert W Whitten and Marjorie C Whitten	Irrigation	56, 60	Colony Upper, Adams	2.40	361.79	Apr 1 - Jun 15							
Ralph C Gorrill	Irrigation	61	Gorrill Ditch	15.00	5,444.63	Apr 1 - Sep 30							
Ralph C Gorrill	Irrigation	61	Gorrill Ditch	6.70	2,431.93	Jul 1 - Sep 30							
E E White	Irrig	62	White Pumps	9.50	3,448.26	Apr 1 - Sep 30							
Parrott Investment Company	Domestic	50	Parrott Ditch	5.00	1,668.60	Oct 16 - Mar 31							
M & T Incorporated	Domestic	50	Parrott Ditch	5.00	1,668.60	Oct 16 - Mar 31							
Parrott Investment Company	Domestic, Stockwater, Irrigation	50	Parrott Ditch	25.00	9,818.18	Apr 1 - Oct 15							
M & T Incorporated	Domestic, Stockwater, Irrigation	50	Parrott Ditch	25.00	9,818.18	Apr 1 - Oct 15							
California Lands, Inc			Butte Creek	2.50	1,811.16	Continuous							
Yuba Consolidated Gold Fields			Butte Creek	2.50	1,811.16	Continuous							
Western Canal Company	Irrigation	63	Western Canal	33.33	5,024.29	Apr 1 - Jun 15							
Subtotal, Additional Surplus Class Claimants				**164.78**	**60,987.30**								

No comments

- n/a -

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Summary	**Total, cfs**	**Total, AF**											
Schedule 3, Foreign Water Rediversion Group	110.00	79,690.18											
Schedule 4, Nonconsumptive Claimants on Butte Creek and Tributaries	596.85	432,395.63											
Schedule 5, Little Butte Creek and Tributaries Claimants Group	24.09	12,031.75											
Schedule 6, Upper Butte Creek and Tributaries Claimants (above Little Butte Creek)	17.24	9,288.49											
Schedule 7, Lower Butte Creek and Tributaries Claimants (Below Little Butte Creek)	96.66	49,044.30											
Additional Continuous Year-Round Usage Claimants - Special Class	4.05	2,934.07											
Additional Irrigation Season Usage Claimants - Special Class	63.46	16,200.87											
Subtotal, Consumptive Use Claimants in Butte Creek System	**315.50**	**169,189.68**											
Subtotal, Basic Claimants to Butte Creek System Flows	**912.35**	**601,585.30**											
Subtotal, Additional Surplus Class Claimants	164.78	60,987.30											
Total, All Consumptive Use Claimants to Butte Creek System	**480.28**	**230,176.97**											
Total, All Claimants to Butte Creek System	**1,077.13**	**662,572.60**											

No comments

- n/a -

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
Schedule 3, Claimants from Wolf Creek and Its Tributaries										
David J. Anderson	16.40	130C	Haun Creek Camp	0.30	217.34				0.00	217.34
David J. Anderson	24.00	130D	Haun Creek Springs	0.40	289.79				0.00	289.79
Setzer Forest Products, Inc.	Domestic	59A	Setzer Camp Pipeline	0.05	36.22					36.22
Bidwell Water Company	Municipal	64	Round Valley Reservoir	2.00	1,448.93					1,448.93
Bidwell Water Company	7.10	65	Kauffman	0.10	72.45	0.10	48.60			121.04
Alford S. Calais & Nellie E. Calais	10.00	66	Short and Morel	0.07	50.71	0.11	53.45			104.17
John Rilea	4.00	66	Short and Morel	0.03	21.73	0.04	19.44			41.17
H.A. Morel & Mabel Francis Morel	24.50	66	Short and Morel	0.10	72.45	0.15	72.89			145.34
Albert E. McKeen & Randall H Smith	30.30	76	Pecks Valley	0.50	362.23					362.23
Reese L Jones	1.50	76A	Jones	0.15	108.67					108.67
Delfina Taddei	12.60	77	Taddei	0.25	181.12					181.12
A P Podretti	12.60	77	Taddei	0.25	181.12					181.12
Wolf Creek Timber Co., Inc.	Industrial	61	Cedar Mill Lower Pump	0.10	72.45					72.45
Setzer Forest Products, Inc.	Industrial	62	Clark	0.28	136.07					136.07
Setzer Forest Products, Inc.	Industrial	63	Setzer Standby Pump							0.00
Setzer Forest Products, Inc.	15.00	63A	Setzer Standby Pump							0.00
Helen J. Shiell	145.50	62	Clark	0.70	340.17					340.17
E T Kunzler & Edna M Kunzler	125.40	62	Clark	0.70	507.12					507.12
E T Kunzler & Edna M Kunzler		78	Williams Creek	0.50	362.23	0.20	97.19			459.42
H G McCune	82.70	67, 79	Schieser Gott Williams Creek	0.10	72.45	0.75	364.46			436.91
A.O. Lewis	249.00	67	Schieser	0.45	326.01	2.25	1,093.39			1,419.40
Wesley T Wheeler & Idell C Wheeler	94.30	67	Schieser	0.10	72.45	0.45	218.68	0.50	242.98	534.10
United States of America	66.60	67	Schieser	0.05	36.22	0.30	145.79	0.35	170.08	352.09
C G Frederickson & Helen V Frederickson	193.60	68	Frederickson & Forgay Hamblin Spring	0.38	271.67	1.88	911.16			1,182.83
Dan Guidici and James Guidici	334.00	68	Frederickson & Forgay	0.38	271.67	1.88	911.16			1,182.83
Dan Guidici and James Guidici		70, 72	Forgay	0.20	144.89	1.40	680.33			825.22
R Avery Sheehan and Sarah Sheehan	167.10	69, 71	McIntosh	0.15	108.67	0.87	422.78	0.73	354.74	886.19

No comments

- n/a -

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
L E Wheelock & C H Wheelock	95.60	69, 73	McIntosh, Wheelock	0.05	36.22	0.53	257.55	0.42	204.10	497.88
W B Ferry R L Perry, Ivy Mae Heald and Susie Perry (Rogers)	126.90	69, 73, 74	McIntosh, Wheelock, Perry	0.05	36.22			1.35	656.03	692.26
Subtotals, Schedule 3 - Wolf Creek Group	**1,838.70**			**8.38**	**5,837.26**	**10.90**	**5,296.86**	**3.35**	**1,627.93**	**12,762.05**
Schedule 4: Claimants from Lights Creek and Its Tributaries										
United States of America	3.00	85B	Morton Creek	0.15	108.67					108.67
William M Hosken	219.00	80, 80A	Hosken Cooks Creek; Proposed Hosken Pump		0.00	1.50	728.93			728.93
Fred Ratcliffe-Smith & Mildred Ratcliffe-Smith	62.00	81	Smiths Cooks Creek	0.50	362.23	0.50	242.98			605.21
Martin A Maier & Cleo B Maier	35.00	82	Burns Cooks Creek	0.20	144.89	0.25	121.49			266.38
W S Quigley & Icie A Quigley	20.90	83	Quigley Pasture	0.20	144.89	0.10	48.60			193.49
W S Quigley & Icie A Quigley	37.00	84	Quigley Meadow		0.00	0.45	218.68			218.68
Walter E Cliff & Ruth M Cliff	66.60	85	Cliff Cooks Creek	0.10	72.45	0.38	182.23			254.68
J B Peter	157.70	96	Peter Creek	1.00	724.46	1.00	485.95			1,210.41
J B Peter		97	Peter Creek Barn							0.00
J B Peter		98	Peter Creek Upper Field							0.00
J B Peter		99	Peter Creek Lower Field							0.00
Arthur Peter and Emma A Peter	14.30	100	A. Peter			0.20	97.19			97.19
Dora Johnson	69.10	103	Road Dam	0.10	72.45	0.75	364.46			436.91
A J Downey and D W Downey	Power	86, 87	Downey Upper, Downey Lower	1.50	1,086.69					1,086.69
California-Engles Mining Company	Domestic & Industrial	87A	Engels	0.10	72.45		0.00			72.45
Hattie Potts	10.00	87B	Potts	0.10	72.45	0.10	48.60			121.04
James T Freeman & Elma L Freeman	87.70	88	Freeman & Bates	0.40	289.79	1.05	510.25			800.03
E B Bates and Minnie Bates	87.80	88	Freeman & Bates	0.40	289.79	1.05	510.25			800.03
Ralph Defanti & Elvezia Defanti	195.40	89	Defanti & Smith	0.60	434.68	1.58	765.37	0.68	328.02	1,528.07

No comments

- n/a -

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
Fred Ratcliffe-Smith & Mildred Ratcliffe-Smith	65.00	89	Defanti & Smith	0.20	144.89	0.53	255.12	0.23	109.34	509.36
Martin A Maier & Cleo B Maier	93.00	90	Burns	0.20	144.89	1.00	485.95			630.84
W S Quigley & Icie A Quigley	247.40	91	Quigley Upper	0.20	144.89	2.90	1,409.26			1,554.15
W S Quigley & Icie A Quigley	152.20	92	Quigley Middle	0.20	144.89	1.70	826.12			971.01
J B Peter	44.30	93	Peter Upper	0.10	72.45	0.45	218.68			291.12
Arthur Peter and Emma A Peter	100.00	93	Peter Upper	0.10	72.45	1.25	607.44			679.88
Arthur Peter and Emma A Peter	126.90	95	Peter Lower	0.10	72.45	0.75	364.46	0.33	157.93	594.84
W S Quigley & Icie A Quigley	69.00	94	Quigley & Cliff	0.10	72.45	0.75	364.46			436.91
Walter E Cliff & Ruth M Cliff	168.40	94	Quigley & Cliff	0.10	72.45	0.75	364.46	0.63	303.72	740.63
S S Openshaw, Gerald Openshaw, & Gene Openshaw	Stockwater	95A	Lights Creek	0.05	36.22					36.22
C H Taresh & H W Awbrey Lumber Company	Industrial	104	Taresh Mill	0.20	144.89					144.89
Subtotals, Schedule 4 - Lights Creek Group	**2,131.70**			**6.90**	**4,998.79**	**18.98**	**9,220.91**	**1.85**	**899.01**	**15,118.71**
Schedule 5: Claimants from Streams in Upper Tributary Area										
Clover Valley Lumber Company	40.00	2A	Lowe	0.20	144.89	0.25	106.12			251.01
Clover Valley Lumber Company	50.00	2B	Hallet	0.20	144.89	0.30	127.34			272.23
United States of America	12.00	2	Boulder Creek	0.20	144.89	0.05	21.22			166.12
Clover Valley Lumber Company	42.60	3, 4	Antelope North, Antelope East	0.10	72.45	0.35	148.56			221.01
F W Flux and Alma A Flux	45.70	5	Flux Antelope	0.10	72.45	0.28	116.73			189.17
W S Quigley & Icie A Quigley	39.60	6, 7	Quigley Upper Antelope, Quigley Antelope Springs	0.10	72.45	0.28	116.73			189.17
Jack W Humphrey	32.80	8, 9	Humphrey West, Humphrey East	0.10	72.45	0.18	74.28			146.73
Claude Harwood and LaViena Harwood	43.70	7E	Fitch Canyon	0.10	72.45	0.30	127.34			199.79
Elbert R Spraker & Roy E Harwood	8.60	7A	S & H Cabin	0.10	72.45	0.05	21.22			93.67
Elbert R Spraker & Roy E Harwood	35.60	7B	Thompson Creek	0.10	72.45	0.20	84.89			157.34
Clover Valley Lumber Company	13.50	7C	Doyle Upper	0.10	72.45	0.05	21.22			93.67
Clover Valley Lumber Company	13.70	7D	Doyle Lower	0.10	72.45	0.05	21.22			93.67

No comments

- n/a -

Indian Creek Decree - Plumas County Case No. 4185, December 19, 1950

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
Clover Valley Lumber Company	63.40	9B	Doyle Last Chance	0.20	144.89	0.35	148.56			293.45
Howard Bass, Warren Bass, Dudley Bass, Claude Bass, deceased	26.50	9C	Bass	0.10	72.45	0.15	63.67			136.12
Howard Bass, Warren Bass, Dudley Bass, Claude Bass, deceased	9.80	9D	Bass Cabin	0.10	72.45	0.05	21.22			93.67
Howard Bass, Warren Bass, Dudley Bass, Claude Bass, deceased	11.00	9E	Upper Poison	0.10	72.45	0.05	21.22			93.67
Howard Bass, Warren Bass, Dudley Bass, Claude Bass, deceased	24.50	9F	Lower Poison	0.10	72.45	0.15	63.67			136.12
Clark C Rowland	38.60	10, 10A	Rowland Dixie Creek, Rowland Power	0.20	144.89	0.18	74.28			219.17
Westover Company	617.00	11, 12, 13, 14, and 15	Dixie Upper West, Dixie upper East, Dixie Upper Meadow Dam, Dixie Middle Mdw Dam	0.50	362.23	4.25	1,803.97			2,166.20
Westover Company	58.50	28	Clover Overflow	0.30	217.34	0.25	106.12			323.45
Westover Company	24.50	105	Clover Valley Ranch Spring	0.20	144.89					144.89
George Humphrey	560.00	17 through 27	Upper Dotta Neck, North Spring Clover Upper, Clover Middle, Clover North Meadow, Clover South Meadow, Clover Lower, Spring Ch Upper Spring Ch Lower, Crocker Creek Crocker Old Channel	1.00	724.46	3.50	1,485.62			2,210.08
R H Conklin	270.00	16, 29	Guidici Dixie, Guidici Clover	0.50	362.23	2.00	848.93			1,211.16

No comments

- n/a -

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
Clover Valley Lumber Company	Industrial	-	Upper Tributary of Stream System	1.00	724.46					724.46
Subtotals, Schedule 5 - Upper Tributary Area Group	**2,081.60**			**5.80**	**4,201.88**	**13.25**	**5,624.13**	**0.00**	**0.00**	**9,826.02**
Schedule 6, Indian Creek in Genesee and Indian Valleys Group										
J LaRue Robinson & Elizabeth Evans Robinson	362.90	36	Robinson	0.78	565.08	4.50	2,186.78			2,751.86
P R Evans	14.10	36, 37	Robinson, Evans	0.02	14.49	0.20	97.19			111.68
Joseph C Kaltner	8.80	30, 31, 32	Pratt Upper, Pratt Lower, Pratt House	0.10	72.45	0.20	97.19			169.64
Department of Veteran Affairs & Edward D Riehl & Helen Riehl	116.60	33, 34, 35	Curnow Upper, Curnow Pasture, Curnow	0.50	362.23	1.35	656.03			1,018.26
J W Goodhue	Domestic & Power	38	Goodhue	0.50	362.23	9.50	4,616.53			4,978.76
John B Sobrero & Lena M Sobrero	0.50	38A, 38B	Sobrero Field, Sobrero House	0.10	72.45					72.45
Mary Sobrero, Heirs	5.30	39, 40	Sobrero East, Sobrero West	0.10	72.45	0.20	97.19			169.64
Willoughby T Grace and Helen M Grace	291.70	41, 42, 43, 44	Ward Upper West, Ward Middle West, Ward East, Ward Pipeline	1.00	724.46	4.50	2,186.78			2,911.24
Plumas Land Company	Mining	46, 47	Walker Flume, Walker Pipe	2.00	1,448.93					1,448.93
Willoughby T Grace and Helen M Grace	96.80	48, 49	Grizzly Upper, Grizzly Lower	1.00	724.46	1.40	680.33			1,404.79
Willoughby T Grace and Helen M Grace	46.80	45	Hosselkus	0.45	326.01					326.01
W J Beacom	18.00	50	Beacom	0.40	289.79	0.35	170.08			459.87
W J Beacom	Fish Culture	50	Beacom	0.50	362.23					
William F Masters	66.30	51, 52	Barnes East, Barnes West	0.50	362.23	0.83	403.34			765.57

No comments

- n/a -

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
James G Young, William G Young, George W Young, and Hazel Dolphin	Municipal	53	Taylorsville	1.00	724.46					724.46
Claude E Young & Ivy M Young	28.10	54	Mill Race	0.50	362.23	1.00	485.95			848.18
W H Dolphin	153.40	54	Mill Race	0.73	528.86	1.47	714.35			1,243.20
H C Neer and Eva M Neer	110.00	54	Mill Race	1.00	724.46	0.60	291.57			1,016.03
Lloyd E Hardgrave & John A Hardgrave	233.70	54	Mill Race	1.52	1,101.18	1.03	500.53			1,601.71
Lloyd E Hardgrave & John A Hardgrave	24.30	54	Mill Race	0.15	108.67	0.30	145.79			254.45
Colburn J Smith and Wilma T Smith	167.90	54	Mill Race	0.75	543.35	1.65	801.82			1,345.17
Samuel F Brown, Hazel Brown and Fletcher L Brown	298.10	54	Mill Race	1.00	724.46	2.70	1,312.07			2,036.53
Lee G Johnson	370.80	54	Mill Race	1.00	724.46	3.60	1,749.42			2,473.88
S S Openshaw, Gerald Openshaw and Gene Openshaw	693.40	54	Mill Race	1.00	724.46	7.60	3,693.22			4,417.69
Paul Sobrero & Helen Sobrero	144.50	54	Mill Race	0.67	485.39	1.13	549.12			1,034.51
Samuel F Brown and Hazel Brown	230.60	54	Mill Race	0.50	362.23	2.40	1,166.28			1,528.51
Samuel F Brown and Hazel Brown	249.20	54	Mill Race	1.00	724.46	2.10	1,020.50			1,744.96
T L Hannon & H S Hannon	78.80	54	Mill Race	0.32	231.83	0.70	340.17			571.99
George F Osmeyer & Jane Osmeyer	6.20	54	Mill Race	0.01	7.24	0.07	34.02			41.26
L E Wheelock & Nellie Wheelock	123.50	54	Mill Race	0.50	362.23	1.00	485.95			848.18
Albert A Toscani, Ernest J Toscani, Chester M Toscani, and Arthur F Toscani	345.60	54	Mill Race	1.00	724.46	2.70	1,312.07	0.60	291.57	2,328.10
A J Sheehan & C J Sheehan	68.70	54	Mill Race			0.20	144.89	0.65	315.87	460.76
David R Strong	57.40	54	Mill Race			0.20	144.89	0.55	267.27	412.17
B B Gregory & Estella E Gregory	32.40	54	Mill Race			0.20	144.89	0.20	97.19	242.08
J E Cardoza & Marion Cardoza	72.40	54	Mill Race					2.15	1,044.79	1,044.79
S S Openshaw, Gerald Openshaw and Gene Openshaw	238.50	55	Snyder			0.40	289.79	3.00	1,457.85	1,747.64
H C Neer and F C Neer	200.00	57A	Neer Pump					2.50	1,811.16	1,811.16
Mrs. A L Gorbet	46.50	58A	Gorbet Pump					0.60	434.68	434.68
A J Sheehan & C J Sheehan	32.00	58B	Sheehan Pump					0.40	289.79	289.79
Subtotal, Schedule 6 - Indian Creek in Genesee and Indian Valleys Group	**5,033.80**			**20.60**	**14,923.93**	**54.08**	**26,518.71**	**10.65**	**6,010.17**	**47,452.81**
Schedule 7, "Special Class" Rights on Indian Creek Stream System										
Marian A Flood Norma A Flood	Domestic and resort	125	Hamblin Springs	0.06	43.47					43.47
Fred Prasun & Medie Prasun	6.00	125A	Hamblin Springs Collectinq	0.15	108.67					108.67
Alford S Calais & Nellie A Calais	See Schedule 3	127	Short Spring	0.10	72.45					72.45
Bidwell Water Company	Municipal	129	Buckeye Ravine Pipeline	Entire Flow						0.00
Forest Lodge Resort	Domestic and resort	130	Clark Ravine	0.50	362.23					362.23

No comments

- n/a -

Indian Creek Decree - Plumas County Case No. 4185, December 19, 1950

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
Wolf Creek Timber Company, Inc.	Domestic	130A, 130B	Western Pacific Pipeline	0.08	54.33					54.33
A O Lewis	Domestic	131	Schieser Spring Pipeline	0.02	14.49					14.49
Wesley T Wheeler & Idella C Wheeler	Domestic	131	Schieser Spring Pipeline	0.01	7.24					7.24
W B Perry, R L Perry, Ivy Mae Heald, and Susie Perry	48.80	132	Perry Springs	0.55	398.45					398.45
L E Wheelock & Eva Neer	5.40	132	Perry Springs	0.05	36.22					36.22
United States of America in Trust	20.00	133	Hickerson West Springs	0.65	470.90					470.90
T L Hannon & H S Hannon	58.40	134, 134A	Hickerson East Springs, Hickerson	0.95	688.24					688.24
W B Perry, R L Perry, Ivy Mae Heald, and Susie Perry	Domestic	133	Lower Spring Hickerson West Springs	0.05	36.22					36.22
United States of America in Trust	22.30	135	Chico Springs	0.62	449.17					449.17
John F Davidson & Lena Davidson	12.90	136	Leggett Springs	0.10	72.45					72.45
James T Freeman & Elma L Freeman	Domestic	139A	Remick Pipeline	0.02	14.49					14.49
J B Peter	Domestic	96A	Peter Pipeline	Entire Flow						0.00
J LaRue Robinson & Elizabeth Evans Robinson	Domestic	143	School Spring Pipeline	0.001	0.72					0.72
John Davis & Evelyn Cunningham	2.00	106	Davis Spring	0.15	108.67					108.67
Willoughby T Grace & Helen M Grace	Domestic	48A	Hosselkus Spring Pipeline	Entire Flow						0.00
S S Openshaw, Gerald Openshaw, and Gene Openshaw	66.70	137	Snyder Spring	0.45	326.01					326.01
United States of America	Domestic	107A	Taylorsville Suppression Camp Pipeline	0.01	7.24					7.24
Burr J Sherick & Edith R Sherick	0.90	108	Hotel Pipe	0.025	18.11					18.11
G R Clark	Domestic	109	Clark Pipe	0.02	14.49					14.49
Mabel Taresh	0.20	109	Clark Pipe	0.02	14.49					14.49

No comments

- n/a -

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
A E Viacava	34.60	110, 111, 112	Viacava Upper, Viacava Middle, Viacava Lower	0.50	362.23					362.23
United States of America in Trust	6.00	112A	Smith & Jenkins	0.23	166.63					166.63
S S Openshaw, Gerald Openshaw, and Gene Openshaw	269.70	113, 114	Hough Creek Upper, Hough Creek Lower	3.40	2,463.17					2,463.17
Plumas Unified School District	Domestic	108	Hotel Pipe	0.025	18.11					18.11
J E Cardoza and Marion Cardoza	42.50	114A, 114B	Cardoza	0.55	398.45					398.45
J E Cardoza and Marion Cardoza	99.10	115 & 115A	Cardoza Springs	1.00	724.46					724.46
August C Frohlich	8.90	123	Crescent	0.15	108.67					108.67
H C Neer	1.00	123	Crescent	0.02	14.49					14.49
Sorsoli Water Company	Municipal	123	Crescent	0.13	94.18					94.18
B B Gregory & Estella E Gregory	2.00	123A	Domestic Spring Pipeline	0.05	36.22					36.22
Margaret Frizzie, Frances Frizzie, and Theresa Frizzie	Domestic & Industrial	118	Frizzie	1.50	1,086.69					1,086.69
Dawn Institute of Science & Art	Domestic	119	Indian Falls	0.01	8.69					8.69
Subtotal, Schedule 7 - "Special Class" Rights Group	**707.40**			**12.148**	**8,800.77**					**8,800.77**
Schedule 8, "Surplus Class" Rights on Indian Creek Stream System										
Jack W Humphrey	90.00	9A	Humphrey Last Chance					0.65	275.90	275.90
George Humphrey	245.00	23, 25, 26, 27	Clover Lower, Spring Channel Lower, Crocker Creek, Crocker Old Channel					1.75	742.81	742.81
Westover Company	320.00	11, 12, 27 1/2	Dixie Upper West, Dixie Upper East, Crocker Lower					2.30	976.26	976.26
R H Conklin	398.00	16, 29	Guidici Dixie, Guidici Clover					3.00	1,273.39	1,273.39

No comments

- n/a -

Indian Creek Decree - Plumas County Case No. 4185, December 19, 1950

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
W E Cooper, Ed Cooper & J A Ritchy	Mining	85C	Proposed Cooper					0.50	212.23	212.23
S S Openshaw, Gerald Openshaw, and Gene Openshaw	15.60	95A	Proposed Lights Creek					0.125	53.06	53.06
C H Taresh and H W Awbrey Lumber Company	17.00	104	Taresh Mill Pump					0.125	53.06	53.06
William F Masters	76.20	51, 52A	Barnes East, Proposed Barnes Pump					0.76	322.59	322.59
E T Kunzler & Edna M Kunzler	36.00	"	Proposed					0.24	101.87	101.87
Almanor Lumber Company	8.40	"	Proposed					0.06	25.47	25.47
Subtotal, Schedule 8 - "Surplus Class" Rights	**1,206.20**							**9.51**	**4,036.64**	**4,036.64**
Special Class Claimants										
Bidwell Water Company	Municipal	64	Round Valley Reservoir		4,800.00	Winter season				
K R Doyle and Murray Doyle	Domestic, Stockwater, Irrigation	7F	Doyle Reservoir		45.00	Winter Season				
Subtotal, Special Class Claimants					**4,845.00**					
Surplus Class Claimants										
J LaRue Robinson & Elizabeth Evans Robinson	Domestic, Stockwater	1	Taylor Lake		200.00					
Charles H Bryson Sr and Estate of Kathryn Bryson	Domestic, Resort	117	Avrit Pipe Line	0.02	11.59	Continuous, Year-long				
Dawn Institute of Science & Art	Domestic, Resort	120	Jackson Springs Pipe Line	1.25	905.58	Continuous, Year-long				
Subtotal, Surplus Class Claimants				**1.27**	**1,117.17**					

Summary of Indian Creek Adjudication	Acreage to be supplied	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Total Allotments, Face Value (AF)
Schedule 3 - Wolf Creek Group	1,838.70	8.38	5,837.26	10.90	5,296.86	3.35	1,627.93	12,762.05
Schedule 4 - Lights Creek Group	2,131.70	6.90	4,998.79	18.98	9,220.91	1.85	899.01	15,118.71
Schedule 5 - Upper Tributaries Group	2,081.60	5.80	4,201.88	13.25	5,624.13	0.00	0.00	9,826.02
Schedule 6 - Indian Creek in Genesee & Indian Valleys Group	5,033.80	20.60	14,923.93	54.08	26,518.71	10.65	6,010.17	47,452.81
Schedule 7 - Special Class Group	707.40	12.148	8,800.774	0.000	0.000	0.000	0.000	8,800.774
Schedule 8 - Surplus Class Group	1,206.20	0.00	0.00	0.00	0.00	9.51	4,036.64	4,036.64
Subtotal, Special Class Claimants								4,845.00
Subtotal, Surplus Class Claimants								1,117.17
Total Face Value (AF), Indian Creek Decree	**12,999.40**	**53.83**	**38,762.64**	**97.21**	**46,660.61**	**25.36**	**12,573.75**	**103,959.17**

No comments

- n/a -

Middle Fork Feather River (and Its Tributaries Above Beckwith)
Decree
County of Plumas, Case No. 3095

Seasons of Use

Continuous, regardless of season	353.25	divi
March 1 through October 31	245.00	divi
March 15 through September 30	200.00	divi

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
Schedule 3, Claimants from Last Chance Creek and Its Tributaries above Adams Nack															
C C Rowland & Ida May Rowland	180.40	1, 2, 3	Rowland Upper North and South, Rowland Lower South, Rowland Lower North	2.30	912.40									912.40	2.30
C C Rowland & Ida May Rowland	57.70	4	Rowland South Creek Kemelli, Hall & Kemelli, Kemelli Spring Channel	0.70	277.68									277.68	0.70
Alessio Kemelli & Adelina Kemelli	151.40	5, 6, 7		1.90	753.72									753.72	1.90
Marietta Hall	13.40	6, 7	Hall & Kemelli, Kemelli Spring Channel	0.23	99.17									99.17	0.23
Elsie Herz Golden	16.00	8	Trail Last Chance	0.28	111.07									111.07	0.28
Elsie Herz Golden	7.00	8A	Trail Dooley Canyon	0.12	47.60									47.60	0.12
Elsie Herz Golden	11.30	9	Trail Dixie Creek	0.20	79.34									79.34	0.20
Elsie Herz Golden	57.60	11, 11A	Trail Grigsby Creek, Trail Cabin	0.45	178.31	0.30	198.35							376.66	0.85
Charles A Gelepp, Fred E Gelepp, Lee B Gelepp, and Rose Gelepp	257.80	10, 12	Gelepp Upper Last Chance, Gelepp Lower Last Chance Gelepp Grigsby Creek & Trail Cabin,	3.25	1,289.26									1,289.26	3.25
Charles A Gelepp, Fred E Gelepp, Lee B Gelepp, and Rose Gelepp	78.70	13A, 24A, 24B	Gelepp North Springs, Gelepp South Springs	1.00	396.68									396.68	1.00
Elsie Herz Golden	111.10	13, 18	Trail Camp, Trail Spring Creek	1.60	634.71									634.71	1.60
Elsie Herz Golden	41.00	20	Trail Friendman Creek	0.70	277.68									277.68	0.70
Fred P Giudici and Myrtle M Giudici	103.30	14, 15	Giudici Upper Spring Creek, Giudici Lower Spring Creek	1.30	515.70									515.70	1.30
Charles A Gelepp, Fred E Gelepp, Lee B Gelepp, and Rose Gelepp	161.10	15, 17	Gelepp Spring Creek, Gelepp Creek	2.00	793.38									793.38	2.00
Emilio Kemelli	76.20	19	Kemelli and Diffk Friendman Creek	1.00	396.69									396.69	1.00

No comments

- n/a -

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Frank Datta	94.90	19	Kenelli and Datta Frenchman Creek Datta Frenchman Creek Spring, Galapp and Datta Spring	0.80	317.36									317.36	0.80
Frank Datta	10.00	230, 231		0.13	39.90									39.90	0.13
Subtotal, Schedule 3 - Last Chance Creek Group	**1,401.10**			**18.00**	**7,140.90**	**0.50**	**198.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**7,338.84**	**18.50**
Schedule 4, Claimants from Last Chance Creek and its Tributaries below Frenchman Creek															
Fred P Giudici and Myrtle M Giudici	265.40	21, 22	F P Giudici Upper, F P Giudici Lower	4.80	1,904.13		0.00		0.00		0.00		0.00	1,904.13	4.80
Mauricio Giudici & Julia Giudici	62.30	21,22	F P Giudici Upper, F P Giudici Lower	0.95	376.86							0.60		376.86	1.55
Alex E Giudici	180.00	23	A E Giudici Dams	2.00	793.39	1.00	396.69							1,190.08	3.00
Guy Sabrina & Germaine Sabrina	187.10	24, 25	Sabrina Upper Dam, Sabrina Lower Dam	1.00	396.69	1.40	555.37					0.60		952.07	3.00
Elsie Hare Golden	146.80	25, 26, 27, 28	A E Giudici Dams, Trois Upper, Trois Middle, Trois Lower Trois Lower, F V Datta Upper, F V Datta Middle, F V Datta Lower F V Datta Lower, Kenelli North Channel Kenelli North Channel, M B Humphrey West Side F V Datta Lower, Ede Schoolhouse, Ede Lower Gable Upper North Channel, Gable Middle North Channel, Gable Lower North Channel Gable Lower North Channel, Saleri North Channel Laffranchini North Channel			1.70	674.38	0.15	59.50					733.88	1.85
Frank Datta	370.00	28, 29, 30, 31				2.70	1,071.07			0.65	337.19	0.65		1,408.26	4.40
Emilio Kenelli	81.20	31, 32				1.05	416.53							416.53	1.05
Emilio Kenelli	21.30	32, 37				0.25	99.17							99.17	0.25
Philip E Ede & Sophie L Ede	220.20	31, 33, 34						2.75	1,090.91					1,090.91	2.75
Edmond J Gable & Ida C Gable	251.00	35, 36, 37						2.65	1,051.24	0.50	198.33			1,249.39	3.15
Daniel M Scott & Gemma Saleri Scott	126.60	37, 38						1.65	654.53					654.53	1.65
C D Laffranchini & Maria C Laffranchini	132.70	38						0.60	238.02	1.20	476.03			714.05	1.80

No comments

- n/a -

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Jennie F Huntley	410.90	39, 40, 41, 42	Leffingwell North Channel, Huntley Upper North Channel, Huntley Middle North Channel, Huntley Lower North Channel Wherry North, Wherry South, Wherry Upper Dam							3.05	1,209.92	1.80	714.05	1,923.97	4.85
Josephine Robert	200.90	43, 44, 45	Wherry North, Wherry South, Wherry Lower Dam							1.65	654.53	0.33	130.84	793.39	2.00
C D Leffingwell & L A Leffingwell	259.70	43, 44, 46	Wherry North, Wherry South, Wherry Lower Dam							1.65	654.53	0.95	376.86	1,031.40	2.60
J A Bonta & S A Bonta	260.10	47, 48, 49	Bonta North, Bonta South, Bonta Meadow							1.00	396.69	1.60	634.71	1,031.40	2.60
C D Leffingwell & L A Leffingwell	171.00	50, 51	Dedmon North, Dedmon South									1.75	694.38	694.38	1.75
L D Maddalena	70.00	52, 53	Maddalena South, Maddalena North									0.70	277.69	277.69	0.70
M B Humphrey	68.40	36, 37	M B Humphrey East Side, M B Humphrey			4.60	1,824.79	0.40	158.68			0.85	337.19	2,320.66	5.85
Emilio Remelli	72.30	38	West Side Remelli Vinton Remelli			1.10	436.38					0.05	19.83	456.20	1.15
Emilio Remelli	42.00	59, 60	Railroad Dam, Remelli Lower Dam M B Humphrey					0.45	178.51			0.10	39.67	218.18	0.55
Alessio Remelli & Adeline Remelli	166.40	57, 58	West Side, Remelli Vinton Remelli					1.70	674.38			0.40	158.68	833.06	2.10
Alessio Remelli & Adeline Remelli	142.50	59, 60	Railroad Dam, Remelli Lower Dam M B Humphrey					1.80	714.05					714.05	1.80
Edmond J Goble & Ida C Goble	21.00	57, 58	West Side, Remelli Vinton					0.25	99.17					99.17	0.25

No comments

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Donal M Scott & Gemma Salen Scott	188.10	61, 62, 63	Salen Upper East Channel, Salen Middle East Channel, Salen Lower East Channel					1.65	733.68			0.50	198.55	932.23	2.15
C D Laffranchini & Marie C Laffranchini	305.00	64, 65, 66	Laffranchini Upper East Channel, Laffranchini Middle East Channel, Laffranchini East Channel Division					1.35	533.54	1.95	773.55	0.50	198.55	1,507.64	3.80
Jennie F Huntley	268.80	69, 66, 68, 71, 72	Laffranchini Middle East Channel, Laffranchini East Channel Division, Robert Upper, Huntley Upper East Channel Huntley Lower East Channel							2.55	1,011.57	1.10	436.36	1,447.93	3.65
M B Humphrey	268.30	67, 70, 72	Drain Division, Robert Lower Channel, Huntley Lower East Channel							2.50	991.74	1.10	436.36	1,428.10	3.60
Josephine Robert	311.70	67, 68, 69, 70	Drain Division, Robert Upper, Robert Lower, Robert Lower Channel							2.90	1,150.41	1.00	396.69	1,547.11	3.90
Bernard E Giudici & Rudolph E Giudici	141.30	73, 98	Doan Dam, Giudici East Dam									2.35	932.23	932.23	2.35
Subtotal, Last Chance Creek below Franchman Creek Group Schedule 5, Claimants from Last Chance Creek Below Adams Rock	**1,474.10**			**0.75**	**2,471.07**	**13.80**	**5,474.38**	**15.80**	**6,188.43**	**10.80**	**7,054.55**	**17.10**	**5,970.25**	**28,958.68**	**75.05**
Philip E Ede & Sophie L Ede	212.00	31, 33	F V Dotta Lower, Ede Schoolhouse			0.45	178.51	0.45	178.51					357.02	0.90
Edmond J Goble & Ida C Goble	630.70	35	Goble Upper North Channel			0.70	277.69	1.40	555.37					833.06	2.10
Donal M Scott & Gemma Salen Scott	120.30	36	Salen North Channel			0.50	198.33							198.33	0.50

No comments

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C D Leffingwell & Maria C Leffingwell	447.90	39, 64, 67	Leffingwell North Channel, Leffingwell Upper East Channel, Dixon Division			0.35	138.84	1.20	476.03					614.88	1.55
Jennie F Huntley	123.50	39, 65	Leffingwell North Channel, Leffingwell Middle East Channel			0.45	178.51							178.51	0.45
J A Banta & S A Banta	203.30	47, 48, 49	Banta North, Banta South, Banta Meadow	1.75	694.21	0.10	39.67							733.88	1.85
C D Leffingwell & L A Leffingwell	60.00	50, 51	Dedmon North, Dedmon South	0.60	238.02									238.02	0.60
L D Maddalena	99.00	52, 53	Maddalena South, Maddalena North	0.40	158.68	0.10	39.67							198.35	0.50
Westover Company	45.00	54, 55	Noble North, Noble South	0.45	178.51									178.51	0.45
Alessio Remelli & Adelina Remelli	31.50	60	Remelli Lower Dam					0.15	59.50					59.50	0.15
M B Humphrey	360.00	67, 70, 72	Dixon Division, Roberts Lower Channel, Huntley Lower East Channel			1.60	634.71							634.71	1.60
Smithneck Creek**		67, 73	Dixon Division, Dixon Dam					3.50						0.00	3.50
Antone E Dotta	49.10	67, 108	Dixon Division, A E Dotta East Channel			0.20	79.34							79.34	0.20
Amelia Remelli	135.80	70	Roberts Lower Channel			0.55	218.18							218.18	0.55
Louise Scalen, Ida A Scalen, Celia D Fallon, P A Scalen, M A Scalen, Olive R Roberts, Lydia H Westover	51.50	70	Roberts Lower Channel			0.20	79.34							79.34	0.20
James L Humphrey	18.40	70	Roberts Lower Channel			0.10	39.67							39.67	0.10
Josephine Roberts	11.00	70	Roberts Lower Channel			0.05	19.83							19.83	0.05
Bernard E Giudici & Rudolph E Giudici	113.00	73	Dixon Dam			0.35	138.84	0.25	99.17					238.02	0.60
Subtotal, Last Chance Creek Group Below Adams Neck	**2,718.00**			**3.20**	**1,269.42**	**5.70**	**2,261.18**	**6.95**	**1,368.60**	**0.00**	**0.00**	**0.00**	**0.00**	**4,899.17**	**15.85**
Schedule 8. Claimants from Smithneck Creek and Tributaries															
Eddie John Trieb & Dolly Cornutt	73.00	77A	Trieb Mountain	1.20	869.36									869.36	1.20
Clover Valley Lumber Company	70.30	77, 78	Mountain Ranch West Side, Mountain Ranch East Side	1.20	869.36									869.36	1.20

No comments

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Clover Valley Lumber Company	160.70	88, 89	Cobb, Mill Pond Dam	1.40	1,014.25							0.23	99.17	1,113.42	1.63
Mary C Laffranchini	46.40	79, 80	Lamberdi West, Lamberdi East	0.70	507.12									507.12	0.70
Mary C Laffranchini	134.70	84, 83, 232	Turner South, Turner North, Lamberdi Canyon	2.20	1,593.82									1,593.82	2.20
Cesar P Lamberdi	Domestic	81	Upper Concrete Dam	0.04	28.98									28.98	0.04
Clover Valley Lumber Company	164.70	81, 82, 83	Upper Concrete Dam, Middle East, Turner Channel	1.30	941.80	1.00	724.46			0.45	178.31			1,844.76	2.75
First National Bank of Nevada	151.80	82, 87	Middle East, Lewis Bros East	0.20	144.89	1.05	760.69					0.15	138.84	1,044.42	1.40
J S Rees	30.40	86, 253	Lewis Bros West, Loyalton Pipe	0.50	362.23									362.23	0.50
J S Rees	182.20	87, 89	Lewis Bros East, Mill Pond Dam	1.30	941.80	0.40	138.68					0.45	178.31	1,278.99	2.15
J S Rees	Municipal	253	Loyalton Pipe	0.60	434.68									434.68	0.60
Mex Dorr & Mey Dorr	60.40	90, 91	Division Dorrs, Dorr East Channel			0.95	376.66							376.66	0.95
Mex Dorr & Mex Dorr	46.90	110	Dorr West	0.30	217.34	0.13	59.30							276.64	0.43
Ida Grandi	18.00	90	Division Dams									0.10	38.67	38.67	0.10
Louis S Lamberdi	34.70	110	Dorr West									0.20	79.34	79.34	0.20
Sierra Valley Bank	58.20	110	Dorr West									0.25	99.17	99.17	0.25
Alda Giudo, Frances Giudo, & Stephen Giudo	63.30	92	Giudo East Channel			1.05	760.69							760.69	1.05
Leon F Dotta	87.80	92	Giudo East Channel			0.50	362.23	0.60	238.02					600.25	1.10
Raffaele Dotta	120.00	92	Giudo East Channel			0.65	470.90	0.70	277.69					748.59	1.35
Raffaele Dotta	118.00	94, 95	R Dotta West, R Dotta Main Dam			1.30	513.70							513.70	1.30
Mex Dorr & Cora V Kaves	66.00	93	Kaves East R Dotta			0.85	337.19							337.19	0.85
Albert C Dotta & Cesar Dotta	180.00	94, 95	West, R Dotta Main Dam			1.80	714.03							714.03	1.80
Albert C Dotta & Cesar Dotta	298.80	96, 97	A & C Dotta East, A & C Dotta East Dam			3.40	1,348.76							1,348.76	3.40
Bernard E Giudo & Rudolph E Giudo	180.30	98,99,106	Giudo East Dam, Junction Dam, Lower Middle Channel			1.80	634.71							634.71	1.80
Alda Giudo, Frances Giudo, & Stephen Giudo	62.00	100	Giudo Middle			0.85	337.19							337.19	0.85
Mey Dorr & Cora V Kayes	94.00	100, 101	Giudo Middle, Kaves Middle			1.15	456.20							456.20	1.15

No comments

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Julio Geraldi & Angie Geraldi	410.60	102, 103	Upper Dotta Geraldi, Lower Dotta Geraldi			3.70	1,467.77	0.60	238.02			0.15	59.50	1,765.29	4.45
Albert C Dotta & Cleone Dotta	345.30	102, 103, 104, 105	Upper Dotta Geraldi, Lower Dotta Geraldi, A & C Dotta Middle, A & C Dotta Home Ranch Junction			3.25	1,289.26	1.05	416.53					1,705.79	4.30
Bernard E Giudici & Rudolph E Giudici	88.40	99, 106	Dam, Lower Middle Channel Geraldi			0.75	297.52	0.25	99.17					396.69	1.00
Attilio A Geraldi & Laura Geraldi	298.60	111, 112	Upper Field, Geraldi Lower Field			2.65	2,137.17	0.80	317.36					2,454.52	3.75
Perpetum Geraldi	60.00	110	Dory West									0.24	95.21	95.21	0.24
Perpetum Geraldi	1.10	111	Geraldi Upper Field			0.06	43.47							43.47	0.06
Amelia D Reinelli	379.30	110, 113, 114	Dory West, Reinelli Flood, Reinelli Division			2.83	1,120.58	1.20	513.70			0.65	257.85	1,904.13	4.80
Albert C Dotta & Cleone Dotta	254.30	115	A & C Dotta West Channel			2.05	813.22	0.80	317.36					1,130.58	2.85
Antone E Dotta	78.70	113, 116	A & C Dotta West Channel, A E Dotta Upper West Channel Reinelli Division, A E Dotta Lower West Channel, A E Dotta Lower Channel			0.80	317.36							317.36	0.80
The Federal Land Bank of Berkeley	186.20	114, 116, 117						2.20	872.73					872.73	2.20
Albert C Dotta & Cleone Dotta	83.90	104	Left Cheville Dam					1.05	416.53					416.53	1.05
Antone E Dotta	59.60	108	A E Dotta East Channel					0.70	277.69					277.69	0.70
Charles W Ede	38.00	108	A E Dotta East Channel					0.45	178.51					178.51	0.45
The Federal Land Bank of Berkeley	74.00	108, 109	A E Dotta East Channel, A E Dotta Lower Reinelli Division					0.80	317.36					317.36	0.80
M B Humphrey	94.20	114						0.30	119.01			0.25	99.17	218.18	0.55
M B Humphrey	355.00	118	Ede Lake					1.60	634.71	2.40	952.07				4.00
Charles W Ede	137.90	108, 118	A E Dotta East Channel, Ede Lake							1.75	694.21			694.21	1.75
Francis A Bradley, Jr.	130.80	119	Ede Lake Cut							1.50	595.04			595.04	1.50
Antone E Dotta	70.90	119	Ede Lake Cut							0.90	357.02			357.02	0.90
Subtotal, Claimants from Smithneck Creek and Its Tributaries Group	**3,888.80**			**10.94**	**7,925.92**	**33.11**	**15,514.15**	**13.20**	**5,236.36**	**7.00**	**2,776.86**	**2.89**	**1,146.45**	**31,612.86**	**67.14**

No comments

- n/a -

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March 15 through September 30	200.00	divi

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Schedule 7, Claimants from West Side Canal and its Tributaries (Hamlin, Miller and Turner Creeks)															
Harry Datta	431.80	158, 159, 161, 162, 261	H Datta Upper South, H Datta Lower South, H Datta North Channel, H Datta South Channel, H Datta Springs	2.00	1,448.93	1.05	1,209.92	0.80	317.02	0.20	79.34			3,055.21	6.15
A E String	555.60	160, 161, 163, 164	H Datta Old Power, H Datta North Channel, String Upper, String Lower	1.00	724.46	4.60	1,824.78	1.20	476.03	0.20	79.34			3,104.63	7.00
Delia R Martinetti	29.60	165	Martinetti & Miller			0.40	158.68							158.68	0.40
Delia R Martinetti	238.00	165, 166	Martinetti & Miller, Miller Hamlin	0.10	72.45	0.90	357.02	0.75	297.52	0.65	257.19			1,084.18	2.40
A E String	86.50	167	Miller - String	0.40	289.78	0.80	317.36							726.99	2.60
A E String	34.00	170, 167	Miller - String, String & Martinetti			0.35	138.84							138.84	0.35
Delia R Martinetti	80.00	167	Lower Field Miller - String Martinetti			0.80	317.36							317.36	0.80
Delia R Martinetti	274.10	168, 169, 170	Upper East Channel, Martinetti Middle East Channel, String & Martinetti Lower Field Martinetti	0.50	362.23	3.00	1,190.08							1,552.31	3.50
Delia R Martinetti	94.40	171, 173	Upper West Channel, Martinetti Middle West Channel Martinetti			0.95	376.86							376.86	0.95
Delia R Martinetti	20.00	174	Lower West Channel					0.25	99.17					99.17	0.25
Delia R Martinetti	199.20	172	Quitt Miller Creek Martinetti	0.30	217.34	2.20	872.73							1,090.07	2.50
B F Myers and C B Myers	20.00	174	Lower West Channel Turner					0.25	99.17					99.17	0.25
B F Myers and C B Myers	147.20	202	Mounds Martinetti	0.10	72.45	0.40	269.76	1.35	535.54					897.77	1.85
Kate L Devine	74.60	174, 175	Lower West Channel Miller Creek Mounds Channel	0.10	72.45			0.40	158.68					231.12	0.50
Albert B Church	103.00	175	Miller Creek Mounds Channel	0.10	72.45			1.20	476.03					548.48	1.30

No comments

- n/a -

Middle Fork Feather River (and Its Tributaries Above Beckwith)
Decree
County of Plumas, Case No. 3095

Seasons of Use

Continuous, regardless of season	363.25	cfs
March 1 through October 31	245.00	cfs
March 15 through September 30	200.00	cfs

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
M O Binninger, J M Binninger, & Anita L Binninger	117.00	175	Miller Creek Mounds Channel	0.10	72.45			1.35	535.54					607.98	1.45
Frenie N Turner, Earl Turner, and Gene Turner	42.20	173, 187	Miller Creek Mounds Channel, Church Lower Turner Creek Meadow	0.10	72.45			0.40	158.68					231.12	0.50
Frenie N Turner, Earl Turner, and Gene Turner	60.00	173, 202	Miller Creek Mounds Channel, Turner Mounds	0.10	72.45			0.90	357.02					429.47	1.00
Horace G Adams	120.00	176	Adams Mounds	0.10	72.45	0.40	158.68	1.00	396.69					627.82	1.50
Delia R Martinetti	29.40	177	Martinetti Spring Brook	0.45	311.52									311.52	0.45
Delia R Martinetti	84.00	177	Martinetti Spring Brook, Civitt Spring Brook	0.20	144.89	0.80	357.02							501.92	1.10
Delia R Martinetti	30.00	262	Civitt Foothill Springs Church,		0.00	0.45	178.51							178.51	0.45
Delia R Martinetti	37.70	184, 183	Civitt Turner Creek	0.20	144.89	0.45	178.51							323.40	0.65
Frenie N Freeman	117.50	180	Freeman	0.60	434.68	1.20	476.03							910.71	1.80
Frenie N Freeman	88.90	188	Freeman Lower Meadow	0.10	72.45			1.00	396.69					469.14	1.10
T K Turner, Earl Turner, Frenie N Turner, & Gene Turner	0.20	180	Freeman	0.02	14.49									14.49	0.02
Frenie N Turner, Earl Turner, and Gene Turner	70.60	181, 182	Turner West, Turner East	0.60	434.68	0.65	257.85							692.53	1.25
Frenie N Turner, Earl Turner, and Gene Turner	23.00	183	Turner Corwin Church,			0.40	158.68							158.68	0.40
Frenie N Turner, Earl Turner, and Gene Turner	21.90	184, 183	Civitt Turner Creek Church			0.33	130.84							130.84	0.33
Frenie N Turner, Earl Turner, and Gene Turner	109.40	187	Lower Turner Creek Meadow			0.15	59.50	0.25	99.17	1.00				158.68	1.40
Albert B Church	58.30	184	Church			0.80	317.36							317.36	0.80
Albert B Church	148.90	186	Church Upper Turner Creek	0.20	144.89	1.60	634.71							779.60	1.80
Albert B Church	134.10	187	Church Lower Turner Creek Meadow	0.20	144.89			1.50	583.04					728.93	1.70
Samuel Devine, Kirsti L Devine, Sarne H Devine, Allen B Devine, and Bradley & Weadina Trustees, Rexel Union Fund	200.80	189	Clark Turner Creek Meadow	0.20	144.89			1.30	513.70	1.00	396.69			1,057.29	2.50
Estate of C W Toomey & Estate of Virginia McLean	200.80	189, 190	Clark Turner Creek meadow, Toomey Meadow	0.20	144.89					1.80	714.03	0.50	198.33	1,057.29	2.50
Isolina Pesqueti	184.70	189, 191, 202	Clark Turner Creek Meadow, Pesqueti Turner, Turner Mounds	0.20	144.89					0.80	317.36	1.30	515.70	977.95	2.30

No comments

- n/a -

Middle Fork Feather River (and its Tributaries Above Beckwith)
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Continuous, regardless of season	363.25	divi
March 1 through October 31	245.00	divi
March 15 through September 30	200.00	divi

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
Isolina Pasquetti	102.20	204, 203	Pasquetti Upper Westside, Pasquetti Lower Westside			0.30	362.23	2.10	833.06	1.15	456.20			1,651.49	3.75
Frank R Turner, Earl Turner, and Dana Turner	109.90	202	Turner Mounds	0.20	144.69	0.30	217.34	0.90	357.02						
George A Henderson	120.00	176, 203	Adkins Mounds, Henderson Westside			0.30	362.23	1.00	396.69					758.93	1.30
Battista Pasquetti	189.00	176, 204	Adkins Mounds, Pasquetti Upper West Side			0.30	362.23	1.30	585.04	0.40	158.68			1,115.95	2.40
F E Humphrey, Jr.	742.10	205, 206, 207, 208, 209	Pasquetti Lower West Side, Humphrey O'Hara, Humphrey Upper, Humphrey Lower, Humphrey Hahn			1.30	1,086.68	3.30	2,102.46	1.60	634.71			3,823.88	8.40
F E Humphrey, Jr.	411.50	210, 214	Humphrey Division, Humphrey Freeman			0.75	543.35	2.50	991.74	1.35	535.54			2,070.62	4.60
F E Humphrey, Jr.	160.00	212, 214	Humphrey-Neeman, Humphrey Division			0.30	362.23	1.10	436.36	0.30	119.01			917.60	1.90
F E Humphrey, Jr.	291.60	219, 220	Humphrey Meraki, Albini & Humphrey							3.00	1,190.08			1,190.08	3.00
John B Metley & Annie M Metley	134.30	211, 214	Metley, Humphrey Division			0.30	362.23	0.60	238.02	0.60	238.02			838.26	1.70
Fred Berry & Lillian Berry	121.20	213, 213	Berry West Side, Berry Meadow Dams			0.25	181.12			1.25	496.87			676.98	1.50
Fred Berry & Lillian Berry	110.80	214	Humphrey Division							0.90	357.02	0.50	198.35	555.37	1.40
E F Ghidoss	349.40	213, 216	Berry West Side, Ghidoss Upper Field Dams			0.25	181.12			2.55	1,011.57	1.60	634.71	1,827.40	4.40
E F Ghidoss	114.10	218	Ghidoss Lower West Side Dams			0.25	181.12			1.00	396.69	0.15	59.50	637.31	1.40
A A Vicca	158.90	216, 217	Ghidoss upper Field Dams, Caley Westside Dams			0.25	181.12			0.95	376.86	0.80	317.36	875.33	2.00
Henry Albini	61.80	220	Albini & Humphrey							0.80	317.36			317.36	0.80
James L Humphrey	127.30	220 219	Albini & Humphrey							0.80	317.36	0.60	238.02	555.37	1.40
Subtotal Schedule 7 - Claimants from West Side Canal and its Tributaries (Hamlin, Miller and Turner Creeks)	**7,712.40**			**0.55**	**6,049.20**	**30.85**	**14,352.12**	**29.00**	**11,504.13**	**22.90**	**8,928.93**	**5.45**	**2,161.98**	**41,997.02**	**90.15**

No comments

- n/a -

Middle Fork Feather River (and Its Tributaries Above Beckwith) Decree
County of Plumas, Case No. 3095

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March 1 through October 31	245.00	divi
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Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
Schedule B, Claimants from Fletcher Creek and Spring Channels															
Davies-Johnson Lumber Company	134.80	192, 193, 197	Davies-Johnson House, Davies-Johnson Spring, Chalen Davies-Johnson Meadow	0.65	613.79	0.65	337.19							952.98	1.30
Davies Johnson Lumber Company	Industrial	196	Calpine Pope Freeman Spring Channel, Freeman Fletcher Creek Meadow											0.00	0.00
Estate of William Freeman, Frank W Freeman, Administrator	53.80	194, 198	Devine Spring Channel, Devine Meadow	0.10	72.45	0.60	238.02							310.46	0.70
Samuel Devine & Kate L Devine	195.10	195, 199	Devine Spring Channel, Devine Meadow	0.40	269.79	1.00	396.68	0.35	138.84					825.32	1.75
Samuel Devine, Kate L Devine, Geri H Devine Allen & Devine, and Bradley & Wooding, Trustees Royal Union Fund	200.10	199, 200	Clarke Fletcher Creek Meadow	0.20	144.89	1.45	575.21	0.28	111.07					831.17	1.93
Subtotal Schedule B, Claimants from Fletcher Creek and Spring Channels	**583.80**			**1.55**	**1,122.92**	**3.90**	**1,547.11**	**0.63**	**249.92**	**0.00**	**0.00**	**0.00**	**0.00**	**2,919.94**	**5.68**

Schedule 9, Allocations to Shareholders in Sierra Valley Water Company for Rediversion From Little Truckee River Water Conveyed Into Middle Fork of Feather River Stream System	**No. of Shares**	**Allotment, cfs**	**Face Value Amount**
Anna B Miller	700.00	7	2,697.52
G Maddalena	200.00	2	769.58
Dell L. Johnson	200.00	2	769.58
Francesco G Bonv & Marcel J Bonv	200.00	2	769.58
Fred P Abers	200.00	2	769.58
Ken Tom	300.00	3	1,158.33
Wilson	200.00	2	769.58
Small	125.00	1	463.97
Mabel Eur	200.00	2	769.58
Russel	750.00	7	2,887.93
Van Vleck	200.00	2	769.58
Van Vleck	100.00	1	388.76
Mello	100.00	1	388.76
Alice Venetti	200.00	2	769.58
A Hills	200.00	2	769.58
Russel	200.00	2	769.58
George Filippini	300.00	3	1,158.33
Russel	500.00	5	2,417.93
Russel	200.00	2	769.58
Frances A Bradley, Jr	125.00	1	463.97
S J Carmichael	325.00	4	1,327.27
Wiley (RT), Howell (1)	100.00	1	404.62
Bridal Fuel	150.00	1	579.17
Paul Noble	200.00	2	769.58
Subtotal, Schedule 9	6,175.00	60	23,801.65

No comments

- n/a -

Middle Fork Feather River (and its Tributaries Above Beckwith) Decree
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Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
Schedule 10, Claimants from Middle Fork of Feather River, and Tributaries Cold, Webber, Town and Perry Creeks	**Acreage to be supplied**	**Diversion No. as per DWR Map**	**Name of Diversion System**	**First Priority Class (cfs)**	**First Priority Face Value (AF)**	**Second Priority Class (cfs)**	**Second Priority Face Value (AF)**	**Third Priority Class (cfs)**	**Third Priority Face Value (AF)**	**Fourth Priority Class (cfs)**	**Fourth Priority Face Value (AF)**	**Fifth Priority Class (cfs)**	**Fifth Priority Face Value (AF)**	**Sixth Priority Class (cfs)**	**Sixth Priority Face Value (AF)**	**Total Allotments, Face Value (AF)**	**Check, total CFS**
S C Lindeugh	5.00	127	Treasure and Camp Springs	0.04	28.98	0.08	31.74									60.71	0.12
S C Lindeugh	1.30	134	Town Pumps	0.02	14.49											14.49	0.02
John Arnaldi & Anna Arnaldi	144.60	155	Arnaldi Morgan East	1.50	1,086.69	1.00	396.68									1,483.39	2.50
James W Morgan	97.70	136, 157	Channel, Morgan West Channel	1.10	796.91											796.91	1.10
James W Morgan	19.90	133	Morgan, Johnson & Adams	0.10	72.43			0.18	71.40							143.83	0.28	
Dell L Johnson	30.30	129, 129A	, Johnson Cold Creek, Cook	0.20	144.89			0.80	317.36							462.25	1.00
Dell L Johnson	146.70	131, 132, 143, 238	Johnson Webber Creek, Johnson Town Creek, Webber, Ditz & Johnson, Hobo Springs	0.20	144.89	2.00	793.28	0.25	99.17							1,037.43	2.45
Dell L Johnson	60.70	133	Morgan, Johnson & Adams	0.20	144.89			0.80	317.36							462.25	1.00
Kelso N Dellers & Columbine Dellers	181.60	129	Miller Dellers	0.30	362.23	1.38	553.54			0.45	178.31					1,076.28	2.10
Anna B Miller	129.60	129, 258A	Miller Dellers, Miller Spring	0.50	362.23	1.38	553.54									897.77	1.85
Anna B Miller	20.00	133	Morgan, Johnson & Adams	0.27	195.60											195.60	0.27
Rendolph Water Company	12.80	130	Rendolph Morgan,	0.30	362.23											362.23	0.30
Annie Dore Adams	2.90	133	Johnson & Adams	0.04	28.98											28.98	0.04
Thomas E Miller	9.90	134	Town Pumps	0.04	28.98			0.13	59.50							88.48	0.19
C D Johnson	13.40	134	Town Pumps	0.08	36.22			0.20	79.34							115.56	0.25
John A McIntosh	1.00	134	Town Pumps	0.02	14.49											14.49	0.02
Fred Dolev	0.50	134	Town Pumps	0.01	7.24											7.24	0.01
Carmichael	3.40	135	Wilson Dam	0.10	72.43			0.50	198.33							270.79	0.60
Francesco G Bony & Marcel J Bony	388.70	136, 137, 138, 139	Bony Upper Dam, Bony Division Dam, Bony Middle Concrete Dam, Bony Lower Dam	0.50	362.23			5.05	2,003.31							2,365.54	5.55
Fred P Alpers & Christina Alpers	173.80	140	Alpers Lower Field	0.20	144.89			2.00	793.28							938.28	2.20
Fred P Alpers & Christina Alpers	60.00	256	Alpers Springs	0.20	144.89	0.80	317.36									462.25	1.00
Giulio Toni	321.90	142, 143, 255	Toni Upper, Toni Lower, Henderson Springs	0.20	144.89			3.80	1,507.44							1,652.33	4.00
Anna B Miller	296.00	137	Bony Division Dam	0.20	144.89					1.90	753.72	0.90	357.02			1,255.64	3.00
Anna B Miller	291.80	146	Miller Upper	0.50	362.23			2.60	1,031.40					1.00	396.68	1,790.33	4.10
Anna B Miller	132.30	147	Miller Schoolhouse					1.90	753.72							753.72	1.90

No comments

- n/a -

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Anna B Miller	326.00	149, 152	Perry Creek Division, Miller Lower Perry Creek							2.00	792.39	2.00	792.39			1,584.78	4.00
Willem A Ditz	8.00	145	Webber & Ditz & Johnson	0.05	36.22			0.10	39.47							75.69	0.15
Mary Ella Webber	7.00	145	Webber & Ditz & Johnson	0.05	36.22			0.10	39.47							75.69	0.15
Francesco G Bony & Marcel J Bony	91.60	147, 146A	Miller Schoolhouse, Bony Perry Dam							1.30	515.70					515.70	1.30
Horace G Adams	137.80	148	Adams	0.50	362.23			1.19	472.07	0.21	122.98					957.27	2.00
Seth Lee & Florence M Lee	130.00	149	Adams	0.50	362.23			1.19	472.07	0.21	83.31					917.60	1.90
Seth Lee & Florence M Lee	123.00	149	Perry Creek Division							1.55	614.88					614.88	1.55
Seth Lee & Florence M Lee	119.40	150, 151	Webber Upper, Webber Lower							1.45	575.21					575.21	1.45
George A Henderson	136.80	144, 154	Henderson Town Creek, Henderson Perry Creek	0.20	144.89					1.80	714.03					858.84	2.00
Battista Pasquetti	252.20	221	Pasquetti Dam	0.20	144.89					0.13	852.69			0.25	99.17	1,096.96	2.60
Robert L Henderson	134.70	222	East Side Slough	0.20	144.89					1.30	515.70					660.60	1.50
Alice Venetti	227.40	222, 223	East Side Slough, Venetti Slough	0.20	144.89					2.05	813.22					958.12	2.25
F E Humphrey Jr	1,309.70	224, 225, 226, 227, 228, 229	Humphrey Upper River, Humphrey North Rive, East Side, Humphrey Lower Concrete Dam, Humphrey Lower River Dam, Robbins Dam	0.70	507.12	0.80	379.57			5.20	2,062.81	3.70	1,467.77	2.70	1,071.07	5,688.35	13.10
Perpetua Genesio & Raffaele Datta	143.10	226, 229	East Side, Robbins Dam							0.85	337.19	0.60	238.02			575.21	1.45
Cesare C Datta	184.70	223	Humphrey North River											2.40	952.07	952.07	2.40
Cesare C Datta	122.80	229, 230, 231	East Side, Datta Meadow Dams, Datta Pump			0.40	289.78			1.45	555.37					845.16	1.80
Julius Filippini	156.40	226	East Side Filippini Upper Meadow Dams, Filippini Lower Meadow Dams									1.55	416.51	0.95	376.86	793.38	2.00
Julius Filippini	394.80	232, 233				0.50	362.23			2.30	912.40			0.83	337.19	1,611.82	3.65
M B Humphrey	222.90	226	East Side Mokey Meadow, Mokey East Side Dam									2.20	872.73			872.73	2.20
M B Humphrey	698.70	215, 216								3.20	1,269.42	2.30	912.40	1.50	595.04	2,776.86	7.00

No comments

- n/a -

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Amelia D Reinelli	102.30	226	East Side Pilgrim Middle									1.03	416.53			416.53	1.03
A A Vicce	40.00	234	Pilgrim Middle							0.40	158.68					158.68	0.40
F E Humphrey Jr	76.50	234	Pilgrim Middle									0.75	297.52			297.52	0.75
Francis A Bradley, Jr.	65.00	237	Ede River Dam							0.30	119.01	0.35	138.64			257.65	0.65
James L Humphrey	1,032.40	238, 239, 240	Humphrey Dam East, Humphrey Dam West, Humphrey Lower Field Dams							1.30	515.70	7.60	3,014.88	1.60	634.71	4,165.29	10.30
Louise Scalen, Ida A Scalen, Celia D Fallon, P A Scalen, N A Scalen, Olive R Alberti, Lyda H Westover	124.40	238	Humphrey Dam East									1.23	488.67			488.67	1.23
Antone E Dotta	109.80	238, 119	Humphrey Dam East, Ede Lake Cut									1.10	436.36	0.30	119.01	555.37	1.40
Henry Alberti	80.00	239	Humphrey Dam West H B									0.80	317.36			317.36	0.80
M B Humphrey	302.60	241, 242	Humphrey Tagneeni Ranch									1.90	753.72	1.10	436.36	1,190.08	3.00
L D Maddalena	32.50	242, 32	L D Maddalena River, Maddalena South									0.20	79.34	0.15	59.50	138.84	0.35
Westover Company	402.70	243,244,245, 263, 34, 33	Noble East, Noble West, Noble Dam, Noble Reservoir, Noble North, Noble South									2.50	991.74	2.00	793.39	1,785.12	4.50
Giacomo Feichi	164.40	246	Decker Dam									0.40	158.68	1.05	416.53	575.21	1.45
C Roy Carmichael	65.90	246, 247	Decker Dam, Carmichael Dam											0.65	337.19	337.19	0.65
Subtotal, Schedule 10, Claimants from Middle Fork of Feather River and Tributaries Cold, Walker, Town, and Parry Creeks	**10,049.70**			**9.79**	**7,092.49**	**8.28**	**3,841.83**	**20.81**	**8,259.21**	**31.42**	**12,494.13**	**30.05**	**12,158.68**	**10.70**	**6,624.76**	**50,437.14**	**117.05**

Additional Special Class Claimants, Last Chance Creek Group

				cfs	AF	Season
Sam Banta	Domestic, Stockwater, Irrigation	270	Banta Creek Ditches	3.15	2,282.06	Continuous
Sam Banta	Stockwater, Irrigation	271	Banta East Ditch	0.37	8.07	Apr 10 - Apr 20
A D Maddalena	Domestic, Stockwater, Irrigation	269	Maddalena Pasture Ditches	0.52	376.72	Continuous
L D Maddalena	Domestic, Stockwater		Maddalena Spring Pipe Line	0.02	10.87	Continuous
L D Maddalena	Stockwater, Irrigation	272	L D Maddalena Pasture Ditch	0.47	330.24	Apr 21 - Apr 9
Louis A LaFranchini	Domestic, Stockwater, Irrigation	273	LaFranchini Creek Ditches	3.20	2,318.28	Continuous

No comments

- n/a -

Middle Fork Feather River (and Its Tributaries Above Beckwith)
Decree
County of Plumas, Case No. 3095

Seasons of Use

Continuous, regardless of season	363.25	divi
March 1 through October 31	245.00	divi
March 15 through September 30	200.00	divi

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
Elsie Hart Golden	Domestic, Stockwater, Irrigation	274, 275	Trail West Canyon, Trail Middle Canyon, Trail East Canyon Ditches	2.25	1,630.04	Continuous									
Fred P Giudici and Myrtle W Giudici	Storage	21, 22	F P Giudici Upper and F P Giudici Lower Ditches	3.50	1,388.43	Irrigation Season									
Mauricio Giudici & Julie Giudici	Stockwater, Irrigation	Drainage from F P Giudici and M W Giudici	Drainage from F P Giudici and M W Giudici	unspecified	unspecified	Continuous									
Subtotal, Additional Special Class Claimants - Last Chance Creek Group				**13.48**	**8,344.71**										
Additional Surplus Class Claimants - Last Chance Creek Group															
Amelia D Ramelli	Domestic, Stockwater, Irrigation	70	Robert Lower Channel, Last Chance Lake		220.00										
Louise Scolari, Ida A Scolari, Celia D Pellen, P N Scolari, N A Scolari, Olive R Roberti, Lyda H Wetlaver	Domestic, Stockwater, Irrigation	70	Robert Lower Channel, Last Chance Lake		84.00										
James L Humphrey	Domestic, Stockwater, Irrigation	70	Robert Lower Channel, Last Chance Lake		27.00										
Subtotal, Additional Surplus Class Claimants, Last Chance Creek Group					**331.00**										
Additional Special Class Claimants, Smithneck Creek Group															
J S Rees and John Cecconi	Domestic, Stockwater, Irrigation	74	Parker (Grey) Ditch	0.50	362.23	Continuous									
John Cecconi	Domestic, Stockwater, Irrigation	75	Cecconi Ditches	1.15	833.13	Continuous									
Leon F Datto and Raffaele Datto	Domestic, Stockwater, Irrigation	76	Lower Meadowville Channel	0.80	317.36	Irrigation Season									
Ida Grendi	Domestic, Stockwater, Irrigation		Graveyard Creek through the Grendi Ditch	0.50	198.33	Irrigation Season									
Subtotal, Additional Special Class Claimants - Smithneck Creek Group				**2.95**	**1,711.07**										
Additional Surplus Class Claimants - Smithneck Creek Group															
Charles W Ede	Domestic, Stockwater, Irrigation	118	Ede Lake		70.00										
M B Humphrey	Domestic, Stockwater, Irrigation	118			70.00										
Clover Valley Lumber Company	Industrial	69	Mill Pond		30.00										
J S Rees	Domestic, Stockwater, Irrigation	67	Lewis (Rees) Reservoir		30.00										
Subtotal, Additional Surplus Class Claimants - Smithneck Creek Group					**240.00**										
Additional Special Class Claimants, West Side Canal Group															

No comments

- n/a -

Middle Fork Feather River (and Its Tributaries Above Beckwith) Decree
County of Plumas, Case No. 3095

Seasons of Use

Continuous, regardless of season	363.25	divi
March 1 through October 31	245.00	divi
March 15 through September 30	200.00	divi

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
P E Humphrey Jr	Domestic, Stockwater, Irrigation	201	Lower Greycroft Creek Diversion	0.22	87.27	Irrigation Season									
Henry Albini	Domestic, Stockwater, Irrigation	201	Lower Greycroft Creek Diversion	0.18	71.40	Irrigation Season									
James L Humphrey	Domestic, Stockwater, Irrigation	201	Lower Greycroft Creek Diversion	0.60	238.02	Irrigation Season									
James L Humphrey	Domestic, Stockwater, Irrigation	201	Lower Greycroft Creek Diversion	0.20	79.34	Irrigation Season									
P E Humphrey Jr	Domestic, Stockwater, Irrigation	201A	Upper Greycroft Creek Diversion	0.75	297.52	Irrigation Season									
Subtotal, Additional Special Class Claimants, West Side Canal Group Additional Surplus Class Claimants - Fletcher Creek Group				**1.95**	**773.55**										
Sabine Redgrath	Domestic, Stockwater, Irrigation		Fletcher Creek and Spring Channels	0.25	99.17	Irrigation Season									
Subtotal, Additional Surplus Class Claimants, Fletcher Creek Group Additional Special Class Claimants - Middle Fork Feather River Group				**0.25**	**99.17**										
Cesare P Lombardi	Domestic, Stockwater, Irrigation	120, 121, 122	Antelope Upper, Antelope East Channel, Antelope West Channel Ditches	4.00	1,586.76	Irrigation Season									
Julius Filippini and Perpetua Genasci	Domestic, Stockwater, Irrigation		Antelope Creek	2.00	793.38	Irrigation Season									
Annie B Miller	Domestic, Stockwater, Irrigation	125 to 129	Bimmen Spring Channel, Lemon East, Lemon West, Lemon Lower Ditches	5.00	3,622.31	Continuous									
Fred P Alpers & Christine Alpers	Domestic, Stockwater, Irrigation		Lemon Creek	2.70	1,956.05	Continuous									
Maria Metarozo and B V Metarozo	Domestic, Stockwater, Irrigation	257, 258	Campbell Springs, Echo Springs Ditches	0.80	579.57	Continuous									
Frank Carmichael	Domestic, Stockwater, Irrigation	267, 268	Hapes West Meadow, Hapes East Meadow Ditches	5.00	3,622.31	Continuous									
Velta Nelson	Domestic, Stockwater, Irrigation	265	Nelson Ditches	1.30	941.80	Continuous									
Giacomo Peichi and M Peichi	Domestic, Stockwater, Irrigation	266		1.70	1,231.59	Continuous									

No comments

- n/a -

Middle Fork Feather River (and Its Tributaries Above Beckwith)
Decree
County of Plumas, Case No. 3095

Seasons of Use

Continuous, regardless of season	363.25	divi
March 1 through October 31	245.00	divi
March 15 through September 30	200.00	divi

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
Westover Company	Domestic, Stockwater, Irrigation	266		1.60	1,304.03	Continuous									
Westover Company	Domestic, Stockwater	Unnamed Spring	Unnamed Spring	0.01	3.62	Continuous									
John Amadei & Anna Amadei	Domestic, Stockwater, Irrigation	259, 260	Amadei Meadow Spring Ditches Amadei Upper Spring, Amadei Meadow Spring Ditches	1.20	869.26	Continuous									
A E Strang	Domestic, Stockwater, Irrigation	259, 260	Amadei Meadow Spring Ditches Amadei Upper Spring, Amadei Meadow Spring Ditches	0.20	144.89	Continuous									
A E Strang	Irrigation	Amadei Springs	Amadei Meadow Springs	0.80	579.57	Continuous									
Subtotal, Additional Special Claim Claimants - Middle Fork Feather River				**26.51**	**17,235.28**										
Additional Surplus Claim Claimants - Middle Fork Feather River															
Anna B Miller	Domestic, Stockwater, Irrigation	155	Amadei Ditch	3.00	1,190.08	Irrigation Season									
Westover Company	Domestic, Stockwater, Irrigation	243, 244, 245	Noble East, Noble West Ditches	3.30	1,309.08	Irrigation Season									
Westover Company	Domestic, Stockwater, Irrigation	263	Noble Reservoir		200.00										
Frank Carmichael	Domestic, Stockwater, Irrigation	Mapes Creek & Tributaries	Mapes Reservoir		80.00										
Subtotal, Additional Surplus Claim Claimants - Middle Fork Feather River Group				**6.30**	**2,779.17**										

No comments

- n/a -

Middle Fork Feather River (and Its Tributaries Above Beckwith)
Decree
County of Plumas, Case No. 3095

Seasons of Use

Continuous, regardless of season	363.25	cfs
March 1 through October 31	245.00	cfs
March 15 through September 30	200.00	cfs

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total Allotments, Face Value (AF)	Check, total CFS
Summary of Middle Fork of Feather River Adjudication Decree	**Total cfs**	**Total AF**													
Subtotal, Schedule 3 - Last Chance Creek Group	18.50	7,338.84													
Subtotal, Schedule 4	75.03	28,858.68													
Schedule 5, Claimants from Last Chance Creek Below Adams Neck	13.83	4,899.17													
Schedule 6, Claimants from Smithneck Creek and Tributaries	67.14	31,012.66													
Schedule 7, Claimants from West Side Canal and Its Tributaries (Hamlin, Miller and Turner Creeks)	96.13	41,997.02													
Schedule 8, Claimants from Fletcher Creek and Spring Channels	6.08	2,919.84													
Schedule 9, Allocations to Shareholders in Sierra Valley Water Company for Rediversion from Little Truckee River Water Conveyed Into Middle Fork of Feather River Stream System	60.00	20,801.63													
Schedule 10, Claimants from Middle Fork of Feather River, and Tributaries Cold, Webber, Town and Perry Creeks	117.65	30,427.14													
Subtotal, Schedules 3-10	**498.42**	**191,305.11**													
Subtotal, Additional Special Class Claimants - Last Chance Creek Group	13.48	8,544.71													
Subtotal, Additional Special Class Claimants - Smithneck Creek Group	0.00	240.00													
Subtotal, Additional Special Class Claimants, West Side Canal Group	1.93	773.55													
Subtotal, Additional Special Class Claimants - Middle Fork Feather River	26.51	17,235.20													
Subtotal Schedules 3-10 and Special Class Claimants	**498.35**	**217,958.95**													
Subtotal, Additional Surplus Class Claimants, Last Chance Creek Group	0.00	331.00													
Subtotal, Additional Surplus Class Claimants - Smithneck Creek Group	0.00	240.00													
Subtotal, Additional Surplus Class Claimants, Fletcher Creek Group	0.23	99.17													
Subtotal, Additional Surplus Class Claimants - Middle Fork Feather River Group	6.30	2,779.17													
Subtotal, All Surplus Class Claimants	**6.55**	**3,449.35**													
Grand Total, All Schedules and Classes of Claimants	**504.90**	**221,408.00**													

No comments

- n/a -

Summary of Pit River Decrees

Pit River Decrees	Face Amount
Ash Creek	66,518.40
Burney Creek	11,308.76
Big Valley of Pit River	102,467.90
Franklin Creek	4,230.48
Hat Creek	93,210.83
Rattlesnake Creek	37,023.47
North Fork Pit River	46,856.17
South Fork Pit River	68,097.30
Roaring Creek	5,289.43
Willow Creek	552.02
Total Pit River Decrees	**435,554.75**

No comments

- n/a -

Modoc County Judgment and Decree No. 3670

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through October 15	198.00	days
March 1 through October 15	229.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Fifth Priority (cfs)	Fifth Priority (AF)	Total (cfs)	Total (AF)
Rush Creek Group (Schedule 3)															
Joe F Walker and Elsie D Walker	7.00	61, 62	Walker Upper, Walker Lower	0.16	70.69									0.16	70.69
Thomas J McClure	5.00	63	Higgins	0.12	47.13									0.12	47.13
C L Harder and Neta Harder	35.80	63	Higgins	0.60	235.64									0.60	235.64
Audrey Rice	62.80	64, 65	Audrey Rice, T J Rice	1.05	412.36									1.05	412.36
Erma Harrigan, Lillian Rice, May West, Red Rice, Clarence Rice, Mary Ash, and Rose Bartle	14.00	65	T J Rice	0.25	98.16									0.25	98.16
N S Kresge and Laura Kresge	49.50	66, 67	Kresge-Holbrook, Kresge East	0.85	333.82									0.85	333.82
Joseph H Holbrook, Erwin E Triplett, Henry O Triplett, and Grace Gordon	131.60	66, 68, 69, 70, 71	Kresge-Holbrook, Holbrook-Barrows, Holbrook-East Dams, Holbrook West, Holbrook Lower	2.20	864.00									2.20	864.00
Subtotal, Rush Creek Group	**305.70**			**5.25**	**2,061.82**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5.25**	**2,061.82**
Butte Creek Group (Schedule 4)															
Herbert S Bath and Anne Bath	53.50	72, 73	H S Bath Upper, H S Bath Lower	0.40	157.09									0.40	157.09
S J Niles and Myrtle Niles	106.50	74, 75, 76, 79 to 83	Niles Upper Meadow, Niles and Auble, Niles Middle Meadow, Niles Lower Meadow Dams	1.60	628.36									1.60	628.36
E M Auble and Ivy Auble	56.40	75, 77, 78	Niles and Auble, Auble Upper, Auble Lower	0.40	157.09									0.40	157.09
E J Schmidt and Emma B Schmidt	75.20	84	Elzea	0.10	39.27	0.90	353.45							1.00	392.73
Subtotal, Butte Creek Group	**291.60**			**2.50**	**981.82**	**0.90**	**353.45**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3.40**	**1,335.27**
Willow Creek Group (Schedule 5)															
Alton, P. Avilla, Lloyd Avilla, Irene Totten, Ida D Copper	15.00	85	Avilla Upper Springs							0.15	58.91			0.15	58.91
E V Wino	105.30	88, 89	Avilla West Side, Avilla East Side							0.85	333.82			0.85	333.82
Alice Gray	94.50	90A	Gray							0.80	314.18			0.80	314.18
E B Armstrong and Wilhelmina R Armstrong	70.00	91	Armstrong							0.50	196.36			0.50	196.36
Floyd E Walker	71.20	92	Knight	0.07	50.71	0.63	247.42							0.70	298.13
J E Albaugh	356.90	92	Knight	0.32	231.83	2.88	1,131.05							3.20	1,362.88
Frank Studley and Hattie Studley	355.80	93	Studley Johnson	0.32	231.83	2.88	1,131.05							3.20	1,362.88
R L Holmes and May L Holmes	210.90	93	Studley Johnson	0.16	115.91	1.44	565.53							1.60	681.44
Kasper Weigand and Etta Weigand	153.10	94, 95	Weigand Upper Dams, Weigand Lower Dams	0.10	72.45			1.50	589.09					1.60	661.54
Subtotal, Willow Creek Group	**1,432.70**			**0.97**	**702.73**	**7.83**	**3,075.05**	**1.50**	**589.09**	**2.30**	**903.27**	**0.00**	**0.00**	**12.60**	**5,270.15**
Ash Creek Group (Schedule 6)															
John T Bath, Alice B Walker, Carrie F Stone	126.60	7, 8	Bath Dam, Bath North Springs	1.95	765.82									1.95	765.82
Robert Fleming and Ora Lee Fleming	131.20	9	Fulstone Springs	2.00	785.45									2.00	785.45
John T Bath, Alice B Walker, Carrie F Stone	219.10	10	Bath (West Ranch)	3.30	1,296.00									3.30	1,296.00
John T Bath, Alice B Walker, Carrie F Stone	13.50	10	Bath	0.20	78.55									0.20	78.55
John T Bath, Alice B Walker, Carrie F Stone, Robert Fleming, Mary Fleming, and Ora Lee Fleming	142.20	10, 10A	Bath, Bath North	2.20	864.00									2.20	864.00
G H Perkins and Etta A Perkins	263.30	11, 12	Perkins Springs, Perkins	3.90	1,531.64									3.90	1,531.64
T A Barrows and Lulu M Barrows	305.10	13, 13A, 14, 14A	Barrows Upper, Barrows Dam #2, Barrows Slough, Barrows Lower Dams	4.70	1,845.82									4.70	1,845.82
John A Kresge and May E Kresge	26.00	15	John A Kresge Dam	0.45	176.73									0.45	176.73
R E Clark and Donnie Clark	23.90	None	Subirrigation	0.35	158.98									0.35	158.98

No comments

- n/a -

Modoc County Judgment and Decree No. 3670

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through October 15	198.00	days
March 1 through October 15	229.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Fifth Priority (cfs)	Fifth Priority (AF)	Total (cfs)	Total (AF)
J E Yowell, Addie Yowell, F E Yowell and Dorothy Yowell	24.50	17	Vogt	0.35	158.96									0.35	158.96
Louise Vogt and John Vogt	353.50	17, 18	Vogt, Vogt Lower Dam	5.45	2,475.47									5.45	2,475.47
W H Hurt Estate Co.	739.10	19	Clarke Co Upper Support Dams, New Canal Swamp Head	8.80	3,997.09							0.95	431.50	9.75	4,428.60
A J Weeks and Mary A Weeks	93.20	19	Clarke Co Upper Support Dams							1.45	658.61			1.45	658.61
J C Lane and Nora Lane	276.20	20, 21, 22, 46	North Slough, New Canal Swamp Head, Cannon Box, Lane Death Slough Dam					1.00	454.21			1.10	499.64	2.10	953.85
A L Cannon	110.00	22	Cannon Box					1.40	635.90					1.40	635.90
Indian Allotment	61.80	22	Cannon Box					0.80	363.37					0.80	363.37
W H Hurt Estate Co.	1,997.90	21, 22, 23, 24, 46, 47, 48, 49, 50, 51	New Canal Swamp Head, Cannon Box, Jenkins-Cannon, Death Slough Head Box, North Branch South Channel Lower, Island Taps, Lane Death Slough Dams, Death Slough, Death Slough South Bypass, Death Slough North					25.00	11,355.37			0.10	45.42	25.10	11,400.79
W H Hurt Estate Co.	68.00	23	Jenkins-Cannon			0.50	362.23	0.60	272.53					1.10	634.76
A L Cannon	68.00	22, 23	Cannon Box, Jenkins-Cannon			0.50	362.23	0.60	272.53					1.10	634.76
Wm Kramer and Rachel R Kramer	25.00	22, 23	Cannon Box, Jenkins-Cannon							0.30	136.26			0.30	136.26
W H Hurt Estate Co.	1,855.00	25, 26, 27, 28, 29, 32, 36, 37, 38, 42, 43, 44, 45	South Channel Head Box, Big Valley Drainage Canal, North Branch South Channel, Middle Branch South Channel, Chisholm Upper Dam, Wayman Support Dam, C W Clarke Co Upper South Channel Dam, C W Clarke Co Middle South Channel Dam, C W Clarke Co Lower South Channel Dam, Weigand-Genig Dam, Genig Swamp Dam, South Branch South Channel Dam, Middle Branch South Channel Dam					23.20	10,537.79					23.20	10,537.79
Wm H Bean	38.90	25, 29, 30	South Channel Head Box, Chisholm Upper Dam, Chisholm Lower Dam					0.50	227.11					0.50	227.11
M D Wayman and Alice M Wayman	232.90	25, 26, 31, 32, 33	South Channel Head Box, Big Valley Drainage Canal, Wayman Upper Dam, Wayman Support Dam, Wayman Lower Dam					2.90	1,317.22					2.90	1,317.22
R L Holmes and May L Holmes	94.00	25, 34, 35	South Channel Head Box, Holmes Upper Dam, Holmes Lower Dam					1.20	545.06					1.20	545.06
J P Miller and Clara Miller	172.40	25, 39, 40, 41	South Channel Head Box, Miller Upper Dam, Miller Middle Dam, Miller Lower Dam					2.15	976.56					2.15	976.56
Kasper Weigand and Etta Weigand	141.10	25, 42	South Channel Head Box, Weigand-Genig Dam					1.75	794.88					1.75	794.88
Charles A Genig	200.70	25, 42, 43	South Channel Head Box, Weigand-Genig Dam, Genig Swamp Dam					2.50	1,135.54					2.50	1,135.54
W H Hurt Estate Co.	97.90	26	Big Valley Drainage Canal							1.25	567.77			1.25	567.77
W H Hurt Estate Co.	38.00	52, 53	Genig, Mouth of Ash Creek							0.20	90.84			0.20	90.84
James A Hollenbeak and Lela Hollenbeak	207.00	52, 54, 55	Genig, Watson, Hollenbeak Swale							1.15	522.35			1.15	522.35
Ardella Babcock and Estate of Andrew Babcock	12.00	52, 54	Genig, Watson							0.07	31.80			0.07	31.80
Arad Babcock	91.00	52, 54	Genig, Watson							0.50	227.11			0.50	227.11

No comments

- n/a -

Modoc County Judgment and Decree No. 3670

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through October 15	198.00	days
March 1 through October 15	229.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority (cfs)	Fourth Priority Face Value (AF)	Fifth Priority (cfs)	Fifth Priority (AF)	Total (cfs)	Total (AF)
Lester A Babcock and Frances B Babcock	259.00	52, 54	Gerig, Watson							1.45	658.61			1.45	658.61
Oral Lester Babcock	4.00	52, 54	Gerig, Watson							0.03	13.63			0.03	13.63
Marjorie M Merritt and McElroy Brown	32.40	52, 54	Gerig, Watson							0.20	90.84			0.20	90.84
Subtotal Ash Creek Group Special Class Claimants on Ash Creek (Schedule 7)	**6,588.40**			**33.65**	**14,134.51**	**1.00**	**724.46**	**63.60**	**28,888.07**	**6.60**	**2,997.82**	**2.15**	**976.56**	**107.00**	**47,721.42**
Robert McGarva and Rhoda McGarva	28.60	56, 57	Steele Upper, Steele Lower	0.60	235.64									0.60	235.64
Robert McGarva and Rhoda McGarva	21.20	58, 59, 60	Johnson Upper, Johnson Middle, Johnson, Lower	0.40	157.09									0.40	157.09
Audrey Rice	4.00	96	Rice Spring Channel	0.05	36.22									0.05	36.22
Alice Gray	94.50	90	Gray Springs	0.80	579.57									0.80	579.57
Robert Fleming and Ora Lee Fleming	818.80	1, 2, 3	Fleming West Springs, Fleming East Springs, Fleming Spreading Dams	9.15	3,593.45									9.15	3,593.45
John T Bath, Alice B Walker, Carrie F Stone	599.90	4, 5, 6, 8	Bath West Springs, Bath Middle Springs, Bath East Springs, Bath North Springs	6.95	2,729.45									6.95	2,729.45
John T Bath, Alice B Walker, Carrie F Stone	36.70	None	Bath Seeps	Entire Flow										0.00	0.00
T A Barrows and Lulu M Barrows	37.20	106, 107	Unnamed, Shane Gulch	0.50	362.23									0.50	362.23
T A Barrows and Lulu M Barrows	Domestic	108	Unnamed	0.50	362.23									0.50	362.23
T A Barrows and Lulu M Barrows	6.00	98	Barrows Spring	0.10	39.27									0.10	39.27
Alta J Wallace and Daisy H Smith	75.00	97	Wallace	1.00	454.21									1.00	454.21
John A Kresge and May E Kresge	134.50	99, 100, 101	Kresge South Springs, Kresge North Springs, Kresge House Spring	1.40	549.82									1.40	549.82
John A Kresge and May E Kresge	7.00	102	Kresge Lower Spring	0.15	108.67									0.15	108.67
J E Yowell, Addie Yowell, F E Yowell and Dorothy Yowell	66.00	103	Clark Springs	1.05	412.36									1.05	412.36
J A Clark, W E Clark, and Donnie Clark	70.80	105	Clark Upper Springs	0.38	147.27									0.38	147.27
W H Hurlt Estate Co.	1,263.50	None	Tule Swamp	Entire Flow										0.00	0.00
R L Holmes and May L Holmes	162.50	None	Holmes Pond	Entire Flow										0.00	0.00
R L Holmes and May L Holmes, M D Wayman and Alice M Wayman	125.40	104	Hot Spring Channel	0.50	362.23									0.50	362.23
J C Lane and Nora Lane	92.00	109	Lane-Fleming	Entire Flow										0.00	0.00
Subtotal, Special Class (Schedule 7)	**3,645.60**			**23.53**	**10,129.74**									**23.53**	**10,129.74**

Summary of Ash Creek Decree	First Priority Face Value (AF)	Second Priority Face Value (AF)	Third Priority Face Value (AF)	Fourth Priority Face Value (AF)	Fifth Priority Face Value (AF)	Total Face Amount (AF)
Rush Creek Group	2,061.82	0.00	0.00	0.00	0.00	2,061.82
Butte Creek Group	981.82	353.45	0.00	0.00	0.00	1,335.27
Willow Creek Group	702.73	3,075.05	589.09	903.27	0.00	5,270.15
Ash Creek Group	14,134.51	724.46	28,888.07	2,997.82	976.56	47,721.42
Special Class Rights Holders	10,129.74	0.00	0.00	0.00	0.00	10,129.74
Total	**28,010.61**	**4,152.97**	**29,477.16**	**3,901.09**	**976.56**	**66,518.40**

No comments

- n/a -

Big Valley Pit River Decree - Between Canby Bridge to Muck Valley
Modoc County Decree No. 6395

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through September 30	183.00	days
		days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Total (cfs)	Total (AF)
Tributary Group													
R H Bushey	Domestic	4a	Unnamed Spring	0.05	18.15							0.05	18.15
Merlin Kennedy and Erma Kennedy	50.00	5, 6	Upper Turner Creek	0.72	261.34							0.72	261.34
E W Caldwell and Rose Marie Caldwell	60.00	6a	Hulbert Creek	0.86	312.16							0.86	312.16
Robert Sherer and A F Gerig	80.00	12a	Stone Coal Creek	1.15	417.42							1.15	417.42
W O Grover	Domestic	11	Stone Coal Creek									0.00	0.00
Robert Sherer and A F Gerig	96.00	10a	Tom Deskins Creek	1.36	493.65							1.36	493.65
Gladys Troy	Domestic	14b	Holl Creek			0.07	25.41					0.07	25.41
H S Lorenz and Flora Richards, Executrix	5.00	14c	Holl Creek	0.07	25.41							0.07	25.41
George W Hines, Marvin A Hines, and Mason Hines	80.00	14f	Holl Creek					1.14	413.79			1.14	413.79
J H Duncan and Marian Duncan	40.00	14d	Holl Creek					0.57	206.90			0.57	206.90
Gladys Troy	160.00	15a	Lower Turner Creek	2.26	827.58							2.26	827.58
George W Hines, Marvin A Hines, and Mason Hines	40.00	15b	Lower Turner Creek	0.57	206.90							0.57	206.90
R E Potter, Joe L Potter, L J Potter, and Forrest D Potter	160.00	29b	Egg Lake Slough-Taylor Creek	2.26	827.58							2.26	827.58
Albert W Joiner and Lillian B Joiner	23.00	29c	Egg Lake Slough-Taylor Creek	0.33	119.78							0.33	119.78
R E Potter, Joe L Potter, L J Potter, and Forrest D Potter	85.00	29a	Egg Lake Slough-Taylor Creek					1.22	442.83			1.22	442.83
L W Kramer	130.00	29d	Egg Lake Slough-Taylor Creek					1.86	675.13			1.86	675.13
J H Holl and Kenneth K Holl	204.00	46, 43a	Egg Lake Slough-Taylor Creek							2.92	1,059.69	2.92	1,059.69
Richard Hemsted and Karl Hemsted	400.50	30, 31, 32, 33, 34, 35	Widow Valley Creek	5.72	2,076.22							5.72	2,076.22
W Lee Jr	4.00	31a	Widow Valley Creek	0.06	21.76							0.06	21.76
L W Kramer	200.00	36	Widow Valley Creek					2.86	1,038.11			2.86	1,038.11
L W Kramer	1,075.00	37, 38	Widow Valley Creek			15.40	5,589.62					15.40	5,589.62
W L Gray	1.00	47a	Knox Spring	0.02	7.26							0.02	7.26
W L Gray	Domestic, Stockwater	47b	Knox Spring Channel	0.01	3.63							0.01	3.63
Gerald G Packwood	76.00	53	Bassett Hot Springs	1.08	392.01							1.08	392.01
Charles A Gerig and W L Gray	28.00	53b, 53	Bassett Hot Springs					0.40	145.19			0.40	145.19
Norris Gerig	133.00	28, 43	Bull Run Slough	1.90	689.65							1.90	689.65
Alvin E Watson and Mary V Watson	160.00	56a	Bull Run Slough			2.26	827.58					2.26	827.58
Andrew C Babcock and Dorothy J Babcock	166.00	72	Bull Run Slough					2.40	871.14			2.40	871.14
S J Thompson	40.00	56b	Bull Run Slough							0.57	206.90	0.57	206.90
Frank Iverson	372.50	62	Juniper Creek	5.33	1,934.66							5.33	1,934.66
Subtotal, Tributary Group	**3,971.00**			**23.79**	**8,635.18**	**17.75**	**6,442.81**	**10.45**	**3,793.09**	**3.49**	**1,266.78**	**55.48**	**20,137.86**
Big Valley Pit River Group													
Klaus Mohr	37.00	2				0.53	192.36					0.53	192.36
R H Bushey	152.00	3				2.17	787.66					2.17	787.66
Alden Miller	211.00	12				3.02	1,096.19					3.02	1,096.19
Robert Sherer and A F Gerig	100.00	12a				1.43	519.05					1.43	519.05
C M Shaw and R Shaw	134.50	13b				1.92	696.91					1.92	696.91
R A Blair	60.50	13b				0.86	312.16					0.86	312.16
R D Kerley and Angel E Kerley (Cross Ranch)	110.00	13d				1.57	569.87					1.57	569.87
R D Kerley and Angel E Kerley (Home Ranch)	660.00	28, 42, 44				1.94	704.17			10.63	3,858.43	12.57	4,562.60
J H Duncan and Marian Duncan	200.00	13c				2.86	1,038.11					2.86	1,038.11
Kenneth K Gould	84.00	14a				1.20	435.57					1.20	435.57

No comments

- n/a -

Big Valley Pit River Decree - Between Canby Bridge to Muck Valley
Modoc County Decree No. 6395

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through September 30	183.00	days
		days

Allotments

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Total (cfs)	Total (AF)
George A Hines, Marvin A Hines, and Mason Hines	506.00	15		15 cubic feet per second to maintain channel storage and supply stock water or such amounts as may be reasonably		7.26	2,635.20					7.26	2,635.20
Gladys Tiry	112.00	140				1.60	580.76					1.60	580.76
Albert W Joiner and Lillian B Joiner (Upper Ranch)	160.00	29c				2.28	827.58					2.28	827.58
Albert W Joiner and Lillian B Joiner (Miller Ranch)	263.00	17				3.76	1,364.79					3.76	1,364.79
Albert W Joiner and Lillian B Joiner (Home Ranch)	66.00	18				0.94	341.20					0.94	341.20
Ernest C Robinson	178.00	24				1.77	642.47			0.77	279.49	2.54	921.96
L H Monchamp	121.00	22a				1.73	627.95					1.73	627.95
F E Yowell	287.00	22b					0.00	4.10	1,488.20			4.10	1,488.20
H M Roberts	229.00	22b				0.21	76.22	3.06	1,110.70			3.27	1,186.93
Cyril R Mamath	609.00	24				3.83	1,390.20	2.84	1,030.85	2.03	736.84	8.70	3,157.88
D J Leventon (Courtright Ranch)	200.00	25				1.49	540.83	0.85	308.53	0.52	188.75	2.86	1,038.11
D J Leventon (Courtright Ranch)	140.00	25				1.00	362.96	1.00	362.96			2.00	725.95
Cornelius Jest	794.00	25				1.66	602.54	9.68	3,513.60			11.34	4,116.14
E K Brown and Leila A Brown	331.00	23				0.59	214.16	3.85	1,397.45	0.29	105.26	4.73	1,716.87
R E Potter, Joe L Potter, Forrest D Potter, and L J Potter	314.00	27				4.50	1,633.39					4.50	1,633.39
C R Brown, A G Brown, and E K Brown	202.00	26				2.89	1,049.00					2.89	1,049.00
H L Hayes, Jessie Hayes, and Emma Hayes	537.00	23, 24				3.37	1,223.23	1.17	424.68	3.13	1,136.11	7.67	2,784.02
Orbil Gerig and Gertrude M Gerig	159.00	27a				2.27	823.95					2.27	823.95
W H Hunt Estate Co.	440.00	23				6.30	2,286.74					6.30	2,286.74
W H Gerig	305.50	23, 39				2.70	980.03			1.66	602.54	4.36	1,582.57
L W Kramer	640.50	28				5.24	1,901.99			3.91	1,419.23	9.15	3,321.22
E J Raehl	61.00	28				0.87	315.79					0.87	315.79
James H Piron and Verna L Piron	23.00	28				0.33	119.78					0.33	119.78
Peter Gerig (Knox Ranch)	268.00	28, 43				3.83	1,390.20					3.83	1,390.20
Peter Gerig (Home Ranch)	339.00	23, 43, 39				4.66	1,691.46			0.18	65.34	4.84	1,756.80
E V Wind	146.00	28				2.08	754.99					2.08	754.99
Norris Gerig	27.00	28, 43				0.39	141.56					0.39	141.56
Alvin E Watson and Mary V Watson	15.00	28				0.21	76.22					0.21	76.22
Ralph T Hody	31.00	28				0.44	159.71					0.44	159.71
Andrew C Babcock and Doretha J Babcock	12.00	28				0.17	61.71					0.17	61.71
Lester Babcock	268.00	42				2.23	809.43	2.23	809.43			4.46	1,618.87
Arad Babcock	97.00	42				0.81	294.01	0.81	294.01			1.62	588.02
J H Holl and Kenneth K Holl	407.00	28				5.82	2,112.52					5.82	2,112.52
J H Holl and Kenneth K Holl	160.00	45								2.28	827.58	2.28	827.58
Merlin Kennedy	32.50	48				0.47	170.60					0.47	170.60
Aubrey C Bieber and Carmen B Conner	30.00	48a				0.43	156.08					0.43	156.08
W M Snipes	193.00	49				1.61	584.39			1.13	410.16	2.74	994.55
Mary DeMange Kennedy	176.00	49				2.51	911.07					2.51	911.07
Kenneth McArthur and John R McArthur	320.00	49				4.56	1,655.17					4.56	1,655.17
Aldrew C Babcock	53.00	49				0.76	275.86					0.76	275.86
Chester Babcock	154.00	49				2.20	798.55					2.20	798.55
R A Babcock	120.00	49				1.71	620.69					1.71	620.69
Ernest G Babcock and Bessie J Babcock	677.00	49				9.67	3,509.97					9.67	3,509.97
King A Stubblefield and Beatrice Stubblefield	160.00	51a				2.28	827.58					2.28	827.58
Estate of Walter Burnham Armstrong	381.00	49				5.44	1,974.59					5.44	1,974.59
Kenneth McArthur and John R McArthur, Anna McArthur	320.00	67				4.56	1,655.17					4.56	1,655.17
Kenneth McArthur and John R McArthur, Anna McArthur	680.00	66				7.58	2,751.35			2.14	776.77	9.72	3,528.12
E J Britten and Thelma Britten	676.00	68, 69				11.23	4,076.21			1.27	460.96	12.50	4,537.19
W L Campbell	120.00	71				1.28	464.61			0.43	156.08	1.71	620.69
S J Thompson	803.50	70, 71								11.50	4,174.21	11.50	4,174.21

No comments

- n/a -

Big Valley Pit River Decree - Between Canby Bridge to Muck Valley
Modoc County Decree No. 6395

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through September 30	183.00	days
		days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments	First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Total (cfs)	Total (AF)
S J Thompson and W H Thompson	304.00	49					3.21	1,165.15			1.13	410.16	4.34	1,575.31
Subtotal, Big Valley Pit River Group	**15,819.00**				**15.00**	**5,444.63**	**154.23**	**55,981.67**	**29.59**	**10,740.44**	**43.00**	**15,607.93**	**241.82**	**82,330.04**
Surplus Class Claimants (in order of priority)	cfs	Acre-feet	Season											
Albert W Joiner and Lillian B Joiner	0.09	28.00	Nov 1 - Apr 1											
Orol Babcock, H W Killebrew, Richard B Keene, Homer C Jack	10.00	892.56	Apr 1 - May 15											
Orol Babcock, H W Killebrew, Richard B Keene, Homer C Jack	11.84	3,600.00	Jan 15 - May 15											
Big Valley Mutual Water Company	8.67	2,635.00	Oct 1 - June 1											
Big Valley Mutual Water Company	0.33	100.00	Oct 1 - June 1											
Big Valley Mutual Water Company	8.60	2,615.00	Oct 1 - June 1											
L W Kramer	6.75	2,476.86	May 1 - Nov 1											
L W Kramer	0.28	86.50	Feb 1 - Apr 1											
L W Kramer	0.09	27.60	Nov 1 - Apr 30											
Russell M Bushey	500 gpd	0.56	Jan 1 - Dec 31											
United States, Modoc Nat'l Forest	1800 gpd	2.02	Apr 1 - Nov 30											
United States, Modoc Nat'l Forest	650 gpd	0.73	May 1 - Oct 30											
Cornelius Jest	4.93	1,500.00	Nov 1 - Mar 31											
United States, Modoc Nat'l Forest	375 gpd	0.42	May 1 - Oct 30											
United States, Modoc Nat'l Forest	650 gpd	0.73	May 15 - Oct 15											
Clinton Pelter and Do-Be Melon Pelter	0.63	190.00	Nov 1 - Apr 1											
George W Hines, Marvin A Hines and Mason M Hines	0.66	200.00	Oct 1 - May 1											
Alden Miller	0.60	182.00	Oct 1 - Apr 30											
United States, DOI, BLM	0.01	2.23	Oct 1 - May 31											
United States, DOI, BLM	0.00	0.21	Oct 1 - May 31											
California Dept of Water Resources	263.19	80,000.00	Jan 1 - Dec 31	Stone Coal Reservoir project for Big Valley Irrigation District										
Pit Soil Conservation District	252.00	76,600.00	Oct 1 - Apr 30											
Total, Surplus Water Claims	**568.67**	**171,140.62**												

Summary	**cfs**	**Acre-feet**
Tributary Group	55.48	20,137.86
Big Valley Pit River Group	241.82	82,330.04
Total Senior Claimant Groups	297.30	102,467.90
Surplus Water Claimants	568.67	171,140.62
Total, Big Valley Pit River Decree Claims	**865.97**	**273,608.52**

No comments

- n/a -

Burney Creek Decree
Shasta County, Decree No. 5111

Seasons of Use

Continuous, regardless of season	365.25	days
May 5 through November 1	181.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotment During Irrigation Period	Allotment Face Value (AF)
West Side Users					
Richard W Haynes	376.00		Haynes or Creek Laterals	9.45	1,696.31
J C Erickson	21.00		Erickson	0.60	107.70
John Snooks	18.00		Snooks	0.50	89.75
Timothy Desmond	75.00		Cayton or Natural Channel of Burney Creek	1.88	337.47
Karl Elling	314.00		Cayton or Elling	7.85	1,409.11
Mary Ann Cornaz	150.00		Greer-Cornaz or Natural Channel of Burney Creek	3.75	673.14
Ray Vedder	75.00		Greer-Cornaz or Natural Channel of Burney Creek	1.87	335.67
Subtotal, West Side Users	**1,029.00**			**25.90**	**4,649.16**
East Side Users					
A R Haynes	50.00		A R Haynes	1.25	224.38
Fred Greer	87.00		Greer-Cornaz	2.50	448.76
Mary Ann Cornaz	137.00		Greer-Cornaz	3.42	613.90
Red River Lumber Co.	175.00		Greer-Cornaz	4.33	777.25
Ednah M Black	320.00		Greer-Cornaz	8.80	1,579.64
Karl Elling	200.00		Cayton or Elling	5.00	897.52
Subtotal, East Side Users	**969.00**			**25.30**	**4,541.45**
Surplus Water Users					
Karl Elling	71.00		Cayton or Elling	0.90	323.11
Timothy Desmond	8.00		Cayton or Natural Channel of Burney Creek	0.10	35.90
Fred Greer	10.00		Greer-Cornaz	0.12	43.08
Mary Ann Cornaz	32.00		Greer-Cornaz or Natural Channel of Burney Creek	0.40	143.60
Red River Lumber Co.	150.00		Greer-Cornaz	1.88	674.94
Ednah M Black	137.00		Greer-Cornaz	1.70	610.31
Ray Vedder	64.00		Greer-Cornaz or Natural Channel of Burney Creek	0.80	287.21
Subtotal, Surplus Water Users	**472.00**			**5.90**	**2,118.15**
Total, Burney Creek Decree	**2,470.00**			**31.50**	**11,308.76**

No comments

- n/a -

Franklin Creek Decree
Modoc County Decree No. 3118

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through September 30	183.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Total (cfs)	Total Face Value (AF)
Allotments from Franklin Creek													
Earl & Mary Ehrman	15.20		Ehrman	0.18	63.52							0.18	63.52
Ira A & Ida M Hanson	12.80		Hanson North, and/or Hanson Middle			0.16	58.08					0.16	58.08
P Indart	20.55		Indart Main and/or Indart South			0.26	94.37					0.26	94.37
G R Stone	12.80		Stone			0.16	58.08					0.16	58.08
John & Fannie Morrison	20.80		Morrison			0.26	94.37					0.26	94.37
Earl & Bernice Sherer and Bank of America NT&SA	8.00		North Channel			0.10	36.30					0.10	36.30
Paulina Lee	20.80		North Channel			0.26	94.37					0.26	94.37
J G & Mattie M Dawson	20.80		North Channel			0.26	94.37					0.26	94.37
P Indart	50.80		North Channel					0.63	228.67			0.63	228.67
Paulina Lee	52.00		North Channel					1.05	381.12			1.05	381.12
J G & Mattie M Dawson	83.90		North Channel					1.05	381.12			1.05	381.12
Ella M Shartel	10.30		North Channel					0.14	50.82			0.14	50.82
C E & Mary A Crowder	114.20		North Channel					1.43	519.05			1.43	519.05
G R Stone	21.80		Stone					0.28	101.63			0.28	101.63
John & Fannie Morrison	124.60		Morrison, Morrison Middle, and/or Morrison Lower					1.56	566.24			1.56	566.24
Earl & Bernice Sherer and Bank of America NT&SA	8.00		Morrison, Morrison Middle, and/or Morrison Lower					0.10	36.30			0.10	36.30

No comments

- n/a -

Franklin Creek Decree
Modoc County Decree No. 3118

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through September 30	183.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Total (cfs)	Total Face Value (AF)
Ira A & Ida M Hanson	9.60		Hanson North, Hanson Middle, and/or Hanson South					0.12	43.56			0.12	43.56
P Indart	30.80		South Channel					0.40	145.19			0.40	145.19
Raulina Lee	79.90		South Channel					0.85	308.53			0.85	308.53
C E & Mary A Crowder	70.50		South Channel					0.88	319.42			0.88	319.42
Ira A & Ida M Hanson	19.50		Hanson North, Hanson Middle, and/or Hanson South							0.25	90.74	0.25	90.74
P Indart	15.60		Indart Main							0.20	72.60	0.20	72.60
Raulina Lee	12.00		Lee Upper							0.15	54.45	0.15	54.45
John & Fannie Morrison	22.50		Morrison and/or Morrison Middle							0.28	101.63	0.28	101.63
Earl & Bernice Sherer and Bank of America ITR&A	51.60		Morrison, Morrison Middle, and/or Morrison Lower							0.65	235.93	0.65	235.93
Total Franklin Creek Allotments	**909.35**			**0.18**	**63.52**	**1.46**	**529.94**	**8.49**	**3,081.66**	**1.53**	**555.35**	**11.66**	**4,230.48**

No comments

- n/a -

Hat Creek Decree
Shasta County Decree No. 5724
Shasta County Decree No. 7858
Seasons of Use
Continuous, regardless of season 365.25 days
May 1 through October 27 180.00 days
October 28 through April 30 185.25 days

Summer Season
Winter Season

Name of Claimant	Name of Diversion System	Allotments Allotment (cfs)	Allotment (AF)
Summer Season Decree No. 5724			
Upper Users, First Rotation - Schedule I			
Harvey W Wilcox	Harvey Wilcox Upper or Harvey Wilcox Lower	2.13	379.34
Vint W Stevenson	Stevenson	2.38	423.97
Carrie Klots Hall and W P Hall	Hall	2.75	490.91
Alec Brown (Indian)	Alec Brown	0.50	89.26
Charles Hawkins	Hawkins	2.25	401.65
Charles Hawkins	Harry Wilcox Middle	1.88	334.71
Harry M Wilcox	Harry Wilcox Upper	5.63	1,004.13
Harry M Wilcox	Harry Wilcox Middle	8.25	1,472.73
R A Wilcox and Amy Wilcox	Harry Wilcox Upper	1.50	267.77
R A Wilcox and Amy Wilcox	Harry Wilcox Middle	13.00	2,320.66
R A Wilcox and Amy Wilcox	Harry Wilcox Lower	1.00	178.51
R A Wilcox and Amy Wilcox	Rube Wilcox	2.88	513.22
Felice Kelly Davis	Rube Wilcox - Davis	2.13	379.34
Holliday Brown (Indian)	Harry Wilcox Middle	1.13	200.83
William Valentine	Valentine Upper	1.13	200.83
William Valentine	Valentine Lower	0.50	89.26
Charles Heryford	Heryford Upper	1.50	267.77
Charles Heryford	Heryford Middle	0.50	89.26
Charles Heryford	Heryford Lower	1.50	267.77
Edith Snook (Indian)	Edith Snook	0.50	89.26
J S Ratledge	Ratledge-Henry Longuist	3.50	624.79
J S Ratledge	Ratledge-Opdyke-Forest Service	0.88	156.20
Olive Opdyke	Ratledge-Opdyke-Forest Service	5.88	1,048.76
Perry Opdyke, Percy Opdyke	Opdyke	11.88	2,119.83
Henry Lonquist	Ratledge-Henry Longuist	1.88	334.71
H Morris	Morris Upper or Morris Lower	16.13	2,878.51
Iva Morris (Mrs A L Doty, Iva Doty)	Morris Upper or Morris Lower	6.13	1,093.39
Clare Brown, Fay Brown	Reiger	3.25	580.17
Charles Sidney Gray	Gray	1.00	178.51
Subtotal, Schedule I, First Rotation		**103.50**	**18,476.03**
Upper Users, Second Rotation - Schedule II			
	Harvey Wilcox Upper	0.25	44.63
	Harvey Wilcox Lower	0.25	44.63
	Stevenson	0.25	44.63
	Gray	0.13	22.31
	Hall	0.50	89.26
	Alec Brown	0.13	22.31
	Hawkins	0.25	44.63
	Harry Wilcox Upper	0.75	133.88
	Harry Wilcox Middle	1.00	178.51
	Rube Wilcox - Davis	0.50	89.26
	Harry Wilcox Lower	0.25	44.63
	Valentine Upper	0.25	44.63
	Valentine Lower	0.25	44.63
	Heryford Upper	0.25	44.63
	Heryford Middle	0.25	44.63
	Heryford Lower	0.25	44.63
	Edith Snook	0.13	22.31
	Ratledge-Henry Longquist	0.75	133.88
	Ratledge-Opdyke-Forest Service	0.75	133.88
	Opdyke	1.00	178.51
	Morris Upper	0.75	133.88
	Morris Lower	0.75	133.88
	Rieger (for Clare and Fay Brown)	0.50	89.26
Subtotal, Schedule II, Second Rotation		**10.13**	**1,807.44**
Lower Users, First Rotation - Schedule III			
Vernon March	Morris Upper or Morris Lower	13.50	2,409.92
Harry A Lonquist	Harry Lonquist	0.75	133.88
Harry A Lonquist	Rieger	3.75	669.42
Harry A Lonquist	Harry Lonquist-Reynolds-Bidwell	2.50	446.28
Harry A Lonquist	Harry Lonquist-Reynolds-East Side	2.25	401.65
Harry A Lonquist	Harry Lonquist-Reynolds-Middle	0.50	89.26
N Reynolds, A N Reynolds (F Allen)	Harry Lonquist-Reynolds-East Side	1.25	223.14

No comments

- n/a -

Hat Creek Decree
Shasta County Decree No. 5724
Shasta County Decree No. 7858
Seasons of Use
Continuous, regardless of season 365.25 days
May 1 through October 27 180.00 days
October 28 through April 30 185.25 days

Summer Season
Winter Season

Name of Claimant	Name of Diversion System	Allotments Allotment (cfs)	Allotment (AF)
N Reynolds, A N Reynolds (F Allen)	Reynolds Canal	4.00	714.05
N Reynolds, A N Reynolds (F Allen)	Harry Lonquist-Reynolds-Middle	2.50	446.28
N Reynolds, A N Reynolds (F Allen)	Harry Lonquist-Reynolds-Bidwell	3.75	669.42
Henry Lonquist	Henry Lonquist	1.75	312.40
Henry Lonquist	Oppdyke	0.13	22.31
Henry Lonquist	Henry & Fritz Lonquist Upper or Henry & Fritz Lonquist Lower	4.50	803.31
Fritz Lonquist	Henry & Fritz Lonquist Upper or Henry & Fritz Lonquist Lower	2.88	513.22
R E Bidwell	Harry Lonquist-Reynolds-Bidwell	8.75	1,561.98
Jeff Bone & Lee Bone (Indians)	Jeff Bone Upper	0.50	89.26
Jeff Bone & Lee Bone (Indians)	Jeff Bone Lower	0.50	89.26
Jeff Bone & Lee Bone (Indians)	Lee Bone	0.50	89.26
Sam Williams (Indian)	Lee Bone	0.50	89.26
Sam Williams (Indian)	Sam Williams	0.75	133.88
Julia Wilson (Indian)	Julia Wilson	2.00	357.02
Joe Wilson (Indian)	Joe Wilson	2.75	490.91
Harry Bob (Indian)	Julia Wilson	3.50	624.79
Ellen Brown (Alan Brown as successor)	Ellen Brown Upper	3.00	535.54
Ellen Brown (Alan Brown as successor)	Ellen Brown Lower	3.25	580.17
Ellen Brown (Alan Brown as successor)	Ellen Brown - W W Brown	4.00	714.05
Ellen Brown (Alan Brown as successor)	Hat Creek (no ditch)	2.00	357.02
W W Brown	Ellen Brown - W W Brown	7.50	1,338.84
W W Brown	Hat Creek (no ditch)	0.50	89.26
Charley Snooks (Indian)	Charley Snooks	0.50	89.26
David Doyel	Doyel	4.50	803.31
David Doyel	Hat Creek (no ditch)	0.50	89.26
David Doyel, Catherine Doyel, Effie May Doyel	Doyel	13.50	2,409.92
David Doyel, Catherine Doyel, Effie May Doyel	Hat Creek (no ditch)	5.75	1,026.45
Bertha Geissner	Bertha Geissner	10.25	1,829.75
Bertha Geissner	Doyel	2.00	357.02
Otto Geissner	Otto Geissner or Hat Creek (No Ditch)	8.00	1,428.10
Subtotal, Schedule III, First Rotation		**129.00**	**23,028.10**
Lower Users, Second Rotation - Schedulee IV			
	Henry Lonquist	0.75	133.88
	Henry & Fritz Lonquist Upper	0.38	66.94
	Henry & Fritz Lonquist Lower	0.38	66.94
	Harry Lonquist	0.25	44.63
	Harry Lonquist-Reynolds-Bidwell	1.00	178.51
	Harry Lonquist-Reynolds-East Side	0.75	133.88
	Harry Lonquist-Reynolds-Middle	0.25	44.63
	Reynolds Canal	0.75	133.88
	Jeff Bone Upper	0.13	22.31
	Jeff Bone Lower	0.13	22.31
	Lee Bone	0.25	44.63
	Julia Wilson	0.25	44.63
	Sam Williams	0.25	44.63
	Joe Wilson	0.25	44.63
	Ellen Brown Upper	0.25	44.63
	Ellen Brown - W W Brown	1.00	178.51
	Ellen Brown Lower	0.25	44.63
	Charley Snooks	0.13	22.31
	Doyel	1.00	178.51
	Bertha Geissner	0.25	44.63
	Otto Geissner	0.50	89.26
Subtotal, Schedule IV, Second Rotation		**9.13**	**1,628.93**
Schedule 2 - Decree No. 7858			
Harvey W Wilcox	Harvey Wilcox Upper, Harvey Wilcox Middle, and/or Harvey Wilcox Lower	3.06	1,124.36
Vint W Stevenson	Upper Ranch, Stevenson Channel and/or Stevenson	5.20	1,910.68
Ruby F Hencrat and Charles W Gray	Gray	0.75	275.58
Carrie Klotz Hall and W P Hall	Hall	2.79	1,025.15

No comments

- n/a -

Hat Creek Decree
Shasta County Decree No. 5724
Shasta County Decree No. 7858
Seasons of Use
Continuous, regardless of season
May 1 through October 27
October 28 through April 30

Summer Season
Winter Season

	365.25	days
	180.00	days
	185.25	days

Name of Claimant	Name of Diversion System	Allotments Allotment (cfs)	Allotment (AF)
Mrs M H Shearin	Shearin Upper and/or Shearin Lower	0.96	352.74
Alex Brown (Indian)	Alex Brown	0.25	91.86
Estate of Harry M Wilcox and Emma E Wilcox	Hawkins, Harry Wilcox Upper and/or Harry Wilcox Middle	9.40	3,453.92
Gladys Gertrude Smith, Ermyl Roberta Ward, Ida May Wilcox	Harry Wilcox Middle, Wilcox Lower and/or Wilcox Davis	10.54	3,872.80
Holiday Brown (Indian)	Harry Wilcox Middle, and/or Holiday Brown	0.56	205.77
Dessie Snooks (Indian)	Wilcox-Davis	1.06	389.48
William Valentine and Fred Valentine	Valentine Upper and/or Valentine Lower	0.81	297.62
Charles Heryford	Heryford Upper, Herford Middle, and/or Herford Lower	1.75	643.02
Edith Snooks (Indian)	Edith Snooks	0.25	91.86
J S Ratledge and Sabilla J Ratledge	Ratledge-Lonquist and/or Ratledge-Opdyke-Forest Service	2.19	804.69
Perry Opdyke	Opdyke and/or Ratledge-Opdyke-Forest Service	8.88	3,262.85
Henry Lonquist	Ratledge-Lonquist, Henry Lonquist Upper and/or Henry Lonquist Lower	5.56	2,042.96
Iva Doty and Asa L Doty	Morris Upper and/or Morris Lower	11.12	4,085.91
S E Korns	Reiger	1.63	598.92
Vernon March	Morris Upper and/or Morris Lower	6.75	2,480.21
Harry A Lonquist	Harry Lonquist, Reiger, Lonquist-Reynolds-Bidwell, and/or Lonquist Reynolds	4.88	1,793.10
Sofia U Lonquist	Lonquist-Reynolds-Bidwell and/or Reynolds Dam	5.75	2,112.77
R E Bidwell	Lonquist-Reynolds-Bidwell and/or Bidwell	4.98	1,829.84
L H Sullivan and Eva B Sullivan	Reiger	2.30	845.11
Jackson Bone (Indian)	Bone Upper and/or Bone Lower	0.50	183.72
Lee Bone (Indian)	Lee Bone	0.50	183.72
Sam Williams (Indian)	Lee Bone and/or Williams	0.60	220.46
Julia Wilson (Indian)	Julia Wilson	1.00	367.44
Harry Bob (Indian)	Julia Wilson	1.75	643.02
Lorena Wilson Mitchell, Alta Wilson Mullen, Hattie Wilson, Flora Wilson, and Ira Wilson (Indians)	Joe Wilson	1.38	507.06
Alan Brown	Brown Upper, Brown Lower and/or Ellen Brown-W W Brown	6.13	2,252.40
W W Brown	Ellen Brown, W W Brown	4.60	1,690.21
Kate Snooks, Greely Snooks, Cecilia Barnes, and Dessie Snooks (Indians)	Charley Snooks	0.25	91.86
David Doyel, Catherine Doyel and Effie May Doyel	Doyel and/or Doyel East	12.12	4,453.35
Bertha Geissner	Bertha Geissner and/or Doyel	6.12	2,248.72
Otto Geissner	Otto Geissner	4.00	1,469.75
W E Dunwoody	Jones	0.50	183.72
Clara Grant (Indian)	Grant Upper and/or Grant Lower	0.50	183.72
Subtotal, Schedule 2, Decree No. 7858		**131.37**	**48,270.33**

Summary		Allotment (AF)
Upper Users, First Rotation - Schedule I	Summer Irrigation, Stockwater, Domestic	103.50	18,476.03
Upper Users, Second Rotation - Schedule II		10.13	1,807.44
Lower Users, First Rotation - Schedule III	Summer Irrigation, Stockwater, Domestic	129.00	23,028.10
Lower Users, Second Rotation - Schedulee IV		9.13	1,628.93
Schedule 2 - Decree No. 7858	Winter Irrigation, Stockwater, Domestic	131.37	48,270.33
Total, Hat Creek Decrees		**383.12**	**93,210.83**

No comments

- n/a -

North Fork Pit River (and all its tributaries except for Franklin Creek)
Modoc County Decree No. 4074

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to September 30	183.00	days
April 15 to September 30	169.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total cfs	Total AF
Linville Creek and Its Tributaries Claimants															
Grace F Benner	4.90	1	Crabtree	0.10	72.45									0.10	72.45
J W Watkins and Dottie Watkins	112.60	2, 3, 4, 5	Watkins Upper, Watkins House, Watkins Middle, Watkins Lower	1.60	1,159.14									1.60	1,159.14
C C Clarke and Belle Clarke	150.70	6, 7, 8, 9, 10	Clarke Pond, Clarke Upper, Clarke House, Clarke Upper Meadow, Clarke Lower Meadow	1.10	796.91	1.10	399.27							2.20	1,196.18
Milan S Renner	70.00	11, 12	Renner House, Page-Renner	1.01	731.71									1.01	731.71
Lake Shore Cattle Company	323.20	12, 148, 149, 150	Page-Renner, Page Upper Collecting, Page, Page Lower Collecting	0.10	72.45	3.29	1,194.19							3.39	1,266.63
Subtotal, Linville Creek Group	**661.40**			**3.91**	**2,832.65**	**4.39**	**1,593.46**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**8.30**	**4,426.11**
Joseph Creek and its Tributaries Claimants															
Martin Espil and Lucie Espil	60.00	14, 15, 16, 17, 18	Upper Shingle, Lower Shingle, South Couch, Upper Couch, Lower Couch	0.65	470.90					0.50	181.49			1.15	652.39
V L Jacobs and Georgia Jacobs	29.10	19, 152	Jacobs, Jacobs East Spring, Jacobs West Spring	0.40	289.79									0.40	289.79
Irvin K Wilson	69.00	20, 21, 22, 23	Wilson Upper, Wilson House, Wilson Main, Wilson Lower	1.19	862.11					0.09	32.67			1.28	894.78
LeRoy G Black	21.60	22	Wilson Main			0.40	145.19							0.40	145.19
LeRoy G Black	16.40	24	Joseph Creek	0.20	144.89	0.30	108.89							0.50	253.79
Carl William Blac, Mable Sophia Black, Walter Vernon Black, Mildred Black, LeRoy G Black and Capitola Nunn Black	234.20	24, 25	Joseph Creek, Lower Joseph	2.15	1,557.60					1.25	453.72			3.40	2,011.31
United States in Trust	62.60	26	K L Joseph			1.30	471.87							1.30	471.87
Carl William Blac, Mable Sophia Black, Walter Vernon Black, Mildred Black, LeRoy G Black and Capitola Nunn Black	253.50	27, 28, 29, 30	Schoolhouse, Black Upper, Black Middle, Black Lower			1.30	471.87	1.70	617.06	0.55	199.64			3.55	1,288.56
Subtotal, Joseph Creek Group	**706.60**			**4.59**	**3,325.28**	**3.30**	**1,197.82**	**1.70**	**617.06**	**2.39**	**867.51**	**0.00**	**0.00**	**11.98**	**6,007.67**
Thoms Creek and Its Tributaries Claimants															
Philip W McKenney	2.40	31, 31A, 31B, 32	Wortman 1st East, Wortman 2nd East, Wortman 3rd East, Wortman Lower	0.10	72.45									0.10	72.45
Herman Acty	9.00	36 to 40	Acty	0.20	144.89									0.20	144.89
Robert T Johnstone and Jeane Mary Johnstone	18.90	33, 34, 35, 36	Jones Upper Left, Jones Upper Right, Jones Lower Right, Jones Lower Left	0.10	72.45	0.36	127.36							0.46	199.82
Alfred DeWitt	69.10	37, 41 to 45	DeWitt Thoms, DeWitt Bowlin	0.30	217.34	1.05	351.97							1.35	569.31
Clyde Hays and Ruth Hays	33.20	46, 47 to 53, 57 to 59, 61	Hays Garden, Hays Meadow, Hays Control, Hays Mile	0.27	195.60	0.98	328.50							1.25	524.11
Howard Royce and Pearl Royce	38.40	54, 55, 56	H Royce Upper, H Royce Middle, H Royce Lower	0.04	28.96	0.42	140.79							0.46	169.77
Clara May DeWitt and Willie DeWitt	4.00	56A	Willie DeWitt			0.06	20.11							0.06	20.11

No comments

- n/a -

North Fork Pit River (and all its tributaries except for Franklin Creek)
Modoc County Decree No. 4074

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to September 30	183.00	days
April 15 to September 30	169.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total cfs	Total AF
J M Royal	14.60	62, 63	Royle Upper Thoms, Royle Lower Thoms			0.10	33.52	0.15	50.28					0.25	83.80
Albert Stiner, Harold A Stiner, and Howard J Stiner	20.00	64, 65	Stiner Upper, Stiner Lower					0.40	134.08					0.40	134.08
C A Spaulding and Ellie Spaulding	42.30	66 to 70	Spaulding					0.84	281.57					0.84	281.57
Rufus S Carter, Charles M Carter, George Carter, Jacob M Carter, Oliver W Carter, Mrs. Jake Rechsteiner, and Mrs T A Read	21.10	69	Spaulding Lower North					0.30	100.56					0.30	100.56
The Federal Land Bank of Berkeley	32.40	71, 72, 73	Baker Upper, Baker North, Baker Lower			0.05	16.76	0.60	201.12					0.65	217.88
W F Dukes	1.30	74	Dukes			0.10	33.52							0.10	33.52
Subtotal, Thoms Creek Group	**306.70**			**1.01**	**731.71**	**3.14**	**1,052.55**	**2.29**	**767.62**	**0.00**	**0.00**	**0.00**	**0.00**	**6.44**	**2,551.88**
Gleason Creek and Its Tributaries Group															
Ella Russell	64.60	84, 85, 86	Russell Upper, Russell Middle, Russell Lower	0.20	144.89							0.80	290.38	1.00	435.27
Georgia M Jones	133.00	87, 88, 89, 90, 91	Jones North, Jones Upper South, Jones Pasture, Jones Middle South, Jones Lower South			0.20	144.89	1.80						2.00	144.89
J B Faulkner	10.00	86A, 86B, 86C	Faulkner Upper, Faulkner Middle, Faulkner Lower							0.20	72.60			0.20	72.60
United States in Trust	94.30	92	X L Gleason			0.20	144.89			1.15	417.42			1.35	562.31
Subtotal, Gleason Creek Group	**301.90**			**0.20**	**144.89**	**0.40**	**289.79**	**1.80**	**0.00**	**1.35**	**490.02**	**0.80**	**290.38**	**4.55**	**1,215.07**
Parker Creek and Its Tributaries Claimants															
P D McDowell and L Gayle McDowell	155.00	93, 95, 96, 98	Pepperdine-McDowell, McDowell Upper, McDowell House, McDowell Upper Meadow, McDowell Lower Meadow	0.21	152.14	1.89	686.02			0.15	54.45			2.25	892.61
Wheeler E Pepperdine & Nettie L Pepperdine	46.50	93, 100, 100A, 100B	Pepperdine-McDowell, Pepperdine Upper, Pepperdine Lower, Pepperdine House	0.07	50.71	0.63	228.67							0.70	279.39
W S Trumbo	111.50	101, 102, 103, 110	Trumbo Upper Shields, Trumbo Lower Shields, Trumbo Upper Isle, Trumbo Lower Isle	0.20	144.89	1.50	544.46							1.70	689.36
W S Trumbo	12.40	111, 112	Page Upper, Page Lower			0.20	72.60							0.20	72.60
Martha E Page	135.20	111, 112	Page Upper, Page Lower	0.20	144.89	1.70	617.06							1.90	761.95
Myrtle O Stanton	15.00	111, 112	Page Upper, Page Lower			0.20	72.60							0.20	72.60
Martha E Page	23.00	100, 133	Pepperdine Upper, Plum Canyon Reservoir							0.25	90.74			0.25	90.74
Leland Chester Porter, Floyd Eldon Porter, and Oakley Willis Porter	65.00	134	Plum Creek							0.50	181.49			0.50	181.49
James C Porter, Cleve Smith, and Carlton Porter	40.00	158A	Nikolai	0.10	72.45					0.90	326.68			1.00	399.12
Estate of A R Conklin	72.00	158	Conklin							0.63	228.67			0.63	228.67
G B Dorris	129.00	104, 105, 106	Payne Upper, Payne North, Payne Lower	0.20	144.89			1.60	580.76					1.80	725.65

No comments

- n/a -

North Fork Pit River (and all its tributaries except for Franklin Creek)
Modoc County Decree No. 4074

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to September 30	183.00	days
April 15 to September 30	169.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total cfs	Total AF
W S Trumbo	100.00	105, 107, 108, 109	Payne North, Trumbo South Parker, Trumbo North Parker, Stanton					1.30	471.67					1.30	471.67
Myrtle O Stanton	110.00	109	Stanton	0.20	144.89			1.40	508.17					1.60	653.06
Electa Fogarty	105.00	113	Fogarty-Porter	0.20	144.89			1.25	453.72					1.45	598.61
Martha E Page	24.00	114	Fogarty Upper					0.35	127.04					0.35	127.04
Electa Fogarty	10.00	115	Fogarty Lower					0.15	54.45					0.15	54.45
Leland Chester Porter, Floyd Elton Porter, and Oakley Willis Porter	153.00	116, 117, 118, 120, 123, 124	Alice Porter Main, Alice Porter Upper North, Alice Porter Lower North, Parker, Peral Porter, Alice Porter Slough	0.20	144.89			1.78	646.10	0.20	72.60			2.18	863.58
Pearl F Gibson and C C Gibson	159.00	113, 121, 123	Fogarty-Porter, Porter Upper Reservoir Pearl Porter	0.20	144.89			0.63	228.67	0.29	105.26			1.12	478.83
Pearl F Gibson and C C Gibson	33.50	120	Parker					0.50	181.49					0.50	181.49
James C Porter and Estate of Phebe E Porter	66.00	120	Parker	0.40	289.79			0.95	344.83					1.35	634.61
United States in Trust	160.00	130, 130A	X L Parker	0.20	144.89			2.77	1,005.44					2.97	1,150.33
Pearl F Gibson and C C Gibson	41.50	125, 126	Arnold P & J Porter Middle					0.65	235.93					0.65	235.93
James C Porter and Estate of Phebe E Porter	67.50	127, 129A	Bobrd Dam, Porter West	0.20	144.89			0.95	344.83					1.15	489.72
James C Porter	81.00	129A, 130, 131, 131A, 131B	Porter West, X L Parker, J C Porter Lower					1.30	471.67					1.30	471.67
Subtotal, Parker Creek Group	**1,935.10**			**2.58**	**1,869.11**	**6.12**	**2,221.41**	**15.58**	**5,655.15**	**2.92**	**1,059.89**	**0.00**	**0.00**	**27.20**	**10,805.56**
North Fork of Pit River Claimants															
M R Woody	19.50	13	Woody	0.35	253.56									0.35	253.56
United States in Trust	423.00	135, 136	X L Upper Laws; Laws; X L Middle, X L Lower	7.00	5,071.24									7.00	5,071.24
C J Clarke Co	10.30	137, 138	X L Upper Laws; Laws; X L Middle, X L Lower	0.20	144.89									0.20	144.89
Frank McArthur	635.20	136	Lower							3.53	1,281.30			3.53	1,281.30
Charles Bettandorff and Georgie Bettandorff	56.70	139	North Fork			2.00	725.95					0.30	108.89	2.30	834.84
Hans A Hoesch and Margaret M Hoesch	184.20	139	North Fork	0.20	144.89	3.00	1,088.93					0.30	108.89	3.50	1,342.71
A Bolliger and A Keller	55.20	139	North Fork			0.80	290.38					0.30	108.89	1.10	399.27
Sarah Laird, Ella Laird, James R Laird, Mildred (Laird) Kenfield, and Fannie F Laird Estate of B F Lytle, deceased	136.90	139	North Fork	0.20	144.89	2.12	769.51			0.30	108.89			2.62	1,023.29
	550.70	139	North Fork	0.20	144.89	5.06	1,843.91					1.31	475.50	6.59	2,464.30
C A Riker	130.50	139	North Fork			3.20	1,161.52							3.20	1,161.52
A Bolliger and A Keller	236.70	141, 142	Gloster, Hughes					4.00	1,451.90					4.00	1,451.90
John C Noe	10.00	141, 142	Gloster, Hughes					0.16	58.08					0.16	58.08
M J Gloster & Annie G Gloster	68.30	141, 142, 143, 144	Gloster, Hughes, Walls Pump, Walls & Gloster					2.00	725.95					2.00	725.95
Mary E Walls & Eleanor W Asher	85.80	141, 142, 143, 144	Gloster, Hughes, Walls Pump, Walls & Gloster					1.44	522.68					1.44	522.68
Kirk Williams	5.00	141, 142, 143, 144	Gloster, Hughes, Walls Pump, Walls & Gloster					0.40	145.19					0.40	145.19
P S Dorris	1,985.90	142	Hughes							6.33	2,297.63			6.33	2,297.63
G B Dorris and Beryl Parker Dorris	1,626.20	142	Hughes							6.33	2,297.63			6.33	2,297.63
W E Minard	26.50	142	Hughes							0.30	108.89			0.30	108.89
O D Austin and Thelma Austin	132.30	146	Butcher									0.73	264.97	0.73	264.97
Subtotal, North Fork of Pit River Group	**6,378.90**			**8.15**	**5,904.37**	**16.20**	**5,880.20**	**8.00**	**2,903.80**	**16.79**	**6,094.35**	**2.94**	**1,067.15**	**52.08**	**21,849.87**
Special Class Continuous Usage															
C T Watkins	2.55	1,847.36													

No comments

- n/a -

North Fork Pit River (and all its tributaries except for Franklin Creek)
Modoc County Decree No. 4074

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to September 30	183.00	days
April 15 to September 30	169.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total cfs	Total AF
Gracie F Bonner	0.03	21.73													
Electa Fogarty	1.00	724.46													
United States in Trust	0.10	72.45													
Subtotal, Special Class Continuous	**3.68**	**2,666.02**													
Surplus Class (Apr 1 - Sep 30)															
James C Porter	1.15	417.42													
Subtotal, Surplus Class	**1.15**	**417.42**													
Special Class (Apr 15 - Sep 30)															
J F Kerr	2.40	804.50													
F W Koenig and A H Koenig	0.20	67.04													
F L Wallace and Jane Wallace	2.40	804.50													
Subtotal, Special Class Apr 15-Sep 30	**5.00**	**1,676.03**													

No comments

- n/a -

North Fork Pit River (and all its tributaries except for Franklin Creek)
Modoc County Decree No. 4074

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to September 30	183.00	days
April 15 to September 30	169.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Fifth Priority Class (cfs)	Fifth Priority Face Value (AF)	Total cfs	Total AF

Summary	Total cfs	Total AF
Linville Creek Group	6.30	4,426.11
Joseph Creek Group	11.96	6,007.67
Thoms Creek Group	6.44	2,551.88
Gleason Creek Group	4.55	1,215.07
Parker Creek Group	27.20	10,805.56
North Fork Pit River Group	52.06	21,849.87
Special Class Continuous Group	3.66	2,666.02
Surplus Class Group	1.15	417.42
Special Class Apr 15-Sep 30 Group	5.00	1,676.03
Total, All Groups	**110.55**	**46,856.17**

No comments

- n/a -

Rattlesnake Creek Decree (Pit River in Hot Springs Valley)
Modoc County Decree Recorded in Book 17, page 171

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through September 30	183.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments Allotment (cfs)	Allotment (AF)
Schedule 2, Allotments from Rattlensnake Creek and Pit River					
Spicer Corporation	399.00		Rattlesnake	2.00	725.95
P S Dorris and Bank of Modoc County (Hoy & Christen)	167.00		Butcher	1.15	417.42
Emma Godfrey	71.00		Barnes	0.90	326.68
Emma Godfrey, Estate of J W Cummins, A H Layton, John Strawn	124.00		Cummins	0.20	72.60
Hot Spring Valley Irrigation District, Estate of McBrien and McConnell, John Lybarger	225.00		McBrien	2.45	889.29
James M Edwards, Estate of G C Lindauer, Hot Spring Valley Irrigation District (Lindauer)	521.00		Lindauer Upper	0.80	290.38
Estate of G C Lindauer, Hot Spring Valley Irrigation District	242.00		Lindauer Lower	0.55	199.64
Estate of G C Lindauer, Frank McArthur, John Kelley, C S Baldwin, Hot Springs Valley Irrigation District	492.00		McArthur Upper	0.60	217.79
Frank McArthur	140.00		McArthur Lower	0.45	163.34
Frank McArthur, Bank of Modoc County (Claussen), Federal Land Bank of Berkeley	253.00		Claussen	0.40	145.19
Bank of Modoc County (Claussen), Ira Hulbert, Bank of Modoc County (Connelly), George Fellencer, Katherine E Hazelton, California Joint Stock Land Bank (Fitzhugh)	538.00		Fellencer	0.20	72.60
California Joint Stock Land Bank (Fitzhugh), Bank of Modoc County (Connelly)	273.00		Fitzhugh	0.65	235.93
California Joint Stock Land Bank (Fitzhugh), Bank of Modoc County (Connelly), George Fellencer, Estate of G L Kramer	220.00		Marie Caldwell Upper	0.40	145.19
Estate of G L Kramer	100.00		Marie Caldwell Lower	0.55	199.64
G B Wilcox	166.00		Warren Caldwell	1.10	399.27
G B Wilcox	99.00		Hughes	0.40	145.19
Federal Land Bank of Berkeley	28.00		Howe	0.80	290.38
Federal Land Bank of Berkeley (Howe), Lizzie D Pope	89.00		Lizzie Pope	0.40	145.19
Hot Spring Valley Irrigation District (Shelton)	0.00		No Dam	Stockwater	0.00
Hot Spring Valley Irrigation District (Anklin)	0.00		No Dam		0.00
Hot Spring Valley Irrigation District (Mohr)	0.00		No Dam		0.00
Mary L Elledge	0.00		No Dam		0.00
Dora H Kelley	0.00		No Dam		0.00
Subtotal, Schedule 2	**4,147.00**			**14.00**	**5,081.65**
Schedule 3 Allotments from Pit River and Rattlesnake Creek					
Estate of J M Clark	22.00		Kelley Ditch	0.44	159.71
Emma Godfrey	3.00		Kelley Ditch	0.06	21.78
Estate of J W Cummins	37.00		Kelley Ditch	0.74	268.60
S B and B L Kelley	43.00		Kelley Ditch	0.86	312.16
S B Kelley	4.00		Kelley Ditch	0.08	29.04
Dora B Kelley	82.00		Kelley Ditch	1.64	595.28
A H Layton	1.00		Kelley Ditch	0.02	7.26
T W Lush	15.00		Kelley Ditch	0.30	108.89
Spicer Corporation	35.00		Rattlesnake Canal	0.70	254.08
Pickering Lumber Company	39.00		Rattlesnake Canal	0.78	283.12
Spicer Corporation	364.00		Rattlesnake Creek and/or Rattlesnake Canal	7.28	2,642.46
Bank of Modoc County	4.00		Rattlesnake Creek and/or Rattlesnake Canal	0.08	29.04
P S Dorris	39.00		Butcher Dam	0.78	283.12
Bank of Modoc County	128.00		Butcher Dam	2.56	929.22
Emma Godfrey	71.00		Barnes Dam	1.42	515.42
Estate of J W Cummins	35.00		Barnes Dam, Cummins Dam, and/or Kelley Ditch	0.70	254.08

No comments

- n/a -

Rattlesnake Creek Decree (Pit River in Hot Springs Valley)
Modoc County Decree Recorded in Book 17, page 171

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through September 30	183.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments Allotment (cfs)	Allotments Allotment (AF)
A H Layton	32.00		Barnes Dam, Cummins Dam, and/or Kelley Ditch	0.64	232.30
Emma Godfrey	57.00		Barnes Dam, Cummins Dam, and/or Kelley Ditch	1.14	413.79
John Strawn	3.00		Barnes Dam, Cummins Dam, and/or Kelley Ditch	0.06	21.78
Hot Spring Valley Irrigation District	179.00		McBrien Dam	3.58	1,299.45
Estates of McBrien and McConnell	30.00		McBrien Dam	0.60	217.79
John Lybarger	16.00		McBrien Dam	0.32	116.15
James M Edwards	44.00		Lindauer Upper Dam	0.88	319.42
Estate of G C Lindauer	136.00		Lindauer Upper Dam	2.72	987.29
Hot Spring Valley Irrigation District	83.00		Lindauer Upper Dam	1.66	602.54
Estate of G C Lindauer	59.00		Lindauer Upper and/or Lower Dam	1.18	428.31
Hot Spring Valley Irrigation District	441.00		Lindauer Upper and/or Lower Dam	8.82	3,201.44
Estate of G C Lindauer	20.00		Lindauer Upper Dam, Lindauer Lower Dam, and/or McArthur Upper Dam	0.40	145.19
Frank McArthur	542.00		McArthur Upper and/or Lower Dam	10.84	3,934.65
John Kelley	12.00		McArthur Upper and/or Lower Dam	0.24	87.11
C S Baldwin	47.00		McArthur Upper and/or Lower Dam	0.94	341.20
Hot Spring Valley Irrigation District	65.00		McArthur Upper and/or Lower Dam	1.30	471.87
Frank McArthur	122.00		McArthur Upper Dam, McArthur Lower Dam, and/or Claussen Dam	2.44	885.66
Federal Land Bank of Berkeley	37.00		Claussen Dam	0.74	268.60
Bank of Modoc County	65.00		Claussen Dam, and/or Fellencer Dam	1.30	471.87
Katherine E Hazelton	94.00		Fellencer Dam	1.88	682.39
George Fellencer	259.00		Fellencer Dam	5.18	1,880.21
Bank of Modoc County	107.00		Fellencer Dam	2.14	776.77
Ira Hulbert	23.00		Fellencer Dam	0.46	166.97
California Joint Stock Land Bank	50.00		Fellencer Dam and/or Fitzhugh Dam	1.00	362.98
California Joint Stock Land Bank	228.00		Fitzhugh Dam	4.56	1,655.17
Bank of Modoc County	25.00		Fitzhugh Dam	0.50	181.49
California Joint Stock Land Bank	4.00		Marie Caldwell Upper Dam	0.08	29.04
Bank of Modoc County	73.00		Marie Caldwell Upper Dam	1.46	529.94
George Fellencer	54.00		Marie Caldwell Upper Dam	1.08	392.01
Estate of G L Kramer	89.00		Marie Caldwell Upper Dam	1.78	646.10
Estate of G L Kramer	100.00		Marie Caldwell Lower Dam	2.00	725.95
G B Wilcox	166.00		Warren Caldwell Dam	3.32	1,205.08
G B Wilcox	10.00		Hughes Dam	0.20	72.60
Annie Hughes	89.00		Hughes Dam	1.78	646.10
Federal Land Bank of Berkeley	28.00		Howe Dam	0.56	203.27
Federal Land Bank of Berkeley	25.00		Lizzie Pope Dam	0.50	181.49
Lizzie D Pope	64.00		Lizzie Pope Dam	1.28	464.61
Subtotal Schedule 3	**4,400.00**			**88.00**	**31,941.82**

Summary	Allotment (cfs)	Allotment (AF)
Schedule 2	14.00	5,081.65

No comments

- n/a -

Rattlesnake Creek Decree (Pit River in Hot Springs Valley)
Modoc County Decree Recorded in Book 17, page 171

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through September 30	183.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments Allotment (cfs)	Allotments Allotment (AF)
Schedule 3	88.00	31,941.82			
Total	**102.00**	**37,023.47**			

No comments

- n/a -

Roaring Creek Decree
Shasta County, Decree No. 83723

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through November 1	215.00	days
November 1 through April 1	150.25	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Total cfs	Total AF
Schedule 3, Roaring Creek Claimants													
Reich, Walter H and Annabel	16.00	3								0.75	319.83	0.75	319.83
Vopat, Frank	10.00	3								0.47	200.43	0.47	200.43
Parham, Eugene and Linda et al	19.00	3								0.89	379.54	0.89	379.54
Epperson, Ronald T and Theresa M	4.00	3								0.19	81.02	0.19	81.02
Henry, Lynn and Christine	15.00	5		0.75	319.83							0.75	319.83
Carroll, Jerry T and Charlene C	25.00	5		1.26	537.32							1.26	537.32
Miller, Jack O and Helen	2.00	6								0.12	51.17	0.12	51.17
Leonard, Vernon I and Leona J	10.00	6								0.60	255.87	0.60	255.87
Caldwell, F B III and Easton, R B	5.00	6								0.30	127.93	0.30	127.93
Easton, Robert B and Constance C	3.00	6								0.18	76.76	0.18	76.76
Cantrell, Gloria	2.00	6								0.12	51.17	0.12	51.17
Bay Histology Service	2.00	2								0.12	51.17	0.12	51.17
Meckley, Chester and Mary J	Domestic	6								0.36	153.52	0.36	153.52
Terry, Eugene F and Marsha P	Domestic									0.01	7.24	0.01	7.24
Van Steene, Jack L and Doris A	Domestic									0.01	7.24	0.01	7.24
Nipper, Jack J and Grace M	Domestic									0.01	7.24	0.01	7.24
Reddick, Arthur C and Sally	Domestic									0.01	7.24	0.01	7.24
Sivain, Susan Marie Wimbler	Domestic									0.01	7.24	0.01	7.24
Garnett, Bernard E and Ruth M	Domestic									0.01	7.24	0.01	7.24
Close, James and Lucille	1.00	1								0.06	25.59	0.06	25.59
Wilson, Thomas E and Gayle A	Domestic									0.01	7.24	0.01	7.24
Richard, Charles L and Evelyn A	3.00	3								0.18	76.76	0.18	76.76
Roderick, James C and Delores J	5.00	5						0.15	63.97			0.15	63.97
Subtotal, Schedule 3, Roaring Creek Claimants	**122.00**			**2.01**	**857.16**	**0.00**	**0.00**	**0.15**	**63.97**	**4.41**	**1,901.49**	**6.57**	**2,822.61**
Schedule 4, Jake Creek Claimants													
Reich, Walter H and Annabel	16.00	4				0.75	319.83					0.75	319.83
Vopat, Frank	10.00	4				0.47	200.43					0.47	200.43
Parham, Eugene and Linda et al	19.00	4				0.89	379.54					0.89	379.54
Epperson, Ronald T and Theresa M	4.00	4				0.19	81.02					0.19	81.02
Subtotal, Schedule 4, Jake Creek Claimants	**49.00**			**0.00**	**0.00**	**2.30**	**980.83**	**0.00**	**0.00**	**0.00**	**0.00**	**2.30**	**980.83**
Schedule 5, Browns Creek Claimants													
Parham, Eugene and Linda et al	19.00					0.89	379.54					0.89	379.54
Epperson, Ronald T and Theresa M	4.00					0.19	81.02					0.19	81.02
Parham, Eugene and Linda et al	2.00							0.04	17.06			0.04	17.06
Henry, Lynn and Christine	15.00			0.75	319.83							0.75	319.83
Carroll, Jerry T and Charlene C	25.00									1.26	537.32	1.26	537.32
Subtotal, Schedule 5, Browns Creek Claimants	**65.00**			**0.75**	**319.83**	**1.08**	**460.56**	**0.04**	**17.06**	**1.26**	**537.32**	**3.13**	**1,334.78**
Schedule 6, Miscellaneous Claimants													
U S Forest Service				1500 gpd								0.00	0.00

No comments

- n/a -

Roaring Creek Decree
Shasta County, Decree No.
83723

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through November 1	215.00	days
November 1 through April 1	150.25	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Total cfs	Total AF
U S Forest Service				0.06	43.47							0.06	43.47
Roseberg Lumber Co				0.05	36.22							0.05	36.22
Subtotal, Schedule 6, Miscellaneous Claimants	**0.00**			**0.11**	**79.69**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.11**	**79.69**
Paragraph 19: Winter Season Domestic and Stockwater Entitlement													
Schedule 3, Roaring Creek Claimants													
Reich, Walter H and Annabel	16.00	3		0.01	2.98								
Vopat, Frank	10.00	3		0.01	2.98								
Parham, Eugene and Linda et al	19.00	3		0.01	2.98								
Epperson, Ronald T and Theresa M	4.00	3		0.01	2.98								
Henry, Lynn and Christine	15.00	5		0.01	2.98								
Carroll, Jerry T and Charlene C	25.00	5		0.01	2.98								
Miller, Jack O and Helen	2.00	6		0.01	2.98								
Leonard, Vernon I and Leona J	10.00	6		0.01	2.98								
Caldwell, F B III and Easton, R B	5.00	6		0.01	2.98								
Easton, Robert B and Constance C	3.00	6		0.01	2.98								
Cantrell, Gloria	2.00	6		0.01	2.98								
Bay Histology Service	2.00	2		0.01	2.98								
Meckley, Chester and Mary J	Domestic	6											
Terry, Eugene F and Marsha P	Domestic												
Van Steene, Jack L and Doris A	Domestic												
Nipper, Jack J and Grace M	Domestic												
Reddick, Arthur C and Sally	Domestic												
Sivain, Susan Marie Wimbler	Domestic												
Garnett, Bernard E and Ruth M	Domestic												
Close, James and Lucille	1.00	1		0.01	2.98								
Wilson, Thomas E and Gayle A	Domestic												
Richard, Charles L and Evelyn A	3.00	3		0.01	2.98								
Roderick, James C and Delores J	5.00	5		0.01	2.98								
Subtotal, Schedule 3, Roaring Creek Claimants	**122.00**			**0.15**	**44.70**								
Schedule 4, Jake Creek Claimants													
Reich, Walter H and Annabel	16.00	4		0.01	2.98								
Vopat, Frank	10.00	4		0.01	2.98								
Parham, Eugene and Linda et al	19.00	4		0.01	2.98								
Epperson, Ronald T and Theresa M	4.00	4		0.01	2.98								
Subtotal, Schedule 4, Jake Creek Claimants	**49.00**			**0.04**	**11.92**								
Schedule 5, Browns Creek Claimants													
Parham, Eugene and Linda et al	19.00			0.01	2.98								
Epperson, Ronald T and Theresa M	4.00			0.01	2.98								
Parham, Eugene and Linda et al	2.00			0.01	2.98								
Henry, Lynn and Christine	15.00			0.01	2.98								
Carroll, Jerry T and Charlene C	25.00			0.01	2.98								

No comments

- n/a -

Roaring Creek Decree
Shasta County, Decree No. 83723

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through November 1	215.00	days
November 1 through April 1	150.25	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Third Priority Class (cfs)	Third Priority Face Value (AF)	Fourth Priority Class (cfs)	Fourth Priority Face Value (AF)	Total cfs	Total AF
Subtotal, Schedule 5, Browns Creek Claimants	**65.00**			**0.05**	**14.90**								
Subtotal, Winter Season Domestic & Stockwater Allotments	**236.00**			**0.24**	**71.52**								

Summary	Total cfs	Total AF
Subtotal, Schedule 3, Roaring Creek Claimants	6.57	2,822.61
Subtotal, Schedule 4, Jake Creek Claimants	2.30	980.83
Subtotal, Schedule 5, Browns Creek Claimants	3.13	1,334.78
Subtotal, Schedule 6, Miscellaneous Claimants	0.11	79.69
Subtotal, Winter Season Domestic & Stockwater Allotments	0.24	71.52
Total, Roaring Creek Stream System Decree Claims	**12.35**	**5,289.43**

No comments

- n/a -

South Fork Pit River Decree
Modoc County Decree No. 3273

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to June 30	91.00	days
April 1 to October 15	198.00	days
July 1 to July 21	21.00	days
July 22 to August 11	21.00	days
August 12 to October 15	65.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	Allotments: First Priority Face Value (AF)	Allotments: Second Priority Class (cfs)	Allotments: Second Priority Face Value (AF)	Total cfs	Total AF
Schedule 2, Fitzhugh Creek and Its Tributaries Claimants									
John Blevins, Cecil Blevins, and Willetta L Blevins (Bowman)	67.50	124	North Fitzhugh Creek	0.60	235.64			0.60	235.64
Cornelia A Hershey, Davidella Hershey, Grace H Hershey, D N Hershey, and Florence F Hershey	104.50	125	North Fitzhugh Creek	1.00	392.73	0.60	235.64	1.60	628.36
Minnie Derevan	20.10	126, 127	North Fitzhugh Creek	0.50	362.23			0.50	362.23
Walter Cantrall, Elsie A Cantrall, A E Sweeney, and Frances E Sweeney	77.40	128 to 131	Middle and South Fitzhugh Creeks	0.50	362.23	0.70	274.91	1.20	637.14
Minnie Derevan	46.50	132 to 135	South Fitzhugh Creek			0.70	274.91	0.70	274.91
George M Clark and J E Clark	322.00	137 to 141	Fitzhugh Creek	0.60	434.68	4.40	1,728.00	5.00	2,162.68
Frank McArthur and Ethel M McArthur	316.50	142	Fitzhugh Creek	0.20	144.89	4.70	1,845.82	4.90	1,990.71
W E Armstrong	30.00	142	Fitzhugh Creek	0.20	144.89	0.30	117.82	0.50	262.71
Subtotal, Schedule 2, Fitzhugh Creek Claimants	**984.50**			**3.60**	**2,077.29**	**11.40**	**4,477.09**	**15.00**	**6,554.38**

No comments

- n/a -

South Fork Pit River Decree
Modoc County Decree No. 3273

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to June 30	91.00	days
April 1 to October 15	198.00	days
July 1 to July 21	21.00	days
July 22 to August 11	21.00	days
August 12 to October 15	65.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	Allotments: First Priority Face Value (AF)	Allotments: Second Priority Class (cfs)	Allotments: Second Priority Face Value (AF)	Total cfs	Total AF
Schedule 3, South Fork of Pit River and Its Tributaries Claimants									
John McGarva, Peter B McGarva, and Phyllis McGarva	121.80	40 to 46	North and South Forks of Parsnip Creek	0.85	615.79	0.90	162.45	1.75	778.24
J C Van Loan	572.20	47, 48, 49	West Valley Creek	3.65	2,644.29	4.50	812.23	8.15	3,456.52
Frank McArthur and Ethel M McArthur	293.30	1	Mill Creek	1.90	746.18			1.90	746.18
John Blevins, Cecil Blevins, and Willetta L Blevins			Mill Creek	0.44	318.76			0.44	318.76
A J Cantrall and Ida Cantrall	152.30	5, 6, 7, 9	Mill Creek	0.85	615.79	1.65	297.82	2.50	913.61
W S Brooks and Ada H Brooks	22.00	5, 6, 7, 9	Mill Creek					0.00	0.00
Walter Cantrall, Elsie A Cantrall	176.50	2, 3, 4, 7, 8, 9	Mill Creek	0.85	615.79	1.85	333.92	2.70	949.71
W S Brooks and Ada H Brooks	10.50	2, 3, 4, 7, 8, 9	Mill Creek					0.00	0.00
W S Brooks and Ada H Brooks	114.20	10 to 13	Mill Creek	0.85	615.79	1.15	207.57	2.00	823.36
Bessie Whitman and Della Johnson	24.20	21, 22	Soup Creek					0.00	0.00
Arthur Flournoy	91.90	4	Mill Creek	0.85	615.79	1.15	207.57	2.00	823.36
Bessie Whitman and Della Johnson	48.80	4	Mill Creek					0.00	0.00
Felice Leoni	148.00	2, 3, 4	Mill Creek	0.85	615.79	1.25	225.62	2.10	841.41
Bessie Whitman and Della Johnson	10.20	14	Mill Creek			0.15	27.07	0.15	27.07
Arthur Flournoy	178.10	23, 24	Mill Creek			2.80	505.39	2.80	505.39
Bessie Whitman and Della Johnson	19.30	23, 24	Mill Creek					0.00	0.00
George Campbell	52.40	27 to 32	East Creek	0.85	615.79	0.25	45.12	1.10	660.92
Arthur Flournoy	23.70	27 to 32	East Creek					0.00	0.00
Arthur Flournoy	1,736.50	27, 30, 33 to 39	East Creek	5.00	3,622.31	19.80	3,573.82	24.80	7,196.13
Verdi Lumber Company	73.00	50	South Fork of Pit River	0.25	181.12	1.53	276.16	1.78	457.27
Royal E Williams, Marion G Williams and Ann Eliza Duke	150.00	50	South Fork of Pit River			0.70	126.35	0.70	126.35
Arthur Flournoy	56.70	50	South Fork of Pit River	0.40	289.79			0.40	289.79
Arthur Flournoy	80.00	50	South Fork of Pit River	0.33	239.07	1.27	229.23	1.60	468.30
A T Coffman and Eppa W Coffman	171.70	50	South Fork of Pit River	0.18	130.40	1.90	342.94	2.08	473.35
A L Stinson, and Mary E Stinson	7.00	50	South Fork of Pit River	0.08	57.96			0.08	57.96
Douglas McGarva and Margaret McGarva	33.00	50	South Fork of Pit River	0.50	362.23			0.50	362.23
Town of Likely		50	South Fork of Pit River	0.06	43.47			0.06	43.47
Verdi Lumber Company	97.00	51	South Fork of Pit River	0.40	289.79	0.80	144.40	1.20	434.18
Homer Blevins	93.00	51	South Fork of Pit River	0.40	289.79	0.80	144.40	1.20	434.18
John Blevins, Cecil Blevins, and Willetta L Blevins	101.20	51	South Fork of Pit River	0.40	289.79	0.80	144.40	1.20	434.18

No comments

- n/a -

South Fork Pit River Decree
Modoc County Decree No. 3273

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to June 30	91.00	days
April 1 to October 15	198.00	days
July 1 to July 21	21.00	days
July 22 to August 11	21.00	days
August 12 to October 15	65.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	Allotments First Priority Face Value (AF)	Allotments Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Total cfs	Total AF
Dolph E Van Loan and Eva Van Loan	1.00	51	South Fork of Pit River					0.00	0.00
W H Flournoy and Gladys W Flournoy	160.50	52	South Fork of Pit River	0.17	123.16	1.28	231.03	1.45	354.19
Gary Williams and Theresa Williams	286.30		South Fork of Pit River	0.51	369.48	3.84	693.10	4.35	1,062.58
J A Hughes and Willie W Hughes	426.60		South Fork of Pit River	0.68	492.63	5.12	924.14	5.80	1,416.77
Frank McArthur and Ethel M McArthur	515.50		South Fork of Pit River	0.68	492.63	5.12	924.14	5.80	1,416.77
Dolph E Van Loan and Eva Van Loan	111.00	53	South Fork of Pit River	0.25	181.12	1.35	243.67	1.60	424.79
Dolph E Van Loan and Eva Van Loan	345.00		South Fork of Pit River	0.75	543.35	4.05	731.01	4.80	1,274.36
W H Flournoy and Gladys W Flournoy	294.10		South Fork of Pit River	0.50	362.23	2.70	487.34	3.20	849.57
Arthur Flournoy	10.00		South Fork of Pit River					0.00	0.00
Arthur Flournoy	400.00	54	South Fork of Pit River	1.50	1,086.69	3.50	631.74	5.00	1,718.43
F E Humphrey, V F Christensen and Charlotte E Christensen	400.00		South Fork of Pit River			5.00	902.48	5.00	902.48
Gary Williams and Theresa Williams	170.10	55	South Fork of Pit River			2.15	388.07	2.15	388.07
Frank McArthur and Ethel M McArthur	3,414.80	56, 58, 59, 61 to 77, 87 to 91	East Side Canal	1.25	905.58	43.55	7,860.60	44.80	8,766.17
Frank McArthur and Ethel M McArthur	230.60	92 to 96, 98	East Side Canal			3.00	541.49	3.00	541.49
S J Vaughon	17.30	92 to 96, 98	East Side Canal			0.25	45.12	0.25	45.12
Dolph E Van Loan and Eva Van Loan	480.00	57	East Side Canal	0.25	181.12	6.05	1,092.00	6.30	1,273.12
Mrs Katie H Nelson	526.30	60	East Side Canal	0.25	181.12	6.65	1,200.30	6.90	1,381.41
W E Armstrong	206.00	78 to 86	East Side Canal	0.25	181.12	2.45	442.21	2.70	623.33
W E Armstrong	144.60	97	East Side Canal			1.90	342.94	1.90	342.94
F E Humphrey, V F Christensen and Charlotte E Christensen	122.30	99	West Side Canal	0.10	72.45	1.45	261.72	1.55	334.17
Dolph E Van Loan and Eva Van Loan	140.00	99	West Side Canal	0.10	72.45	1.65	297.82	1.75	370.26
Frank McArthur and Ethel M McArthur	161.80	99	West Side Canal	0.10	72.45	1.95	351.97	2.05	424.41
F E Humphrey, V F Christensen and Charlotte E Christensen	1,251.10	100 to 104	West Side Canal	0.90	652.02	14.95	2,698.41	15.85	3,350.43
John McGarva, Peter B McGarva, and Phyllis McGarva	219.50	105	West Side Canal	0.15	108.67	2.65	478.31	2.80	586.98
R J Gaustad and Nellie Gaustad	175.00	106, 107	West Side Canal	0.15	108.67	2.05	370.02	2.20	478.69
R O Gaustad	77.00	106, 107	West Side Canal	0.05	36.22	0.95	171.47	1.00	207.69
R O Gaustad	75.00	108	West Side Canal	0.05	36.22	0.90	162.45	0.95	198.67
Raymond Stepp Bertha L Stepp, Lena Graham and Herbie Graham	90.00	108	West Side Canal	0.10	72.45	1.05	189.52	1.15	261.97
Frank McArthur and Ethel M McArthur	1,161.20	109 to 123	West Side Canal	0.80	579.57	13.90	2,508.89	14.70	3,088.46
Subtotal, Schedule 3, South Fork Pit River and Tributaries Claimants	**16,271.10**			**29.48**	**20,074.85**	**182.71**	**30,279.99**	**196.34**	**50,354.84**
Schedule 3, Surplus Rotational Allotments for Second Priority Class Claimants, July 1 through July 21									

No comments

- n/a -

South Fork Pit River Decree
Modoc County Decree No. 3273

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to June 30	91.00	days
April 1 to October 15	198.00	days
July 1 to July 21	21.00	days
July 22 to August 11	21.00	days
August 12 to October 15	65.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Total cfs	Total AF
John McGarva, Peter B McGarva, and Phyllis McGarva	121.80	40 to 46	North and South Forks of Parsnip Creek			0.90	37.49		
J C Van Loan	572.20	47, 48, 49	West Valley Creek			4.50	187.44		
Frank McArthur and Ethol M McArthur	293.30	1	Mill Creek						
John Blevins, Cecil Blevins, and Willutta L Blevins			Mill Creek						
A J Cantrall and Ida Cantrall	152.30	5, 6, 7, 9	Mill Creek			1.65	68.73		
W S Brooks and Ada H Brooks	22.00	5, 6, 7, 9	Mill Creek						
Walter Cantrall, Elsie A Cantrall	176.50	2, 3, 4, 7, 8, 9	Mill Creek			1.85	77.06		
W S Brooks and Ada H Brooks	10.50	2, 3, 4, 7, 8, 9	Mill Creek						
W S Brooks and Ada H Brooks	114.20	10 to 13	Mill Creek			1.15	47.90		
Bessie Whitman and Della Johnson	24.20	21, 22	Soup Creek						
Arthur Flournoy	91.90	4	Mill Creek			1.15	47.90		
Bessie Whitman and Della Johnson	48.80	4	Mill Creek						
Felice Leoni	148.00	2, 3, 4	Mill Creek			1.25	52.07		
Bessie Whitman and Della Johnson	10.20	14	Mill Creek			0.15	6.25		
Arthur Flournoy	178.10	23, 24	Mill Creek			2.80	116.63		
Bessie Whitman and Della Johnson	19.30	23, 24	Mill Creek						
George Campbell	52.40	27 to 32	East Creek			0.25	10.41		
Arthur Flournoy	23.70	27 to 32	East Creek						
Arthur Flournoy	1,736.50	27, 30, 33 to 39	East Creek			19.80	824.73		
Subtotal, July 1 to 21 Surplus Rotation Claimants	**3,795.90**					**35.45**	**1,476.60**		
Schedule 3, Surplus Rotational Allotments for Second Priority Class Claimants, July 22 through August 11									
Verdi Lumber Company	73.00	50	South Fork of Pit River			1.53	63.73		
Royal E Williams, Marion G Williams and Ann Eliza Duke	150.00	50	South Fork of Pit River			0.70	29.16		
Arthur Flournoy	56.70	50	South Fork of Pit River						
Arthur Flournoy	80.00	50	South Fork of Pit River			1.27	52.90		
A T Coffman and Eppa W Coffman	171.70	50	South Fork of Pit River			1.90	79.14		
A L Stinson, and Mary E Stinson	7.00	50	South Fork of Pit River						
Douglas McGarva and Margaret McGarva	33.00	50	South Fork of Pit River						
Town of Likely		50	South Fork of Pit River						
Verdi Lumber Company	97.00	51	South Fork of Pit River			0.80	33.32		
Homer Blevins	93.00	51	South Fork of Pit River			0.80	33.32		

No comments

- n/a -

South Fork Pit River Decree
Modoc County Decree No. 3273

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to June 30	91.00	days
April 1 to October 15	198.00	days
July 1 to July 21	21.00	days
July 22 to August 11	21.00	days
August 12 to October 15	65.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	Allotments First Priority Face Value (AF)	Allotments Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Total cfs	Total AF
John Blevins, Cecil Blevins, and Willetta L Blevins	101.20	51	South Fork of Pit River			0.80	33.32		
Dolph E Van Loan and Eva Van Loan	1.00	51	South Fork of Pit River						
W H Flournoy and Gladys W Flournoy	160.50	52	South Fork of Pit River			1.28	53.32		
Gary Williams and Theresa Williams	286.30		South Fork of Pit River			3.84	159.95		
J A Hughes and Willie W Hughes	426.60		South Fork of Pit River			5.12	213.26		
Frank McArthur and Ethel M McArthur	515.50		South Fork of Pit River			5.12	213.26		
Dolph E Van Loan and Eva Van Loan	111.00	53	South Fork of Pit River			1.35	56.23		
Dolph E Van Loan and Eva Van Loan	345.00		South Fork of Pit River			4.05	168.69		
W H Flournoy and Gladys W Flournoy	294.10		South Fork of Pit River			2.70	112.46		
Arthur Flournoy	10.00		South Fork of Pit River						
Arthur Flournoy	400.00	54	South Fork of Pit River			3.50	145.79		
F E Humphrey, V F Christensen and Charlotte E Christensen	400.00		South Fork of Pit River			5.00	208.26		
Gary Williams and Theresa Williams	170.10	55	South Fork of Pit River			2.15	89.55		
Frank McArthur and Ethel M McArthur	3,414.80	56, 58, 59, 61 to 77, 87 to 91	East Side Canal			43.55	1,813.98		
Frank McArthur and Ethel M McArthur	230.60	92 to 96, 98	East Side Canal			3.00	124.96		
S J Vaughon	17.30	92 to 96, 98	East Side Canal			0.25	10.41		
Dolph E Van Loan and Eva Van Loan	480.00	57	East Side Canal			6.05	252.00		
Mrs Katie H Nelson	526.30	60	East Side Canal			6.65	276.99		
W E Armstrong	206.00	78 to 86	East Side Canal			2.45	102.05		
W E Armstrong	144.60	97	East Side Canal			1.90	79.14		
F E Humphrey, V F Christensen and Charlotte E Christensen	122.30	99	West Side Canal			1.45	60.40		
Dolph E Van Loan and Eva Van Loan	140.00	99	West Side Canal			1.65	68.73		
Frank McArthur and Ethel M McArthur	161.80	99	West Side Canal			1.95	81.22		
F E Humphrey, V F Christensen and Charlotte E Christensen	1,251.10	100 to 104	West Side Canal			14.95	622.71		
John McGarva, Peter B McGarva, and Phyllis McGarva	219.50	105	West Side Canal			2.65	110.38		
R J Gaustad and Nellie Gaustad	175.00	106, 107	West Side Canal			2.05	85.39		
R O Gaustad	77.00	106, 107	West Side Canal			0.95	39.57		
R O Gaustad	75.00	108	West Side Canal			0.90	37.49		

No comments

- n/a -

South Fork Pit River Decree
Modoc County Decree No. 3273

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to June 30	91.00	days
April 1 to October 15	198.00	days
July 1 to July 21	21.00	days
July 22 to August 11	21.00	days
August 12 to October 15	65.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments First Priority Class (cfs)	Allotments First Priority Face Value (AF)	Allotments Second Priority Class (cfs)	Allotments Second Priority Face Value (AF)	Total cfs	Total AF
Raymond Stepp Bertha L Stepp, Lena Graham and Herbie Graham	90.00	108	West Side Canal			1.05	43.74		
Frank McArthur and Ethel M McArthur	1,161.20	109 to 123	West Side Canal			13.90	578.98		
Subtotal, July 22 to August 11 Rotations Claimants	**12,475.20**					**147.26**	**6,133.80**		

Surplus Class Claimants, South Fork Pit River and Tributaries - Rotation Schedule from Paragraph 38 from August 12 to October 15	**Cubic Feet per Second**	**Acre-Feet**
Mill Creek Ditches	3.00	386.78
East Creek Ditches	3.20	412.56
Parsnip Creek Ditches	0.50	64.46
West Valley Creek Ditches	1.35	174.05
Masters Ditch	2.00	257.85
Jackson Ditch	1.00	128.93
Corporation Ditch	4.00	515.70
Van Loan Ditch	2.00	257.85
Flournoy Ditch	2.00	257.85
Williams Ditch	0.70	90.25
East and West Side Canals	8.00	1,031.40
Subtotal, August 12 to October 15 Rotations Claimants	**27.75**	**3,577.69**

No comments

- n/a -

South Fork Pit River Decree
Modoc County Decree No. 3273

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 to June 30	91.00	days
April 1 to October 15	198.00	days
July 1 to July 21	21.00	days
July 22 to August 11	21.00	days
August 12 to October 15	65.00	days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Name of Diversion System	Allotments: First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Total cfs	Total AF
Summary	**Cubic Feet per Second**	**Acre-Feet**							
Subtotal, Schedule 2, Fitzhugh Creek Claimants	15.00	6,554.38							
Subtotal, Schedule 3, South Fork Pit River and Tributaries Claimants	196.34	50,354.84							
Subtotal, Basic South Fork Claimants Before Surplus Rotations	**211.34**	**56,909.22**							
Subtotal, July 1 to 21 Surplus Rotation Claimants	35.45	1,476.60							
Subtotal, July 22 to August 11 Rotations Claimants	147.26	6,133.80							
Subtotal, August 12 to October 15 Rotations Claimants	27.75	3,577.69							
Grand Total, All Claimants, Basic Plus Surplus Rotations	**421.80**	**68,097.30**							

No comments

- n/a -

Willow Creek Decree
Shasta County, Decree No. 87524

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through November 1	215.00	days
		days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Use	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Total cfs	Total AF
Schedule 3, Willow Creek Claimants									
Buffington, John L Jr		1	Domestic	Entire Flow of Spring					
Buffington, John L Jr	8.00	2	Domestic, Irrigation	Entire Flow of Spring					
Buffington, John L Jr		3	Domestic	Entire Flow of Spring					
Bull, Charles E	10.00	21	Domestic, Irrigation, Fire	Entire Flow of Spring					
Stanbro, Phillip W and Sharon A		5	Domestic, Stockwater	0.01	7.24			0.01	7.24
Stanbro, Phillip W and Sharon A	8.00	5	Irrigation			0.13	55.44	0.13	55.44
Colbert, Louis E and Wilma C	15.00	6	Irrigation			0.15	63.97	0.15	63.97
Gates, Robert L and Marjorie S		7, 8	Domestic	0.01	7.24			0.01	7.24
Gates, Robert L and Marjorie S	6.00	9	Irrigation, Recreation			0.06	25.59	0.06	25.59
Gabriele, Julius and Linda		11	Domestic, Irrigation	0.01	7.24			0.01	7.24
Gabriele, Julius and Linda	30.00	11				0.30	127.93	0.30	127.93
Pacific Gas & Electric Co		22	Stockwater	350 gpd	0.39				0.39
Bertagna, Joseph and Marian L		12	Domestic	0.01	7.24			0.01	7.24
Bertagna, Joseph and Marian L	10.00		Irrigation, Stockwater			0.10	42.64	0.10	42.64
Harbor, Virgil and Pauline		15	Domestic	0.01	7.24			0.01	7.24
	1.00		Irrigation			0.01	4.26	0.01	4.26
Subtotal, Schedule 3 Willow Creek Claimants	**88.00**			**0.05**	**36.62**	**0.75**	**319.83**	**0.80**	**356.45**
Schedule 4, Minnow and Dunn Creeks Claimants									
Bertagna, Joseph and Marian L	10.00	13	Irrigation			0.10	42.64	0.10	42.64
Bertagna, Joseph and Marian L		14	Domestic	0.01	7.24			0.01	7.24
Bertagna, Joseph and Marian L	10.00	14	Irrigation			0.10	42.64	0.10	42.64
Bertagna, Paul J and Mary E	4.00	13	Irrigation			0.04	17.06	0.04	17.06
Webb, Joyce J		16	Domestic	0.01	7.24			0.01	7.24
Webb, Joyce J	2.00	16	Irrigation			0.02	8.53	0.02	8.53
Subtotal, Schedule 4 Minnow and Dunn Creeks Claimants	**26.00**			**0.02**	**14.49**	**0.26**	**110.88**	**0.28**	**125.37**
Schedule 5, Post-1914 Appropriative Water Rights									
Puhlman, Albert E and Carol J		4	Stockwater		2.30				

No comments

- n/a -

Willow Creek Decree
Shasta County, Decree No. 87524

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through November 1	215.00	days
		days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Use	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Total cfs	Total AF
Gates, Robert L and Marjorie S	2.00		Irrigation, Domestic, Stockwater		10.00				
Lincoln, Richard G and Michele L	10.00		Irrigation, Domestic, Stockwater		20.00				
Gabriele, Julius and Linda	30.00		Irrigation, Domestic, Stockwater		14.40				
Wheeler, Ernest L			Stockwater		10.00				
Shaw, Veldon et al			Stockwater		10.00				
Klein, Frederick & Phyllis	3.00		Irrigation, Domestic		3.00				
Truman, John C and Helen G			Recreation, Fire		0.50				
Subtotal, Post-1914 Appropriative Water Rights	**45.00**			**0.00**	**70.20**				

Summary	Total cfs	Total AF
Subtotal, Schedule 3 Willow Creek Claimants	0.80	356.45
Subtotal, Schedule 4 Minnow and Dunn Creeks Claimants	0.28	125.37
Subtotal, Post-1914 Appropriative Water Rights		70.20
Total, Willow Creek Decree Claimants	**1.08**	**552.02**

No comments

- n/a -

Willow Creek Decree
Shasta County, Decree No. 87524

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through November 1	215.00	days
		days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Use	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Total cfs	Total AF
Schedule 3, Willow Creek Claimants									
Buffington, John L Jr		1	Domestic	Entire Flow of Spring					
Buffington, John L Jr	8.00	2	Domestic, Irrigation	Entire Flow of Spring					
Buffington, John L Jr		3	Domestic	Entire Flow of Spring					
Bull, Charles E	10.00	21	Domestic, Irrigation, Fire	Entire Flow of Spring					
Stanbro, Phillip W and Sharon A		5	Domestic, Stockwater	0.01	7.24			0.01	7.24
Stanbro, Phillip W and Sharon A	8.00	5	Irrigation			0.13	55.44	0.13	55.44
Colbert, Louis E and Wilma C	15.00	6	Irrigation			0.15	63.97	0.15	63.97
Gates, Robert L and Marjorie S		7, 8	Domestic	0.01	7.24			0.01	7.24
Gates, Robert L and Marjorie S	6.00	9	Irrigation, Recreation			0.06	25.59	0.06	25.59
Gabriele, Julius and Linda		11	Domestic, Irrigation	0.01	7.24			0.01	7.24
Gabriele, Julius and Linda	30.00	11				0.30	127.93	0.30	127.93
Pacific Gas & Electric Co		22	Stockwater	350 gpd	0.39				0.39
Bertagna, Joseph and Marian L		12	Domestic	0.01	7.24			0.01	7.24
Bertagna, Joseph and Marian L	10.00		Irrigation, Stockwater			0.10	42.64	0.10	42.64
Harber, Virgil and Pauline		15	Domestic	0.01	7.24			0.01	7.24
	1.00		Irrigation			0.01	4.26	0.01	4.26
Subtotal, Schedule 3 Willow Creek Claimants	**88.00**			**0.05**	**36.62**	**0.75**	**319.83**	**0.80**	**356.45**
Schedule 4, Minnow and Dunn Creeks Claimants									
Bertagna, Joseph and Marian L	10.00	13	Irrigation			0.10	42.64	0.10	42.64
Bertagna, Joseph and Marian L		14	Domestic	0.01	7.24			0.01	7.24
Bertagna, Joseph and Marian L	10.00	14	Irrigation			0.10	42.64	0.10	42.64
Bertagna, Paul J and Mary E	4.00	13	Irrigation			0.04	17.06	0.04	17.06
Webb, Joyce J		16	Domestic	0.01	7.24			0.01	7.24
Webb, Joyce J	2.00	16	Irrigation			0.02	8.53	0.02	8.53
Subtotal, Schedule 4 Minnow and Dunn Creeks Claimants	**26.00**			**0.02**	**14.49**	**0.26**	**110.88**	**0.28**	**125.37**
Schedule 5, Post-1914 Appropriative Water Rights									
Puhlman, Albert E and Carol J		4	Stockwater		2.30				
Gates, Robert L and Marjorie S	2.00		Irrigation, Domestic, Stockwater		10.00				
Lincoln, Richard G and Michele L	10.00		Irrigation, Domestic, Stockwater		20.00				
Gabriele, Julius and Linda	30.00		Irrigation, Domestic, Stockwater		14.40				
Wheeler, Ernest L			Stockwater		10.00				
Shaw, Veldon et al			Stockwater		10.00				
Klein, Frederick & Phyllis	3.00		Irrigation, Domestic		3.00				
Truman, John C and Helen G			Recreation, Fire		0.50				
Subtotal, Post-1914 Appropriative Water Rights	**45.00**			**0.00**	**70.20**				

No comments

- n/a -

Willow Creek Decree
Shasta County, Decree No. 87524

Seasons of Use

Continuous, regardless of season	365.25	days
April 1 through November 1	215.00	days
		days

Name of Claimant	Acreage to be supplied	Diversion No. as per DWR Map	Use	Allotments First Priority Class (cfs)	First Priority Face Value (AF)	Second Priority Class (cfs)	Second Priority Face Value (AF)	Total cfs	Total AF
Summary	Total cfs	Total AF							
Subtotal, Schedule 3 Willow Creek Claimants	0.80	356.45							
Subtotal, Schedule 4 Minnow and Dunn Creeks Claimants	0.28	125.37							
Subtotal, Post-1914 Appropriative Water Rights		70.20							
Total, Willow Creek Decree Claimants	**1.08**	**552.02**							

No comments

- n/a -

Deer Creek Decree
Tehama County Suit No. 2449
Stanford Vina Ranch, plaintiff

	Cubic Feet Per Second	Acre-feet	Source
Total Diversions in Decree	150	108,669	Deer Creek, thence Sacramento River

These rights were subsequently deeded over to Deer Creek Irrigation District in the late 1920s.

No comments

- n/a -

No comments

- n/a -

Appendix D

Section D.4
Consumptive Statements of Diversion and Use

Trinity River Watershed - Consumptive Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Right Type Claimed	Year of First Use	Season	Purpose of Use	County	Source
S012967	Dept of Fish and Game	109,500.00	Riparian	1963	All	Fish Culture	Trinity	TRINITY RIVER
	Dept of Fish and Game Total	109,500.00						
S013092	EDGAR MURRISON	724.46	Pre-14	1900	All	Irrigation, Stockwater	Trinity	BIG CREEK
S013093	EDGAR MURRISON	1,224.00	Pre-14	1900	All	Irrigation, Stockwater	Trinity	BIG CREEK
S013094	EDGAR MURRISON	2,408.00	Pre-14	1900	All	Irrigation, Stockwater, Hydropower	Trinity	BIG CREEK
	EDGAR MURRISON Total	4,356.46						
S002528	KEITH L GROVES	2,400.00	Pre-14	1866	All	Irrigation, Stockwater, Domestic	Trinity	HALLS GULCH
	KEITH L GROVES Total	2,400.00						
S010724	ROGER P ECKART	2,062.00	Riparian	1875	All	Irrigation, Stockwater, Domestic, Hydropower	Trinity	DYER CREEK
S010725	ROGER P ECKART	12,000.00	Riparian/Pre-14	1875	All	Irrigation, Stockwater, Domestic, Hydropower	Trinity	BELL CREEK
S010726	ROGER P ECKART	265.00	Riparian	1875	All	Irrigation, Stockwater, Domestic, Hydropower	Trinity	UNST AKA GOODWIN CREEK
S012609	ROGER P ECKART	270.00	Riparian	1875	All	Irrigation, Stockwater, Domestic, Hydropower	Trinity	ROBARDS CREEK
S013923	ROGER P ECKART	1,700.00	Pre-14	1875	All	Irrigation, Stockwater, Domestic, Hydropower	Trinity	DIXIE CREEK
	ROGER P ECKART Total	16,297.00						
S000327	WEAVERVILLE COMMUNITY SERVICES DISTRICT	777.29	Pre-14	1891	All	Irrigation, Stockwater, Domestic	Trinity	WEST WEAVER CREEK
S000361	WEAVERVILLE COMMUNITY SERVICES DISTRICT	753.72	Pre-14	1852	All	Domestic	Trinity	EAST WEAVER CREEK
	WEAVERVILLE COMMUNITY SERVICES DISTRICT Total	1,531.01						
	Grand Total	134,084.47						

No comments

- n/a -

Pit River Watershed - Consumptive Statements of Diversion and Use

Application ID	Holder Name	Highest Claimed Amt	Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S001453	ALBERT E PUHLMAN JR	466.00	Pre-14	1884	All	Irrigation, Stockwatering, Domestic	Shasta	NORTH FORK MONTGOMERY CREEK
S001454	ALBERT E PUHLMAN JR	466.00	Pre-14	1884	All	Irrigation, Stockwatering, Domestic	Shasta	SOUTH FORK MONTGOMERY CREEK
S001455	ALBERT E PUHLMAN JR	466.00	Pre-14	1884	All	Irrigation, Stockwatering, Domestic	Shasta	SAWDUST CREEK
	ALBERT E PUHLMAN JR Total	1,398.00						
S002265	CLIFFORD K OILAR	490.00	Riparian/Pre-14	1873	All	Irrigation, Stockwatering	Modoc	OILAR SPRINGS
S002266	CLIFFORD K OILAR	493.00	Riparian/Pre-14	1873	All	Irrigation, Stockwatering, Domestic	Modoc	UNST
S010786	CLIFFORD K OILAR	470.00	Riparian/Pre-14	1873	All	Irrigation, Stockwatering, Domestic	Modoc	UNSP
S010814	CLIFFORD K OILAR	490.00	Riparian/Pre-14	1873	All	Irrigation, Stockwatering	Modoc	OILAR SPRINGS
S010815	CLIFFORD K OILAR	100.00	Riparian/Pre-14	1957	May-Dec	Irrigation, Stockwatering	Modoc	UNST
S010816	CLIFFORD K OILAR	200.00	Riparian/Pre-14	1940	May-Oct	Irrigation, Stockwatering, Domestic	Modoc	WHIPPLE SPRINGS
	CLIFFORD K OILAR Total	2,243.00						
S008735	CRAIG MCARTHUR	19,528.00	Riparian/Pre-14	1875	All	Irrigation, Stockwatering, Domestic	Shasta	TULE RIVER
S008912	CRAIG MCARTHUR	1,130.00	Riparian/Pre-14	1875	All	Irrigation, Stockwatering, Domestic	Shasta	PEACOCK CREEK
S015104	CRAIG MCARTHUR	7,242.00	Pre-14	1911	All	Irrigation, Stockwatering, Domestic	Shasta	LEE DRAIN CANAL
	CRAIG MCARTHUR Total	27,900.00						
S014558	Dennis Hoffman	1,135.49	Riparian	1995	Mar-Oct	Irrigation	Lassen	PIT RIVER
S014731	Dennis Hoffman	1,150.83	Riparian	2003	Apr-Sept	Irrigation	Shasta	PIT RIVER
	Dennis Hoffman Total	2,286.32						
S004691	Dept of Fish and Game	1,464.00	Pre-14	1904	All	Fish Culture, Domestic	Modoc	PINE CREEK
S012964	Dept of Fish and Game	36,135.00	Riparian	1965	All	Recreation, Fishing	Shasta	ROCK CREEK SPRINGS
	Dept of Fish and Game Total	37,599.00						
S009112	DIXIE VALLEY RANCH	4,000.00	Riparian	1873	All	Irrigation, Stockwatering	Lassen	DAVIS CREEK
S009113	DIXIE VALLEY RANCH	5,000.00	Riparian/Pre-14	1873	All	Irrigation, Stockwatering	Lassen	INDIAN CREEK
S009114	DIXIE VALLEY RANCH	4,000.00	Riparian	1977	All	Irrigation, Stockwatering	Lassen	UNST
S009115	DIXIE VALLEY RANCH	2,000.00	Riparian/Pre-14	1873	All	Irrigation, Stockwatering	Lassen	LITTLE DAVIS CREEK
S009116	DIXIE VALLEY RANCH	2,000.00	Riparian/Pre-14	1873	All	Irrigation, Stockwatering	Lassen	RUSSEL DAIRY SPRING
S009133	DIXIE VALLEY RANCH	5,000.00	Riparian/Pre-14	1873	All	Irrigation, Stockwatering	Lassen	BIG JACK LAKE
S009138	DIXIE VALLEY RANCH	2,173.39	Riparian/Pre-14	1873	All	Irrigation, Stockwatering	Lassen	BIG SPRING
	DIXIE VALLEY RANCH Total	24,173.39						
S008053	ED DEVAUL	1,620.00	Riparian	1949	All	Irrigation, Stockwatering, Domestic	Shasta	UNST
	ED DEVAUL Total	1,620.00						
S013170	EDWARD A BOSWORTH JR	0.00	Pre-14	1885	All	Irrigation, Stockwatering	Shasta	CAYTON CREEK
S013171	EDWARD A BOSWORTH JR	2,421.17	Pre-14	1885	All	Irrigation, Stockwatering, Domestic	Shasta	NORTH FORK CLARK CREEK
S013172	EDWARD A BOSWORTH JR	4,824.34	Pre-14	1885	All	Irrigation, Stockwatering, Domestic	Shasta	CLARK CREEK
	EDWARD A BOSWORTH JR Total	7,245.51						
S000798	ELLEN E TAYLOR	1,451.90	Pre-14	1913	Apr-Nov	Irrigation, Stockwatering	Shasta	LOST CREEK
	ELLEN E TAYLOR Total	1,451.90						

No comments

- n/a -

Application ID	Holder Name	Highest Claimed Amt	Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S014380	Glenn A Nader	2,279.00	Riparian	1876	Apr-Sept	Irrigation, Stockwatering	Modoc	WITCHER CREEK
S014381	Glenn A Nader	1,505.00	Pre-14	1873	Jun-Oct	Irrigation, Stockwatering	Modoc	WITCHER CREEK
S014382	Glenn A Nader	2,334.00	Riparian/Pre-14	1876	Mar-Oct	Irrigation, Stockwatering	Modoc	WITCHER CREEK
S014383	Glenn A Nader	420.00	Riparian	1876	Apr-Oct	Irrigation, Stockwatering	Modoc	WITCHER CREEK
S014384	Glenn A Nader	1,021.00	Pre-14	1876	Nov-Mar	Irrigation, Stockwatering	Modoc	WITCHER CREEK
	Glenn A Nader Total	7,559.00						
S013765	JOSEPH SCOTT VERMILYEA	8,789.00	Riparian	1983	All	Irrigation, Domestic	Shasta	BAKER CREEK
S013766	JOSEPH SCOTT VERMILYEA	2,076.00	Pre-14	1914	Mar-Nov	Irrigation, Stockwatering, Domestic	Shasta	STUMP CREEK
S013767	JOSEPH SCOTT VERMILYEA	720.00	Pre-14	1914	All	Irrigation, Stockwatering, Domestic	Shasta	LITTLE SHOTGUN CREEK
	JOSEPH SCOTT VERMILYEA Total	11,585.00						
S001050	KNOCH INC	19,560.00	Riparian/Pre-14	1909	All	Irrigation, Stockwatering	Shasta	FALL RIVER
	KNOCH INC Total	19,560.00						
S008540	LOWELL L NOVY	0.00	Riparian/Pre-14	1890	All	Irrigation, Stockwatering	Lassen	TULE LAKE RESERVOIR AKA MOON LAKE
S012914	LOWELL L NOVY	2,920.00	Riparian/Pre-14	1900	All	Irrigation, Stockwatering	Lassen	CEDAR CREEK
	LOWELL L NOVY Total	2,920.00						
S008627	MILANO LAND AND CATTLE CO LLC	2,500.00	Pre-14	1902	May-Oct	Irrigation, Stockwatering	Modoc	DUNCAN RESERVOIR
	MILANO LAND AND CATTLE CO LLC Total	2,500.00						
S014308	Outfitter Properties LLC-Oasis Springs	850.00	Riparian	1890	Apr-Sept	Irrigation, Stockwatering	Tehama	UNSP
S014309	Outfitter Properties LLC-Oasis Springs	195.00	Riparian	1900	Apr-Oct	Irrigation	Shasta	SPRING CREEK
S014310	Outfitter Properties LLC-Oasis Springs	500.00	Riparian	1900	Apr-Oct	Irrigation	Shasta	SPRING CREEK
S014311	Outfitter Properties LLC-Oasis Springs	1,700.00	Riparian	1875	Apr-Oct	Irrigation	Shasta	UNSP (AKA VINEYARD SPRING)
	Outfitter Properties LLC-Oasis Springs Total	3,245.00						
S002509	R HAMBY	1,600.00	Pre-14	1898	All	Irrigation, Stockwatering, Domestic	Shasta	EAST FORK NELSON CREEK
	R HAMBY Total	1,600.00						
S016096	Raymond J Paige	1,000.00	Riparian/Pre-14	1986	Mar-Oct	Irrigation	Shasta	LITTLE TULE RIVER TO FALL RIVER
S016097	Raymond J Paige	600.00	Riparian/Pre-14	1896	Mar-Oct	Irrigation	Shasta	LITTLE TULE RIVER TO FALL RIVER
	Raymond J Paige Total	1,600.00						
S014780	RICHARD L JENNINGS	5,250.00	Riparian/Pre-14	1885	Apr-Oct	Irrigation, Stockwatering	Modoc	PIT RIVER
S014781	RICHARD L JENNINGS	5,250.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwatering	Modoc	PIT RIVER
S014782	RICHARD L JENNINGS	2,800.00	Riparian/Pre-14	1870	Apr-Oct	Irrigation, Stockwatering	Modoc	RALSTON GULCH
S014783	RICHARD L JENNINGS	4,500.00	Riparian/Pre-14	1912	Apr-Oct	Irrigation, Stockwatering	Modoc	CANYON CREEK
S014784	RICHARD L JENNINGS	4,500.00	Riparian/Pre-14	1900	Apr-Sept	Irrigation, Stockwatering	Modoc	PIT RIVER
	RICHARD L JENNINGS Total	22,300.00						
S014913	Western Agricultural Services (River Butte Ranch)	150.00	Riparian	1965	Apr-Sept	Irrigation	Shasta	FALL RIVER
S014914	Western Agricultural Services (River Butte Ranch)	400.00	Riparian	1965	Apr-Sept	Irrigation	Shasta	FALL RIVER
	Western Agricultural Services (River Butte Ranch) Total	550.00						
S014193	Western Agricultural Services (Fall River Ranch)	375.00	Riparian	1900	Apr-Oct	Irrigation, Stockwatering	Shasta	FALL RIVER
S014194	Western Agricultural Services (Fall River Ranch)	60.00	Riparian	1900	Apr-Oct	Irrigation, Stockwatering	Shasta	FALL RIVER
	Western Agricultural Services (Fall River Ranch) Total	435.00						
S014937	Western Agricultural Services (River Ranch L P)	485.00	Riparian	1930	Apr-Oct	Irrigation	Shasta	FALL RIVER

No comments

- n/a -

Pit River Watershed - Consumptive Statements of Diversion and Use

Application ID	Holder Name	Highest Claimed Amt	Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S014938	Western Agricultural Services (River Ranch L P)	15.00	Riparian	1872	All	Stockwatering, Domestic	Shasta	FALL RIVER
S014939	Western Agricultural Services (River Ranch L P)	550.00	Riparian	1920	Apr-Oct	Irrigation	Shasta	FALL RIVER
S014940	Western Agricultural Services (River Ranch L P)	75.00	Riparian	1950	Apr-Sept	Irrigation	Shasta	FALL RIVER
S014941	Western Agricultural Services (River Ranch L P)	15.00	Riparian	1900	All	Stockwatering, Domestic	Shasta	FALL RIVER
S014942	Western Agricultural Services (River Ranch L P)	15.00	Riparian	1870	All	Stockwatering	Shasta	FALL RIVER
S014943	Western Agricultural Services (River Ranch L P)	425.00	Riparian	1920	Apr-Oct	Irrigation, Stockwatering	Shasta	FALL RIVER
S014944	Western Agricultural Services (River Ranch L P)	70.00	Riparian	1950	Apr-Oct	Irrigation	Shasta	FALL RIVER
S014945	Western Agricultural Services (River Ranch L P)	1,200.00	Riparian	1870	Apr-Oct	Irrigation, Stockwatering	Shasta	FALL RIVER
	Western Agricultural Services (River Ranch L P) Total	2,850.00						
S012933	ROBERT G BAIRD	1,149.00	Pre-14	1872	Apr-Nov	Irrigation, Stockwatering	Modoc	TOMS CREEK
	ROBERT G BAIRD Total	1,149.00						
S012446	ROBERT H MACKEY & SONS INC	570.00	Riparian	1871	Apr-Oct	Irrigation, Stockwatering	Modoc	CANYON CREEK
S012447	ROBERT H MACKEY & SONS INC	570.00	Riparian	1890	Apr-Oct	Irrigation, Stockwatering	Modoc	CANYON CREEK
S014303	ROBERT H MACKEY & SONS INC	720.00	Riparian	1880	All	Irrigation, Stockwatering, Domestic	Modoc	UNSP
	ROBERT H MACKEY & SONS INC Total	1,860.00						
S004672	RONALD L SCHLUTER	1,500.00	Pre-14	1906	May-Oct	Irrigation, Stockwatering	Modoc	BIG DOBIE SOUTH
S004673	RONALD L SCHLUTER	900.00	Pre-14	1906	Apr-Sept	Irrigation	Modoc	BIG DOBIE NORTH
	RONALD L SCHLUTER Total	2,400.00						
S000106	S X RANCH INC	1,000.00	Riparian	1947	Apr-Sept	Irrigation	Lassen	PIT RIVER
S000107	S X RANCH INC	340.00	Riparian	1947	Apr-Oct	Irrigation, Stockwatering	Lassen	PIT RIVER
	S X RANCH INC Total	1,340.00						
S015534	SX Lowry Ranch	2,000.00	Pre-14	1897	Nov-Apr	Irrigation, Stockwatering	Modoc	SALISBURY GULCH AKA UNST
	SX Lowry Ranch Total	2,000.00						
S002877	WILLIAM K HAGGE	525.00	Riparian	1964	May-Sept	Irrigation, Stockwatering	Modoc	PIT RIVER
S002879	WILLIAM K HAGGE	150.00	Riparian	1947	May-Sept	Irrigation, Stockwatering	Modoc	PIT RIVER
S002880	WILLIAM K HAGGE	1,140.00	Riparian/Pre-14	1880	May-Sept	Irrigation, Stockwatering	Modoc	PIT RIVER
S014183	WILLIAM K HAGGE	380.00	Riparian	1945	May-Sept	Irrigation, Stockwatering	Modoc	PIT RIVER
	WILLIAM K HAGGE Total	2,195.00						
	Grand Total	193,565.12						

No comments

- n/a -

Feather River Watershed - Consumptive Statements of Diversion and Use

Application ID	Holder Name	Highest Claim Amt	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S013390	A L HANSEN	2,800.00	Pre-14	1860	Apr-Nov	Irrigation	Plumas	GREENHORN CREEK
	A L HANSEN Total	2,800.00						
S000267	ALBANO P BRESCIANI	700.00	Riparian/Pre-14	1857	All	Stockwater	Plumas	CLEAR STREAM
	ALBANO P BRESCIANI Total	700.00						
S001884	Phillip A Bresciani	300.00	Pre-14	1904	May-Sep	Irrigation, Stockwater	Plumas	SPANISH CREEK
	Phillip A Bresciani Total	300.00						
S001885	ALBANO P BRESCIANI	360.00	Riparian/Pre-14	1878	May-Sep	Stockwater	Plumas	MILL CREEK
S001886	ALBANO P BRESCIANI	300.00	Riparian/Pre-14	1878	Apr-Sep	Stockwater	Plumas	MILL CREEK
S002099	ALBANO P BRESCIANI	350.00	Riparian/Pre-14	1872	Apr-Oct	Stockwater	Plumas	GREENHORN CREEK
S002100	ALBANO P BRESCIANI	540.00	Riparian/Pre-14	1877	May-Oct	Stockwater	Plumas	SPANISH CREEK
S002101	ALBANO P BRESCIANI	150.00	Riparian/Pre-14	1873	May-Sep	Stockwater	Plumas	HAUN CREEK
S002102	ALBANO P BRESCIANI	250.00	Riparian/Pre-14	1877	Apr-Aug	Stockwater	Plumas	MILL CREEK
S002103	ALBANO P BRESCIANI	70.00	Riparian/Pre-14	1877	Apr-Oct	Stockwater	Plumas	MILL CREEK
S002104	ALBANO P BRESCIANI	182.00	Riparian/Pre-14	1877	Apr-Oct	Stockwater	Plumas	MILL CREEK
	ALBANO P BRESCIANI Total	2,202.00						
S010594	BERRY CREEK WATER USERS INCORPORATED	2,477.66	Pre-14	1852	All	Irrigation, Stockwater	Butte	BERRY CREEK
	BERRY CREEK WATER USERS INCORPORATED Total	2,477.66						
S002956	BROOKS WALKER ET AL	60.00	Riparian/Pre-14	1900	May-Jun	Irrigation, Stockwater	Lassen	UNNAMED STREAM
S002957	BROOKS WALKER ET AL	90.00	Riparian/Pre-14	1900	May-Jul	Irrigation, Stockwater	Lassen	HOMER CREEK
S002958	BROOKS WALKER ET AL	30.00	Riparian/Pre-14	1900	May-Jun	Irrigation, Stockwater	Lassen	UNNAMED STREAM
S002960	BROOKS WALKER ET AL	30.00	Riparian/Pre-14	1900	May-Jun	Irrigation, Stockwater	Lassen	UNNAMED STREAM
S002962	BROOKS WALKER ET AL	9,306.00	Riparian/Pre-14	1900	May-Oct	Irrigation, Stockwater	Lassen	GOODRICH CREEK
S002963	BROOKS WALKER ET AL	7,866.00	Riparian/Pre-14	1900	May-Oct	Irrigation, Stockwater	Lassen	GOODRICH CREEK
	BROOKS WALKER ET AL Total	17,382.00						
S002315	DEAN PANFILI	225.00	Riparian/Pre-14	1957	Apr-Sep	Irrigation, Stockwater, Domestic	Plumas	LONG VALLEY CREEK
S002316	DEAN PANFILI	175.00	Riparian/Pre-14	1870	May-Sep	Irrigation	Plumas	LONG VALLEY CREEK
S002317	DEAN PANFILI	0.00	Riparian/Pre-14	1856	Apr-Sep	Irrigation, Stockwater	Plumas	LONG VALLEY CREEK

No comments

- n/a -

Feather River Watershed - Consumptive Statements of Diversion and Use

Application ID	Holder Name	Highest Claim Amt	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S002318	DEAN PANFILI	613.78	Riparian/Pre-14	1870	Mar-Sep	Irrigation, Stockwater, Domestic	Plumas	LITTLE LONG VALLEY CREEK
	DEAN PANFILI Total	1,013.78						
S015506	GRAEAGLE LAND & WATER COMPANY	1,279.11	Pre-14	1820	Mar-Oct	Irrigation, Stockwater	Plumas	MOHAWK CREEK
S015913	GRAEAGLE LAND & WATER COMPANY	1,400.64	Pre-14	1820	All	Irrigation, Stockwater, Domestic	Plumas	MOHAWK CREEK
S015914	GRAEAGLE LAND & WATER COMPANY	607.64	Pre-14	1820	Mar-Oct	Irrigation, Stockwater	Plumas	MOHAWK CREEK
	GRAEAGLE LAND & WATER COMPANY Total	3,287.39						
S008734	GRAEAGLE WATER COMPANY A CALIF CORP	990.71	Riparian	1941	All	Irrigation, Stockwater, Domestic	Plumas	GRAY EAGLE CREEK
	GRAEAGLE WATER COMPANY A CALIF CORP Total	990.71						
S013351	MOHAWK VALLEY RANCH, INC	485.80	Pre-14	1880	Mar-Oct	Irrigation, Domestic	Plumas	UNST
S013352	MOHAWK VALLEY RANCH, INC	1,457.72	Riparian	1950	Mar-Oct	Golf Course Irrigation	Plumas	SULPHUR CREEK
S013353	MOHAWK VALLEY RANCH, INC	2,171.85	Riparian	1950	All	Golf Course Irrigation	Plumas	BOULDER CREEK
S013354	MOHAWK VALLEY RANCH, INC	485.96	Pre-14	1880	Mar-Oct	Irrigation	Plumas	BOULDER CREEK
S013355	MOHAWK VALLEY RANCH, INC	485.96	Pre-14	1880	Mar-Oct	Irrigation	Sierra	BOULDER CREEK
S013356	MOHAWK VALLEY RANCH, INC	723.95	Pre-14	1880	All	Golf Course Irrigation	Plumas	UNST
S013357	MOHAWK VALLEY RANCH, INC	1,447.90	Pre-14	1880	All	Golf Course Irrigation	Plumas	UNST
	MOHAWK VALLEY RANCH, INC Total	7,259.15						
S009189	PLUMAS PINES GOLF RESORT	10,700.00	Pre-14	1877	May-Oct	Irrigation	Plumas	JAMISON CREEK
	PLUMAS PINES GOLF RESORT Total	10,700.00						
S002953	RED RIVER FORESTS PARTNERSHIP	894.00	Riparian/Pre-14	1900	May-Oct	Irrigation, Stockwater	Lassen	MOUNTAIN MEADOWS CREEK
S002954	RED RIVER FORESTS PARTNERSHIP	5,660.00	Riparian/Pre-14	1900	May-Oct	Irrigation, Stockwater	Lassen	COTTONWOOD CREEK
	RED RIVER FORESTS PARTNERSHIP Total	6,554.00						

No comments

- n/a -

Feather River Watershed - Consumptive Statements of Diversion and Use

Application ID	Holder Name	Highest Claim Amt	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S000262	REID LAND & CATTLE COMPANY	4,346.00	Pre-14	1857	May-Nov	Irrigation, Stockwater	Plumas	GREENHORN CREEK
S000263	REID LAND & CATTLE COMPANY	1,336.00	Pre-14	1857	All	Irrigation, Stockwater, Domestic	Plumas	CHANDLER CREEK
S000264	REID LAND & CATTLE COMPANY	1,217.00	Pre-14	1857	Jun-Nov	Irrigation, Stockwater	Plumas	TAYLOR CREEK
	REID LAND & CATTLE COMPANY Total	6,899.00						
S000544	RICHARD D FRIPP II	0.56	Pre-14	1876	All	Irrigation, Stockwater, Domestic	Plumas	COGSWELL RAVINE
S000545	RICHARD D FRIPP II	1,086.69	Pre-14	1856	All	Irrigation, Stockwater, Domestic	Plumas	LONG VALLEY CREEK
	RICHARD D FRIPP II Total	1,087.25						
S000266	RICHARD D LEONHARDT	970.00	Pre-14	1857	All	Irrigation, Stockwater	Plumas	MILL CREEK
S000268	RICHARD D LEONHARDT	1,200.00	Pre-14	1857	Apr-Oct	Irrigation, Stockwater	Plumas	SPANISH CREEK
S000269	RICHARD D LEONHARDT	240.00	Pre-14	1857	May-Oct	Irrigation, Stockwater	Plumas	FOUR LETTER CREEK
	RICHARD D LEONHARDT Total	2,410.00						
S000378	RICHVALE IRRIGATION DISTRICT	7,560.00	Pre-14	1914	Apr-Sep	Irrigation	Butte	CHEROKEE CANAL
S000379	RICHVALE IRRIGATION DISTRICT	6,000.00	Riparian	1947	Mar-Jan	Irrigation	Butte	LITTLE DRY CREEK
	RICHVALE IRRIGATION DISTRICT Total	13,560.00						
S000925	WESTERN CANAL WATER DISTRICT	348,469.00	Pre-14	1902	Apr-Jan	Irrigation	Butte	FEATHER RIVER
	WESTERN CANAL WATER DISTRICT Total	348,469.00						
S006764	WESTWOOD COMMUNITY SERVICES DISTRICT	0.00	Pre-14	1913	All	Domestic	Lassen	DUCK LAKE
S010000	WESTWOOD COMMUNITY SERVICES DISTRICT	1,053.00	Prescriptive	1924	All	Domestic	Lassen	WALKER SPRINGS
	WESTWOOD COMMUNITY SERVICES DISTRICT Total	1,053.00						
S015240	WILLIAM S KEELER TRUST	1,750.00	Riparian/Pre-14	1900	May-Sep	Irrigation, Stockwater	Lassen	GOODRICH CREEK
	WILLIAM S KEELER TRUST Total	1,750.00						
S013159	WILLIARD H WATTENBURG	0.00					Plumas	UNNAMED SPRING
	WILLIARD H WATTENBURG Total	0.00						
	Grand Total	430,894.94						

No comments

- n/a -

American River Watershed - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S017323	City of Folsom	50,712.40	Pre-14	1851	All	Municipal, Industrial	Sacramento	SOUTH FORK OF THE AMERICAN RIVER
S017326	City of Folsom	5,000.00	Pre-14	1851	All	Municipal, Industrial	Sacramento	SOUTH FORK OF THE AMERICAN RIVER
S017490	City of Folsom	22,000.00	Pre-14	1851	All	Municipal, Industrial	Sacramento	SOUTH FORK OF THE AMERICAN RIVER
S017491	City of Folsom	22,000.00	Pre-14	1851	All	Municipal, Industrial	Sacramento	SOUTH FORK OF THE AMERICAN RIVER
S000388	COLOMA-LOTUS RANCH DITCH USERS ASSOC	10,000.00	Pre-14	1853	Apr-Nov	Irrigation, Stockwater, Domestic	El Dorado	SOUTH FORK AMERICAN RIVER
S010717	EL DORADO IRRIGATION DISTRICT	60.75	Pre-14	1875	All	Irrigation, Municipal	El Dorado	SOUTH FORK AMERICAN RIVER
S000972	EL DORADO IRRIGATION DISTRICT	19.80	Pre-14	1856	Dec	Irrigation, Municipal, Industrial, Hydropower	El Dorado	CARPENTER CREEK
S000973	EL DORADO IRRIGATION DISTRICT	95.60	Pre-14	1873	Feb-May	Irrigation, Municipal, Industrial, Hydropower	El Dorado	UNST
S000974	EL DORADO IRRIGATION DISTRICT	678.00	Pre-14	1873	Apr-Oct	Irrigation, Municipal, Industrial, Hydropower	El Dorado	MILL CREEK
S000975	EL DORADO IRRIGATION DISTRICT	232.00	Pre-14	1873	Jan-Jun	Irrigation, Municipal, Industrial, Hydropower	El Dorado	BRYANT CREEK
S000976	EL DORADO IRRIGATION DISTRICT	132.90	Pre-14	1873	Jan-Jun	Irrigation, Municipal, Industrial, Hydropower	El Dorado	ESMERELDA CREEK
S004708	EL DORADO IRRIGATION DISTRICT	5,400.00	Pre-14	1876	Jul-Dec	Irrigation, Municipal, Industrial, Hydropower	Amador	SILVER FORK OF SOUTH FORK AMERICAN RIVER
S009034	EL DORADO IRRIGATION DISTRICT	40,373.00	Pre-14	1873	All	Irrigation, Municipal, Industrial, Hydropower	El Dorado	SOUTH FORK AMERICAN RIVER
S009035	EL DORADO IRRIGATION DISTRICT	360.00	Pre-14	1875	May-Aug	Irrigation, Municipal, Industrial, Hydropower	El Dorado	PYRAMID CREEK
S014323	EL DORADO IRRIGATION DISTRICT	3,968.00	Pre-14	1889	Apr-Oct	Irrigation, Municipal, Industrial, Hydropower	El Dorado	SLAB CREEK
S014968	EL DORADO IRRIGATION DISTRICT	3,373.00	Pre-14	1855	All	Irrigation, Municipal, Industrial, Hydropower	El Dorado	WEBER CREEK
S015937	EL DORADO IRRIGATION DISTRICT	1.55	Pre-14	1872	April	Irrigation, Municipal, Industrial, Hydropower	El Dorado	UNNAMED STREAM
S015938	EL DORADO IRRIGATION DISTRICT	150.60	Pre-14	1872	Dec-Apr	Irrigation, Municipal, Industrial, Hydropower	El Dorado	UNNAMED STREAM
S015939	EL DORADO IRRIGATION DISTRICT	41.64	Pre-14	1872	All	Irrigation, Municipal, Industrial, Hydropower	El Dorado	Stream at Spillway 8
S015940	EL DORADO IRRIGATION DISTRICT	15.20	Pre-14	1872	Feb-May	Irrigation, Municipal, Industrial, Hydropower	El Dorado	BULL CREEK
S015941	EL DORADO IRRIGATION DISTRICT	8,000.00	Pre-14	1872	Jul-Feb	Irrigation, Municipal, Industrial, Hydropower	Alpine	CAPLES LAKE
S014967	EL DORADO IRRIGATION DISTRICT	1,216.00	Pre-14	1852	Apr-Oct	Municipal, Industrial	El Dorado	HANGTOWN CREEK
S014597	GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT	2,404.00	Pre-14	1850	All	Irrigation, Domestic	El Dorado	MUTTON CANYON

No comments

- n/a -

American River Watershed - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S014598	GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT	2,165.00	Pre-14	1850	All	Irrigation, Domestic	El Dorado	BACON CANYON
S014599	GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT	850.00	Pre-14	1850	All	Irrigation, Domestic	El Dorado	UNST
S014600	GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT	1,295.00	Pre-14	1850	All	Irrigation, Domestic	El Dorado	DEEP CANYON
S014601	GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT	9,552.00	Pre-14	1850	Dec-Oct	Irrigation, Domestic	El Dorado	PILOT CREEK
S010794	NEVADA IRRIGATION DISTRICT	21,085.00	Pre-14	1880	All	Irrigation, Stockwater, Domestic	Placer	COON CREEK, ORR CREEK
S013791	NEVADA IRRIGATION DISTRICT	24,374.00	Pre-14	1853	All	Irrigation, Stockwater, Domestic, Mining	Placer	AUBURN RAVINE
S013790	NEVADA IRRIGATION DISTRICT	7,800.00	Pre-14	1853	Apr-Oct	Irrigation, Stockwater, Mining	Placer	AUBURN RAVINE
S000968	PACIFIC GAS AND ELECTRIC COMPANY	1,220.00	Prescriptive	1917	All	Irrigation, Domestic	Placer	ROCK CREEK
S000969	PACIFIC GAS AND ELECTRIC COMPANY	2,942.00	Prescriptive	1917	All	Irrigation, Domestic	Placer	DRY CREEK
S000959	PLACER COUNTY WATER AGENCY	5,422.00	Pre-14	1864	All	Irrigation, Domestic	Placer	CANYON CREEK
S000967	PLACER COUNTY WATER AGENCY	0.00	Pre-14	1864	All	Irrigation, Domestic	Placer	UNST
S010397	PLACER COUNTY WATER AGENCY	0.00	Pre-14	1896	All	Irrigation, Domestic	Placer	SOUTH FORK DRY CREEK
S010398	PLACER COUNTY WATER AGENCY	0.00	Pre-14	1909	All	Irrigation, Domestic	Placer	NORTH FORK DRY CREEK
S000656	San Juan Water District	33,000.00	Pre-14	1852	All	Domestic	Placer	FOLSOM LAKE
		285,939.44						

No comments

- n/a -

Yuba River Watershed - Consumptive Statements of Diversion and Use

Application ID	Holder Name	Highest Claimed Amt	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S000645	BIG LAND DEVELOPMENT CORP	2,730.00	Riparian/Pre-14	1886	Apr-Oct	Irrigation, Stockwater	Butte	SOUTH HONCUT CREEK
	BIG LAND DEVELOPMENT CORP Total	2,730.00						
S010014	CITY OF NEVADA CITY	1,859.80	Pre-14	1910	All	Domestic	Nevada	LITTLE DEER CREEK
	CITY OF NEVADA CITY Total	1,859.80						
S016332	Hallwood Irrigation Company	69,798.00	Pre-14	1909	All	Irrigation	Yuba	Yuba River
	Hallwood Irrigation Company Total	69,798.00						
S001241	LAKE WILDWOOD ASSOCIATION	1,811.16	Pre-14	1861	All	Irrigation	Nevada	NIGGER CREEK
	LAKE WILDWOOD ASSOCIATION Total	1,811.16						
S004716	NEVADA IRRIGATION DISTRICT	94,346.00	Pre-14	1873	All	Hydropower, Irrigation, Domestic, Recreation	Nevada	CANYON CREEK
S004717	NEVADA IRRIGATION DISTRICT	27,007.00	Pre-14	1859	All	Hydropower, Irrigation, Domestic, Recreation	Nevada	CANYON CREEK
S010591	NEVADA IRRIGATION DISTRICT	2.20	Riparian	1967	May-Oct	Recreation	Nevada	DAMFINE SPRING
S010592	NEVADA IRRIGATION DISTRICT	3.20	Riparian	1967	May-Oct	Recreation	Sierra	UNST
S012949	NEVADA IRRIGATION DISTRICT	551.00	Pre-14	1851	Apr-Oct	Irrigation	Nevada	DEER CREEK
S012950	NEVADA IRRIGATION DISTRICT	13,500.00	Pre-14	1851	All	Irrigation, Stockwater, Domestic	Nevada	DEER CREEK
S012951	NEVADA IRRIGATION DISTRICT	7,900.00	Pre-14	1851	All	Irrigation, Domestic, Fire Protection, Recreation	Nevada	DEER CREEK
S012952	NEVADA IRRIGATION DISTRICT	34,300.00	Pre-14	1851	All	Irrigation, Domestic, Fire Protection, Recreation	Nevada	DEER CREEK
S012953	NEVADA IRRIGATION DISTRICT	30,645.00	Pre-14	1857	All	Irrigation, Domestic, Fire Protection, Recreation	Nevada	SOUTH FORK DEER CREEK
S013330	NEVADA IRRIGATION DISTRICT	83,639.00	Pre-14	1854	All	Irrigation, Domestic, Fire Protection, Recreation, Mining, Hydropower	Sierra	MIDDLE YUBA RIVER
S013800	NEVADA IRRIGATION DISTRICT	117,023.50	Pre-14	1872	All	Irrigation, Domestic, Fire Protection, Recreation, Mining, Hydropower	Nevada	CANYON CREEK
S013801	NEVADA IRRIGATION DISTRICT	47,996.00	Pre-14	1872	All	Irrigation, Domestic, Fire Protection, Recreation, Mining, Hydropower	Nevada	CANYON CREEK
S013927	NEVADA IRRIGATION DISTRICT	61,487.00	Pre-14	1874	All	Irrigation, Domestic, Fire Protection, Recreation, Mining, Hydropower	Nevada	SOUTH YUBA RIVER
S013928	NEVADA IRRIGATION DISTRICT	483,867.00	Pre-14	1874	All	Irrigation, Domestic, Fire Protection, Recreation, Mining, Hydropower	Nevada	SOUTH YUBA RIVER
S014353	NEVADA IRRIGATION DISTRICT	47,789.00	Riparian/Pre-14	1851	All	Irrigation, Domestic, Fire Protection, Recreation, Mining, Hydropower	Nevada	DEER CREEK
S016092	NEVADA IRRIGATION DISTRICT	1,279.00	Pre-14	1859	All	Irrigation, Domestic, Fire Protection, Recreation, Mining, Hydropower	Nevada	JACKSON CREEK
	NEVADA IRRIGATION DISTRICT Total	1,051,334.90						
	Grand Total	1,127,533.86						

No comments

- n/a -

Bear River Watershed - Consumptive Statements of Diversio and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S013809	NEVADA IRRIGATION DISTRICT	69,433.00	Pre-14	1853	All	Irrigation, Domestic	Nevada	BEAR RIVER
S013926	NEVADA IRRIGATION DISTRICT	22,675.00	Pre-14	1859	All	Irrigation, Mining	Nevada	WOLF CREEK
		92,108.00						

No comments

- n/a -

East Creeks Water Rights - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S001115	1990 Johannessen Family Trust	453.72	Pre-14	1880	Apr-Sep	Irrigation, Stockwater	Shasta	DEER CREEK
S013144	1990 JOHANNESSEN FAMILY TRUST	2,759.01	Pre-14	1880	Apr-Oct	Irrigation, Stockwater	Shasta	DEER CREEK
	1990 Johannessen Family Trust Total	3,212.73						
S012313	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	MARTIN CREEK
S012314	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	MARTIN CREEK
S012315	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	MARTIN CREEK
S012316	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	SOUTH FORK BATTLE CREEK
S012318	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	UNST
S012319	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	UNST
S012320	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	UNST
S012321	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	UNST
S012322	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	UNST
S012323	BATTLE CREEK MEADOWS RANCH INC	350.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Tehama	UNST
	BATTLE CREEK MEADOWS RANCH INC Total	3,500.00						
S000550	BUTTE SINK WATERFOWL ASSOCIATION	43,800.00	Riparian/Pre-14	1900	All	Irrigation, Habitat	Butte	BUTTE CREEK
	BUTTE SINK WATERFOWL ASSOCIATION Total	43,800.00						
S002387	CLINE C SOULE	3,200.00	Riparian/Pre-14	1885	Apr - Oct	Irrigation, Stockwater	Siskiyou	BUTTE CREEK
	CLINE C SOULE Total	3,200.00						
S000731	DEER CREEK IRRIGATION DISTRICT	20,400.00	Adjudication	1923	Feb-Nov	Irrigation	Tehama	DEER CREEK
	DEER CREEK IRRIGATION DISTRICT Total	20,400.00						
S010988	DOUGLAS H BOSCO	159.17	Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Shasta	NORTH FORK BATTLE CREEK
S010989	DOUGLAS H BOSCO	848.93	Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Shasta	NORTH FORK BATTLE CREEK
S010990	DOUGLAS H BOSCO	159.17	Pre-14	1900	Apr-Oct	Irrigation, Stockwater	Shasta	NORTH FORK BATTLE CREEK
	DOUGLAS H BOSCO Total	1,167.27						
S000736	E J LOUIE & SONS	1,545.60	Pre-14	1872	Apr-Oct	Irrigation	Siskiyou	BUTTE CREEK
S000739	E J LOUIE & SONS	1,932.00	Pre-14	1872	Apr-Oct	Irrigation	Siskiyou	BUTTE CREEK
S000740	E J LOUIE & SONS	1,200.00	Pre-14	1872	Apr-Oct	Irrigation	Siskiyou	BUTTE CREEK
S000748	E J LOUIE & SONS	386.40	Pre-14	1872	Apr-Oct	Irrigation	Siskiyou	BUTTE CREEK
	E J LOUIE & SONS Total	5,064.00						
S009605	MAURICE JOHANNESSEN	2,759.01	Pre-14	1880	Apr-Oct	Irrigation, Stockwater	Shasta	DEER CREEK
	MAURICE JOHANNESSEN Total	2,759.01						
S008459	Paradise Irrigation District	9,251.00	Pre-14	1916	All	Domestic	Butte	LITTLE BUTTE CREEK
	Paradise Irrigation District Total	9,251.00						
S000729	STANFORD VINA RANCH IRRIGATION CO	9,676.50	Riparian/Pre-14	1900	May-Oct	Irrigation, Stockwater	Tehama	DEER CREEK
S000730	STANFORD VINA RANCH IRRIGATION CO	9,676.50	Riparian/Pre-14	1900	May-Oct	Irrigation, Stockwater	Tehama	DEER CREEK
	STANFORD VINA RANCH IRRIGATION CO Total	19,353.00						
S000732	U S BUREAU OF LAND MANAGEMENT	11,615.21	Pre-14	1870	Apr-Nov	Irrigation, Stockwater, Habitat	Tehama	BATTLE CREEK
	U S BUREAU OF LAND MANAGEMENT Total	11,615.21						

No comments

- n/a -

East Creeks Water Rights - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S009976	WESTERN CANAL WATER DISTRICT	5,045.00	Pre-14	1916	Apr-Jun	Irrigation	Butte	BUTTE CREEK
	WESTERN CANAL WATER DISTRICT Total	5,045.00						
	Grand Total	128,367.21						

No comments

- n/a -

West Creeks (Cache and Stony) - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S015943	PAYNE FARMS - WA PAYNE	1,800.00	Riparian	1990	May-Aug	Irrigation	Yolo	CACHE CREEK
	PAYNE FARMS - WA PAYNE	1,800.00						
S000608	YOLO COUNTY F C & W C DISTRICT	21,006.00	Riparian/Pre-14	1856	Mar-Dec	Irrigation, Domestic, Hydropower	Yolo	CACHE CREEK
S000609	YOLO COUNTY F C & W C DISTRICT	237,206.00	Riparian/Pre-14	1859	Mar-Dec	Irrigation, Domestic, Hydropower	Yolo	CACHE CREEK
S001063	YOLO COUNTY F C & W C DISTRICT	4,775.00	Riparian/Pre-14	1859	Apr-Oct	Irrigation, Domestic, Hydropower	Yolo	CACHE CREEK
S014986	YOLO COUNTY F C & W C DISTRICT	339,976.00	Riparian/Pre-14	1914	All	Irrigation, Municipal, Industrial, Recreation, Hydropower	Lake	CACHE CREEK
	YOLO COUNTY F C & W C	602,963.00						
S006354	U.S. BUREAU OF RECLAMATION	114,300.00	Fed Adjudication	1910	Jan-Nov	Irrigation	Colusa	LITTLE STONY CREEK
S006353	U.S. BUREAU OF RECLAMATION	56,000.00	Fed Adjudication	1910	Oct-Mar	Irrigation	Colusa	STONY CREEK
	U.S. BUREAU OF RECLAMATION	170,300.00						
	Grand Total	775,063.00						

No comments

- n/a -

Sacramento River - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S012208	ANDERSON-COTTONWOOD IRRIGATION DISTRICT	162,788.00	Pre-14	1917	Apr-Oct	Irrigation, Stockwater	Shasta	SACRAMENTO RIVER
	ANDERSON-COTTONWOOD IRRIGATION DISTRICT Total	162,788.00						
S013880	CARTER MUTUAL WATER COMPANY	3,829.00	Riparian	1924	May-Feb	Irrigation, Stockwater, Domestic	Colusa	SACRAMENTO RIVER
	CARTER MUTUAL WATER COMPANY Total	3,829.00						
S005221	CHARLES W TUTTLE JR	1,550.00	Riparian	1968	Feb-Sep	Irrigation	Colusa	SACRAMENTO RIVER
S005222	CHARLES W TUTTLE JR	6,050.00	Riparian/Pre-14	1912	Mar-Jan	Irrigation	Colusa	SACRAMENTO RIVER
	CHARLES W TUTTLE JR Total	7,600.00						
S014834	CITY OF SACRAMENTO	74,036.91	Pre-14	1849	All	Municipal	Sacramento	SACRAMENTO RIVER
	CITY OF SACRAMENTO Total	74,036.91						
S017223	Dead Horse LP	348.80	Riparian/Pre-14	1800s	All	Irrigation	Yolo	SACRAMENTO RIVER
S017224	Dead Horse LP	174.40	Riparian/Pre-14	1800s	All	Irrigation	Yolo	SACRAMENTO RIVER
	Dead Horse LP Total	523.20						
S016908	Deadhorse LP	174.40	Riparian/Pre-14	1800s	All	Irrigation	Yolo	SACRAMENTO RIVER
S018494	Deadhorse LP	348.80	Riparian/Pre-14	1800s	All	Irrigation	Yolo	Sacramento River
	Deadhorse LP Total	523.20						
S020061	Edward McDowell	440.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	Sacramento River
S020612	Edward McDowell	605.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S020616	Edward McDowell	605.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
	Edward McDowell Total	1,650.00						
S017096	Elliot Delta Orchards, LLC	376.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S018886	Elliot Delta Orchards, LLC	444.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	Sacramento River
	Elliot Delta Orchards, LLC Total	820.00						
S017093	Elliot Family Co., LLC	200.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S017383	Elliot Family Co., LLC	352.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S019707	Elliot Family Co., LLC	300.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
	Elliot Family Co., LLC Total	852.00						
S016915	Elliot Family Revocable Trust	821.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S018859	Elliot Family Revocable Trust	394.00	Riparian/Pre-14	1800s	Apr-Oct	Irrigation	Sacramento	Sacramento River
	Elliot Family Revocable Trust Total	1,215.00						
S018613	Farmland Reserve, Inc.	1,800.00	Riparian	1950s	Apr-Oct	Irrigation	Butte	SACRAMENTO RIVER
	Farmland Reserve, Inc. Total	1,800.00						
S018603	Faye Properties, Inc.	3,200.00	Riparian	1800s	Mar-Sep	Irrigation	Yolo	SACRAMENTO RIVER
	Faye Properties, Inc. Total	3,200.00						
S007367	GLENN-COLUSA IRRIGATION DISTRICT	925,200.00	Pre-14	1906	All	Irrigation	Glenn	SACRAMENTO RIVER

No comments

- n/a -

No comments

- n/a -

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
	GLENN-COLUSA IRRIGATION DISTRICT Total	925,200.00						
S018956	Greene & Hemly - Merritt Island Ranch- Greene & Hemly, Inc	137.05	Riparian/Pre-14	1850	Mar-Oct	Irrigation	Yolo	SACRAMENTO RIVER
S018959	Greene & Hemly - Merritt Island Ranch- Greene & Hemly, Inc	589.32	Riparian/Pre-14	1850	Mar-Oct	Irrigation	Yolo	SACRAMENTO RIVER
S020804	Greene & Hemly - Merritt Island Ranch- Greene & Hemly, Inc	370.04	Riparian/Pre-14	1850	Mar-Oct	Irrigation	Yolo	Sacramento River
	Greene & Hemly - Merritt Island Ranch- Greene & Hemly, Inc Total	1,096.41						
S017190	Greene & Hemly - Randall Ranch Greene & Hemly Inc.	354.05	Riparian/Pre-14	1850	Mar-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S017191	Greene & Hemly - Randall Ranch Greene & Hemly Inc.	5.00	Riparian/Pre-14	1850	Mar-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
	Greene & Hemly - Randall Ranch Greene & Hemly Inc. Total	359.05						
S017193	Greene & Hemly - Wheeler Ranch Greene and Hemly, Inc	753.79	Riparian/Pre-14	1850	Mar-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
	Greene & Hemly - Wheeler Ranch Greene and Hemly, Inc Total	753.79						
S013264	HAROLD ARMSTRONG	2,200.00	Riparian	1895	Feb-Oct	Irrigation	Colusa	SACRAMENTO RIVER
	HAROLD ARMSTRONG Total	2,200.00						
S013717	JOSEPH BORGES RANCHES	1,400.00	Riparian	1922	Apr-Sep	Irrigation	Sacramento	SACRAMENTO RIVER
	JOSEPH BORGES RANCHES Total	1,400.00						
S017264	Joseph T Sanchez	700.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S019830	Joseph T Sanchez	600.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
	Joseph T Sanchez Total	1,300.00						
S010294	LAUTRUP IIIVESTMENT PARTNERSHIP	1,000.00	Riparian	1965	Apr-Oct	Irrigation	Yolo	SACRAMENTO RIVER
	LAUTRUP INVESTMENT PARTNERSHIP Total	1,000.00						
S019846	Leary - Dennis Leary Trust 11/19/1990	0.00	Riparian	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
	Leary - Dennis Leary Trust 11/19/1990 Total	0.00						
S018049	Leary - M G	349.00	Riparian/Pre-14	1800s	Apr-Nov	Irrigation	Sacramento	SACRAMENTO RIVER
	Leary - M G Total	349.00						
S018046	Leary (Dennis)	582.80	Riparian/Pre-14	1800s	Apr-Nov	Irrigation	Sacramento	SACRAMENTO RIVER
	Leary (Dennis) Total	582.80						
S019868	Leary etal	600.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
	Leary etal Total	600.00						
S018146	MARY CRANE	1,055.66	Riparian	1907	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
	MARY CRANE Total	1,055.66						
S018012	MCCORMACK WILLIAMSON COMPANY	4,000.00	Riparian	1930	Apr-Sep	Irrigation	Sacramento	Sacramento River
S018018	MCCORMACK WILLIAMSON COMPANY	2,000.00	Riparian	1930	Apr-Sep	Irrigation	Sacramento	Sacramento River
S018021	MCCORMACK WILLIAMSON COMPANY	1,000.00	Riparian	1930	May-Aug	Irrigation	Sacramento	Sacramento River
	MCCORMACK WILLIAMSON COMPANY Total	7,000.00						
S018614	MYERS LAND COMPANY LLP	938.00	Riparian	1903	Apr-Sep	Irrigation	Yolo	SACRAMENTO RIVER
S018617	MYERS LAND COMPANY LLP	131.00	Riparian	1950	Apr-Sep	Irrigation	Yolo	SACRAMENTO RIVER
	MYERS LAND COMPANY LLP Total	1,069.00						
S002064	PACIFIC FRUIT FARMS	356.80	Riparian	1929	All	Irrigation	Sacramento	SACRAMENTO RIVER
S002065	PACIFIC FRUIT FARMS	356.80	Riparian	1929	All	Irrigation	Sacramento	SACRAMENTO RIVER
S002066	PACIFIC FRUIT FARMS	356.80	Riparian	1929	All	Irrigation	Sacramento	SACRAMENTO RIVER
S008159	PACIFIC FRUIT FARMS	356.80	Riparian	1929	All	Irrigation	Sacramento	SACRAMENTO RIVER
S019372	PACIFIC FRUIT FARMS	436.00	Riparian	1929	All	Irrigation	Sacramento	SACRAMENTO RIVER

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S019375	PACIFIC FRUIT FARMS	85.02	Riparian	1929	All	Irrigation	Sacramento	SACRAMENTO RIVER
S019464	PACIFIC FRUIT FARMS	85.02	Riparian	1929	All	Irrigation	Sacramento	Sacramento River
	PACIFIC FRUIT FARMS Total	2,033.24						
S009896	PARROTT INVESTMENT COMPANY	8,805.67	Riparian	1971	Apr-Oct	Irrigation	Butte	SACRAMENTO RIVER
S009897	PARROTT INVESTMENT COMPANY	8,805.67	Riparian	1918	Apr-Oct	Irrigation	Butte	SACRAMENTO RIVER
S009898	PARROTT INVESTMENT COMPANY	8,805.67	Riparian	1979	Apr-Oct	Irrigation	Butte	SACRAMENTO RIVER
	PARROTT INVESTMENT COMPANY Total	26,417.00						
S001905	Pylman - A & M PYLMAN FARMS	945.71	Riparian	1915	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S001908	Pylman - A & M PYLMAN FARMS	1,418.56	Riparian	1915	Mar-Sep	Irrigation	Sacramento	SACRAMENTO RIVER
S001909	Pylman - A & M PYLMAN FARMS	945.71	Riparian	1915	Mar-Sep	Irrigation	Sacramento	SACRAMENTO RIVER
	Pylman - A & M PYLMAN FARMS Total	3,309.98						
S001237	PYLMAN VINEYARDS INC	338.07	Riparian/Pre-14	1910	Apr-Oct	Irrigation	Yolo	SACRAMENTO RIVER
S001867	PYLMAN VINEYARDS INC	338.07	Riparian/Pre-14	1910	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S020149	PYLMAN VINEYARDS INC	960.00	Riparian/Pre-14	1910	Apr-Oct	Irrigation	Yolo	Sacramento River
S020153	PYLMAN VINEYARDS INC	610.00	Riparian/Pre-14	1910	Apr-Oct	Irrigation	Yolo	Sacramento River
S020157	PYLMAN VINEYARDS INC	1,000.00	Riparian/Pre-14	1910	Apr-Oct	Irrigation	Yolo	Sacramento River
	PYLMAN VINEYARDS INC Total	3,246.14						
S020641	RECLAMATION DISTRICT #108	40,185.00	Riparian	1800s	Apr-Dec	Irrigation	Colusa	SACRAMENTO RIVER
S020645	RECLAMATION DISTRICT #108	118,058.00	Riparian	1800s	Apr-Dec	Irrigation	Colusa	SACRAMENTO RIVER
S020649	RECLAMATION DISTRICT #108	487.00	Riparian	1800s	Apr-Oct	Irrigation	Colusa	SACRAMENTO RIVER
S020653	RECLAMATION DISTRICT #108	169.00	Riparian	1800s	Apr-Oct	Irrigation	Colusa	SACRAMENTO RIVER
S020657	RECLAMATION DISTRICT #108	2,885.00	Riparian	1800s	May-Sep	Irrigation	Colusa	SACRAMENTO RIVER
S020661	RECLAMATION DISTRICT #108	10,414.00	Riparian	1800s	Apr-Jul	Irrigation	Yolo	SACRAMENTO RIVER
	RECLAMATION DISTRICT #108 Total	172,198.00						
S018031	RIVER GARDEN FARMS COMPANY	356.00	Riparian	1950	Mar-Sep	Irrigation	Yolo	SACRAMENTO RIVER
	RIVER GARDEN FARMS COMPANY Total	356.00						
S017210	Rivermaid Land Company	230.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S017213	Rivermaid Land Company	330.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S017222	Rivermaid Land Company	260.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S017225	Rivermaid Land Company	170.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S017226	Rivermaid Land Company	234.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S017228	Rivermaid Land Company	1,200.00	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER

No comments

- n/a -

Sacramento River - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S019320	Rivermaid Land Company	191.84	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S019360	Rivermaid Land Company	174.40	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S019377	Rivermaid Land Company	174.90	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	SACRAMENTO RIVER
S019606	Rivermaid Land Company	261.60	Riparian/Pre-14	1800s	All	Irrigation	Sacramento	Sacramento River
	Rivermaid Land Company Total	3,326.74						
S009950	ROY MORRESCO JR	1,654.00	Riparian	1920	Apr-Jan	Irrigation	Sutter	SACRAMENTO RIVER
	ROY MORRESCO JR Total	1,654.00						
S020145	SACRAMENTO RIVER RANCH II LLC	3,834.40	Riparian	NA	NA	Irrigation	Yolo	Sacramento River
	SACRAMENTO RIVER RANCH II LLC Total	3,834.40						
S016992	Spinella (Art, Janelle)	269.20	Pre-14	1908	Apr-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
	Spinella (Art, Janelle) Total	269.20						
S016993	Spinella (Frankie)	2,642.30	Pre-14	1910	Apr-Oct	Irrigation	Yolo	SACRAMENTO RIVER
S017329	Spinella (Frankie)	350.00	Pre-14	1910	Apr-Oct	Irrigation	Yolo	SACRAMENTO RIVER
	Spinella (Frankie) Total	2,992.30						
S012858	THE ARCHES LTD	1,320.00	Riparian/Pre-14	1800s	May-Aug	Irrigation	Sacramento	SACRAMENTO RIVER
S012860	THE ARCHES LTD	1,000.00	Riparian/Pre-14	1800s	May-Aug	Irrigation	Sacramento	SACRAMENTO RIVER
	THE ARCHES LTD Total	2,320.00						
S019793	TOWNE ENTERPRISES	942.00	Riparian	1996	Jan-Oct	Irrigation	Sacramento	SACRAMENTO RIVER
S019796	TOWNE ENTERPRISES	2,024.00	Riparian	1914	Jan-Sep	Irrigation	Sacramento	SACRAMENTO RIVER
S019799	TOWNE ENTERPRISES	0.00	Riparian	1914	All	Irrigation	Sacramento	SACRAMENTO RIVER
S019802	TOWNE ENTERPRISES	0.00	Riparian	1997	All	Irrigation	Sacramento	SACRAMENTO RIVER
S019808	TOWNE ENTERPRISES	5,942.00	Riparian	1914	Apr-Sep	Irrigation	Sacramento	SACRAMENTO RIVER
	TOWNE ENTERPRISES Total	8,908.00						
	Grand Total	**1,433,668.02**						

No comments

- n/a -

Stanislaus River Watershed - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S014003	R J Gallo	6,000.00	Riparian	1940	All	Irrigation	Stanislaus	STANISLAUS RIVER
S009333	US Fish & Wildlife Service	2,040.00	Riparian	1950	All	Irrigation	Stanislaus	STANISLAUS RIVER
S004683	OAKDALE IRRIGATION DISTRICT	485,040.00	Pre-14	1913	All	Irrigation, Domestic	Calaveras	STANISLAUS RIVER
S010402	TUOLUMNE UTILITIES DISTRICT	3,668.00	Pre-14	1852	All	Irrigation, Domestic	Tuolumne	MORMON CREEK
S013888	JOSEPH J FRAGUERO	2,850.00	Pre-14	1884	All	Irrigation, Stockwater	Calaveras	ANGELS CREEK
		499,598.00						

No comments

- n/a -

Tuolumne River Watershed - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S002635	CITY AND COUNTY OF SAN FRANCISCO PUC AGM WATER ENTERPRISE	581,280.00	Pre-14	1922	All	Municipal/ Industrial, Hydropower, Fish & Wildlife, Recreation	Tuolumne	TUOLUMNE RIVER
S002637	CITY AND COUNTY OF SAN FRANCISCO PUC AGM WATER ENTERPRISE	541,652.00	Pre-14	1925	All	Municipal/ Industrial, Hydropower, Fish & Wildlife, Recreation	Tuolumne	TUOLUMNE RIVER
S014379	CITY AND COUNTY OF SAN FRANCISCO PUC AGM WATER ENTERPRISE	258,778.00	Pre-14	1918	All	Municipal/ Industrial, Hydropower, Fish & Wildlife, Recreation	Tuolumne	CHERRY CREEK
	CITY AND COUNTY OF SAN FRANCISCO	1,381,710.00						
S014004	Gallo Vineyards Inc	268.22	Riparian	1960	Apr-Oct	Irrigation	Stanislaus	TUOLUMNE RIVER
	Gallo Vineyards Inc Total	268.22						
S011103	James E Coleman	1,520.00	Riparian	1917	Apr-Oct	Irrigation	Stanislaus	TUOLUMNE RIVER
	James E Coleman Total	1,520.00						
S009161	Joseph E Gallo	329.51	Riparian	1978	Mar-Oct	Irrigation	Stanislaus	TUOLUMNE RIVER
S011191	Joseph E Gallo	66.42	Riparian	1976	Mar-Oct	Irrigation	Stanislaus	TUOLUMNE RIVER
	Joseph E Gallo Total	395.93						
S000996	TUOLUMNE UTILITIES DISTRICT	10,167.00	Pre-14	1851	All	Irrigation, Stockwater, Domestic	Tuolumne	SULLIVAN CREEK
S000997	TUOLUMNE UTILITIES DISTRICT	4,815.00	Pre-14	1852	All	Irrigation, Stockwater, Domestic	Tuolumne	SULLIVAN CREEK
S001006	TUOLUMNE UTILITIES DISTRICT	3,808.00	Pre-14	1852	All	Irrigation, Stockwater, Domestic	Tuolumne	UNST (AKA POWER CREEK)
S001007	TUOLUMNE UTILITIES DISTRICT	893.00	Pre-14	1852	All	Irrigation, Stockwater, Domestic	Tuolumne	CURTIS CREEK
S010403	TUOLUMNE UTILITIES DISTRICT	730.00	Pre-14	1852	All	Irrigation, Stockwater, Domestic	Tuolumne	CURTIS CREEK
	TUOLUMNE UTILITIES DISTRICT Total	20,413.00						
S013848	TURLOCK IRRIGATION DISTRICT	1,196,100.00	Pre-14	1900	All	Irrigation, Domestic	Stanislaus	TUOLUMNE RIVER
	TURLOCK IRRIGATION DISTRICT Total	1,196,100.00						
	Grand Total	2,600,407.15						

No comments

- n/a -

Merced River Watershed - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S007654	Gallo Vineyards Inc	360.00	Riparian	1910	Mar-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007655	Gallo Vineyards Inc	170.00	Riparian	1910	Apr-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007656	Gallo Vineyards Inc	1,275.00	Riparian	1910	Mar-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007657	Gallo Vineyards Inc	150.00	Riparian	1910	Mar-Dec	Irrigation, Frost Protection	Merced	MERCED RIVER
S007658	Gallo Vineyards Inc	135.00	Riparian	1910	Mar-Dec	Irrigation, Frost Protection	Merced	MERCED RIVER
S007661	Gallo Vineyards Inc	175.00	Riparian	1910	Mar-Dec	Irrigation, Frost Protection	Merced	MERCED RIVER
S007662	Gallo Vineyards Inc	155.00	Riparian	1910	Mar-Dec	Irrigation, Frost Protection	Merced	MERCED RIVER
S007663	Gallo Vineyards Inc	150.00	Riparian	1910	Mar-Dec	Irrigation, Frost Protection	Merced	MERCED RIVER
S007664	Gallo Vineyards Inc	230.00	Riparian	1910	Apr-Dec	Irrigation, Frost Protection	Merced	MERCED RIVER
S007665	Gallo Vineyards Inc	1,028.00	Riparian	1910	All	Irrigation, Frost Protection, Industrial	Merced	MERCED RIVER
S007666	Gallo Vineyards Inc	115.00	Riparian	1910	All	Irrigation, Frost Protection	Merced	MERCED RIVER
S007667	Gallo Vineyards Inc	180.00	Riparian	1910	Apr-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007668	Gallo Vineyards Inc	300.00	Riparian	1910	Apr-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007669	Gallo Vineyards Inc	200.00	Riparian	1910	Apr-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007670	Gallo Vineyards Inc	270.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007671	Gallo Vineyards Inc	210.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007672	Gallo Vineyards Inc	375.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007673	Gallo Vineyards Inc	210.00	Riparian/Pre-14	1900	Apr-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007710	Gallo Vineyards Inc	375.00	Riparian/Pre-14	1900	Mar-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007711	Gallo Vineyards Inc	5,500.00	Riparian/Pre-14	1900	Mar-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007712	Gallo Vineyards Inc	2,240.00	Riparian/Pre-14	1900	Mar-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
S007713	Gallo Vineyards Inc	1,050.00	Riparian/Pre-14	1900	Mar-Oct	Irrigation, Frost Protection	Merced	MERCED RIVER
	Gallo Vineyards Inc Total	14,853.00						
S007674	Henry Te Velde	1,205.00	Riparian	1900	Mar-Sep	Irrigation	Merced	MERCED RIVER
	Henry Te Velde Total	1,205.00						
S001496	Kelsey Ranch LP	5,496.00	Pre-14	1858	Apr-Oct	Irrigation, Stockwater, Domestic, Recreation	Merced	MERCED RIVER
S002055	Kelsey Ranch LP	2,649.00	Riparian/Pre-14	1858	All	Irrigation, Domestic	Merced	MERCED RIVER
	Kelsey Ranch LP Total	8,145.00						
S012547	MADERA IRRIGATION DISTRICT	21,457.00	Pre-14	1875	All	Irrigation	Madera	BIG CREEK
	MADERA IRRIGATION DISTRICT Total	21,457.00						
S004718	MERCED IRRIGATION DISTRICT	571,000.00	Pre-14	1911	All	Irrigation	Merced	MERCED RIVER
S004719	MERCED IRRIGATION DISTRICT	3,336.00	Riparian/Pre-14	1888	Apr-Oct	Irrigation	Merced	MERCED RIVER
	MERCED IRRIGATION DISTRICT Total	574,336.00						
	Grand Total	619,996.00						

No comments

- n/a -

San Joaquin River Watershed - Statements of Diversion and Use

Application ID	Holder Name	Highest Amount Claimed	Water Rights Claim Type	Year of First Use	Season	Purpose of Use	County	Source
S005469	ARNOLD SOUZA & SONS	1,242.00	Riparian	1963	Apr-Sep	Irrigation	Stanislaus	SAN JOAQUIN RIVER
	ARNOLD SOUZA & SONS Total	1,242.00						
S001073	COLUMBIA CANAL COMPANY	62,879.00	Pre-14	1872	Feb-Dec	Irrigation	Madera	SAN JOAQUIN RIVER
	COLUMBIA CANAL COMPANY Total	62,879.00						
S005005	COSTA VIEW FARMS #2, A CA GEN PARTNERSHIP	19,000.00	Riparian/Pre-14	1903	All	Irrigation, Stockwater	Madera	FRESNO RIVER
	COSTA VIEW FARMS #2, A CA GEN	19,000.00						
S010411	LONE TREE MUTUAL WATER COMPANY	18,376.00	Riparian	1955	All	Irrigation	Merced	SAN JOAQUIN RIVER
	LONE TREE MUTUAL WATER COMPANY Total	18,376.00						
S004978	MADERA IRRIGATION DISTRICT	51,741.00	Pre-14	1873	All	Irrigation	Madera	FRESNO RIVER
S014187	MADERA IRRIGATION DISTRICT	18,148.00	Pre-14	1873	Oct-Jul	Irrigation	Madera	NORTH FORK WILLOW CREEK
	MADERA IRRIGATION DISTRICT Total	69,889.00						
S001915	Mark D McKean	945.00	Riparian/Pre-14	1908	Apr-Oct	Irrigation	Fresno	FRESNO SLOUGH
S001916	Mark D McKean	770.00	Riparian	1908	Mar-Sep	Irrigation	Fresno	FRESNO SLOUGH
S001917	Mark D McKean	860.00	Riparian/Pre-14	1908	Feb-Oct	Irrigation	Fresno	FRESNO SLOUGH
	Mark D McKean Total	2,575.00						
S006296	MENEFEE RIVER RANCH COMPANY	2,105.00	Riparian	1952	Mar-Oct	Irrigation	Merced	FRESNO RIVER
	MENEFEE RIVER RANCH COMPANY Total	2,105.00						
S009320	PATTERSON IRRIGATION DISTRICT	60,200.00	Pre-14	1910	Mar-Sep	Irrigation	Stanislaus	SAN JOAQUIN RIVER
	PATTERSON IRRIGATION DISTRICT Total	60,200.00						
S015523	POINT MILLERTON RANCH LLC	2,100.00	Riparian/Pre-14	2002	All	Irrigation, Stockwater	Madera	FINE GOLD CREEK
	POINT MILLERTON RANCH LLC Total	2,100.00						
S014001	R J GALLO	5,304.00	Riparian	1950	All	Irrigation	Stanislaus	SAN JOAQUIN RIVER
S014002	R J GALLO	813.00	Riparian	1950	All	Irrigation, Stockwater	Stanislaus	SAN JOAQUIN RIVER
	R J GALLO Total	6,117.00						
S001116	ROBERT F FLYNN	4,200.00	Riparian	1926	All	Irrigation, Stockwater	Merced	DUCK SLOUGH
	ROBERT F FLYNN Total	4,200.00						
S009575	U S FISH & WILDLIFE SERVICE	12,976.00	Pre-14	1900	All	Irrigation, Wildlife Management	Merced	DEADMAN CREEK
	U S FISH & WILDLIFE SERVICE Total	12,976.00						
	Grand Total	261,659.00						

No comments

- n/a -

No comments

- n/a -

Appendix D

Section D.5
Other Pre-1914 Consumptive Water Rights Claims

1) South Feather Water & Power Agency (Formerly Oroville-Wyandotte Irrigation District) Claims:

Notice Date	Priority Date	Miners' Inches	Cubic Feet Per Second	Acre-feet	Source
	9/25/1852		All water		South Fork Feather River
	4/19/1854		All water		South Fork Feather River
	11/29/1854		All water		South Fork Feather River
	6/21/1862	240	5	3,477	South Fork Feather River
	8/15/1889	3,000	60	43,468	South Fork Feather River at LG Valley
	11/23/1908	5,000	100	72,446	Lost Creek
	11/23/1908	1,000	20	14,489	Lost Creek
	9/10/1910	10,000	200	144,893	South Fork Feather River at LG Valley
	9/10/1910	10,000	200	144,893	South Fork Feather River at LG Valley
	9/10/1910	10,000	200	144,893	South Fork Feather River at LG Valley
	9/29/1910	10,000	200	144,893	South Fork Feather River at LG Valley
	9/29/1910	10,000	200	144,893	South Fork Feather River at LG Valley
	4/22/1911	100	2	1,449	McCabe Creek
	4/22/1911	5,000	100	72,446	South Fork Feather River
	10/22/1914	7,500	150	108,669	Near Rock Creek, South Fork Feather River
	10/26/1914	5,000	100	72,446	Lower South Fork Feather River
			Total Face Value	**533,784**	(Less redundant claims in 1910 on South Fork Feather in LG Valley)

2) Western Canal Water District

County/Decree	Priority Date		Cubic Feet Per Second	Acre-feet	Source
Sutter/No. 2360	12/15/1924			150,000	Year-round Feather River
				145,000	Below Centerville PowerHouse
			Total Face Value	**295,000**	

3) Joint Water Districts of Feather River

	Priority Date	Miners' Inches	Cubic Feet Per Second	Acre-feet	Source
	7/29/1902	100,000	2,000	1,448,926	Feather River
	5/12/1903	100,000	2,000	1,448,926	Feather River
	3/29/1904	100,000	2,000	1,448,926	Feather River
	3/3/1909		500	362,231	Feather River
			Total Face Value	**1,811,157**	(less redundant claims on Feather River)

Sutter Decree No. 2360, 12/15/1924	Miners' Inches	Cubic Feet Per Second	Acre-feet	Source
Sutter Butte Canal Company first right		1,200	869,355	Feather River
Great Western Power Company (later PG&E) second right		300	217,339	Feather River
Above 1500 cfs, SBCC's second right is 2/3 of flow between 1500 and 2700 cfs (1200 cfs difference)		800	579,570	Feather River
Above 1500 cfs, Great Western's second right is 1/3 of flow between 1500 and 2700 cfs		400	289,785	Feather River
Above 2700 cfs, Great Western and Western Canal Company receive the next 500 cfs		500	362,231	Feather River
Above 3200 cfs, SBCC has right to divert the next 500 cfs, including all accretions, whatever the source.		500	362,231	Feather River
		SBCC Total Face Value	**1,811,157**	
		Western Canal Company's total claims =	**869,355**	

Water Right Shares of Sutter Butte Canal Company's Decreed Water Rights allocated to Joint Water Districts

Biggs-West Gridley Water District	29.0%	525,236
Butte Water District	24.0%	434,678
Richvale Irrigation District	27.0%	489,012
Sutter Extension Water District	20.0%	362,231

Sources: South Feather Water Power Agency;
Western Canal Water District;
Joint Water Districts.

No comments

- n/a -

Yuba River Pre-1914 Consumptive Water Rights

1) Browns Valley Irrigation District

Priority Date	Miners' Inches	Cubic Feet Per Second	Acre-feet	Source
3/21/1890	10,000	200	**144,893**	North Yuba River

2) Yuba County Water Agency

Priority Date	Miners' Inches	Cubic Feet Per Second	Acre-feet	Source
1890		50	36,223	Colgate Head Dam, year-round - North Yuba River and its tributaries
		200	144,893	Hydropower only - Colgate Head Dam on North Yuba River
		60	43,468	Hydropower only - Colgate Head Dam on North Yuba River
		Total Face Value, Consumptive Rights	**36,223**	

Sources: Browns Valley Irrigation District; Yuba County Water Agency; C-WIN.

No comments

- n/a -

Sacramento River Pre-1914 Consumptive Water Rights

1) Right Bank of Sacramento River at Wheel Ditch in Redding:
Shasta County Water Rights Book 2, p. 391, notice dated 11/21/1914
Deeded by McCoy Fitzgerald to Anderson-Cottonwood Irrigation Disrict, 12/30/1914

Notice Date	Priority Date	Miners' Inches	Cubic Feet Per Second	Acre-feet	Source
11/21/1914	11/21/1914	20,000	400	289,785	Wheel Ditch - Sacramento River

2) Glenn-Colusa Irrigation District

Notice Date	Priority Date	Miners' Inches	Cubic Feet Per Second	Acre-feet	Source
4/16/1903	4/15/1903	500,000	10,000	7,244,628	Sacramento River
2/26/1903	2/25/1903	150,000	3,000	2,173,388	Sacramento River
2/26/1903	2/25/1903	150,000	3,000	2,173,388	Sacramento River
12/7/1901	11/30/1901		5,000	3,622,314	Sacramento River
12/7/1901	11/30/1901		5,000	3,622,314	Sacramento River
12/21/1883	12/18/1883		5,000	3,622,314	Sacramento River
11/19/1903	11/13/1903		5,000	3,622,314	Sacramento River
				26,080,661	**Sacramento River Total**
8/1/1907	8/1/1907		5,000	3,622,314	Stony Creek
			5,000	3,622,314	Stony Creek
5/4/1905	4/26/1905		5,000	3,622,314	Stony Creek
				10,866,942	**Stony Creek Total**
11/23/1904	11/21/1904		2,000	1,448,926	Willow Creek
				1,448,926	**Willow Creek Total**
				38,396,529	**Grand Total**

3) City of Sacramento
Source: State Water Board Notice of Petitions for Extensions of Time to Complete Construction Under Permits 11358, 11359, 11360, and 11361, November 3, 1988

Notice Date	Priority Date	Miners' Inches	Cubic Feet Per Second	Acre-feet	Source
	1854		75	54,335	Sacramento River

Sources: Anderson-Cottonwood Irrigation District;
Glenn-Colusa Irrigation District;
City of Sacramento;
State Water Resources Control Board.

No comments

- n/a -

Turlock and Modesto Irrigation Districts' Pre-1914 Consumptive Water Rights

Holder Name	Date	Point of Diversion	Facility Name	Comment	Diversion	Diversion Units	Storage	Storage Units	Irrigation Season Face Amount, AF (246 days)
Turlock and Modesto Irrigation Districts and La Grange	5/18/1871	La Grange Dam	La Grange Dam	Acquired from F. Green and A.D. Allen	66	cubic feet per second			66 cfs max
Modesto Irrigation District	2/27/1913	La Grange Dam	La Grange Dam	Acquired from J.M. Finley	13,000	miner's inches			Not to exceed 250 cfs, among these first three water rights claims for a total of: 121,983.47
Modesto Irrigation District	11/13/1913	La Grange Dam	La Grange Dam	Acquired from Waterford Irrigation District	16,000	miner's inches			
Turlock and Modesto Irrigation Districts	1/16/1855	La Grange Dam	La Grange Dam	Acquired from Franklin Water Company					The sum of these water rights may not exceed 4,500 cfs diversion; Franklin Water Co and Elam Dye have no diversion amounts; all rights associated with this limit are converted to acre-feet:
Turlock and Modesto Irrigation Districts	1/18/1862	La Grange Dam	La Grange Dam	Acquired from Elam Dye					
Turlock and Modesto Irrigation Districts	5/18/1872	La Grange Dam	La Grange Dam	Acquired from John Burcham, M.A. Wheaton, and Charles Elliott	500,000	miner's inches			
Turlock Irrigation District	1/5/1889	La Grange Dam	La Grange Dam	Posted by TID	225,000	miner's inches			
Modesto Irrigation District	6/21/1890	La Grange Dam	La Grange Dam	Posted by MID	250,000	miner's inches			
Modesto Irrigation District	10/1/1908	La Grange Dam, Modesto Reservoir	La Grange Dam, Modesto Reservoir	Posted by MID	50,000	miner's inches	40,000	acre-feet	
Turlock Irrigation District	8/31/1911	La Grange Dam, Turlock Lake	La Grange Dam, Turlock Lake	Posted by TID	200,000	miner's inches	100,000	acre-feet	3,260,082.64
					Estimated Total Face Amount =				3,382,066.12

Source: Letter from Kenneth Petruzzelli, O'Laughlin and Paris LLP, attorneys for the Modesto Irrigation District, "Public Records Act Request for Pre-1914 Water Rights," dated January 14, 2011; California Water Impact Network. There are 50 miner's inches to 1 cubic foot per second.

No comments

- n/a -

Pre-1914 Appropriative Water Rights Claims of the City and County of San Francisco

Appropriation ID	Date	Point of Diversion	Facility Name	Face Amt (cfs)	Source
151(6)	7/22/1902	Stanislaus National Forest, Cherry Valley Reservoir Site, NE 1/4 Section 5, T1N R19E MDB&M	Cherry Valley Reservoir Site	1,000.00	Cherry Creek
151(4)	7/20/1902	Junction Eleanor & Cherry Creek, Section 16, T1N R19E MDB&M	Cherry Valley Reservoir Site	240.00	Eleanor & Cherry Creek
158	2/27/1911	Stanislaus National Forest, just north of S 1/4 corner of Setion 32, T2N R19E	Cherry Valley Reservoir Site	500.00	Cherry Creek
153(1)	10/24/1909	Stanislaus National Forest, just west of E 1/4 corner of Section 8, T2N R19E MDB&M	Cherry Valley Reservoir Site	1,000.00	Cherry Creek
151(21)	10/11/1909	Junction Eleanor & Cherry Creek, Section 16, T1N R19E MDB&M	Cherry Valley Reservoir Site	240.00	Eleanor & Cherry Creek
			Cherry Valley Reservoir Site Total	2,980.00	
160	2/18/1911	Yosemite National Park, NW 1/4 of Section 16, T1N R20E MDB&M	Hetch Hetchy Reservoir Site	500.00	Tuolumne River
155(2)	10/4/1908	Stanislaus National Forest near mouth of Jawbone Creek	Hetch Hetchy Reservoir Site	200.00	Tuolumne River
156(3)	9/29/1908	Yosemite National Park, NE 1/4 Section 17, T1N R20E MDB&M	Hetch Hetchy Reservoir Site	200.00	Tuolumne River
			Hetch Hetchy Reservoir Site Total	700.00	
154(6)	7/29/1901	Yosemite National Park, Lake Eleanor Reservoir Site (1/4 mile beow Lake Eleanor) SE 1/4 Section 34, T2N R19E MDB&M NW 1/4 within SE 1/4.	Lake Eleanor Reservoir Site	1,000.00	Eleanor Creek
155(1)	7/29/1901	Yosemite National Park NW 1/4 Section 3, T1N R19E MDB&M	Lake Eleanor Reservoir Site	100.00	Eleanor Creek
159	2/27/1911	Yosemite National Park, NW 1/4 Section 3, T1N R19E MDB&M	Lake Eleanor Reservoir Site	All the waters of Eleanor Creek	Eleanor Creek
154(14)	11/17/1909	Stanislaus National Park, West Bank NE 1/4 of NE 1/4Section 9 T1N R19E, MDB&M	Lake Eleanor Reservoir Site	100.00	Eleanor Creek
156(1)	10/1/1908	Yosemite National Park, NW 1/4 Section 3, T1N R19E	Lake Eleanor Reservoir Site	100.00	Eleanor Creek
			Lake Eleanor Reservoir Site Total	1,100.00	
163	2/28/1911	Stanislaus National Forest near mouth of Jawbone Creek	Tuolumne River at and Near Early Intake	500.00	Tuolumne River
161	2/21/1911	Stanislaus National Forest 1 1/4 miles upstream from Range Line between R18E and R19E	Tuolumne River at and Near Early Intake	500.00	Tuolumne River
162	2/20/1911	Stanislaus Forest near west line of new park boundary	Tuolumne River at and Near Early Intake	500.00	Tuolumne River
153(5)	10/15/1909	Stanislaus National Forest 1 1/4 miles upstream from Range Line between R18E and R19E	Tuolumne River at and Near Early Intake	1,000.00	Tuolumne River
151(22)	10/12/1909	Stanislaus National Forest, above junction with Cherry River	Tuolumne River at and Near Early Intake	240.00	Tuolumne River
156(2)	10/4/1908	Near mouth of Jawbone Creek	Tuolumne River at and Near Early Intake	300.00	Jawbone Creek Tuolumne River
			Tuolumne River at and Near Early Intake Total	3,040.00	
			Grand Total	7,820.00	
			Tuolumne River at and Near Early Intake Total in Acre-feet originally claimed	**2,202,366.94**	

Source: R.B. Hansen, *San Francisco's Water Rights on the Tuolumne River Watershed*, prepared under the direction of A.O. Olson, Manager and Chief Engineer, Hetch Hetchy Water Supply, Power and Utilities Engineering Bureau, City and County of San Francisco Public Utilities Commission, July 1951. Available from the UC Riverside Water Resources Collections and Archives, Call No. G4794 H1.

No comments

- n/a -

Merced River Riparian Pre-1914 Consumptive Water Rights

Water Right Type	Status	Holder Name	Date	Point of Diversion	Comment	Face Amount, AF
Appropriative	Pre-1914	Farmer's Canal Company	1876	Originally that of the Robla Ditch	2500 cfs, with no apparent seasonal limitations.	1,811,157
Appropriative	Pre-1914	Crocker-Huffman Land & Water Company	1883	Crocker-Huffman Dam	2500 cfs; this right was originally filed by C.H. Huffman personally, acquired by Huffman and Crocker's Merced Canal & Irrigation Company, later taken over by Crocker Huffman Land & Water Company in late 1880s. This water right was acquired by Merced Irrigation District in 1919 after the District was formed.	1,811,157
Riparian		Upton et al	1895	Various - along Merced River below Crocker-Huffman Dam	Maximum diversion of 225 cfs pursuant to the Upton Decree of 1895	163,004
Riparian		Dale & Cook Ranch owners	1876	Various individuals associated with ownership of the Dale and Cook Ranch	24 cfs amount to a total diversion of 1,900 AF during diversion season	1,900
Riparian		J.J. Stevinson	1930	Merced ID's boundary intersecting with McCoy Spillway, Arena Spillway, or Bear Creek	Diversion season is from April 1 through September 30 with varying flow rates each month therein, according to the Stevinson Decree. Merced ID agreed with Stevinson to exchange delivery of water from Lake McClure up to 24,000 acre-feet annually, in exchange for an easement for the District to incorporate Stevinson's riparian water into District operations at Lake McClure."The rights hereby conveyed by the Company to the District shall be an easement in all the right title, interest, estate, and claims of the Company in and to the lands...in which it has an interest, and as against any right which the Company may now have in and to the waters of said Merced River."	24,000
Riparian		Parties to the Cowell Agreement	1926	Crocker-Huffman Dam	Merced Irrigation District is required to provide releases from New Exchequer Dam to meet riparian right holders requirements.	93,793
					Pre-1914 and Riparian Water Rights, Merced River	**3,905,012**

No comments

- n/a -

San Joaquin River Riparian and Pre-1914 Consumptive Water Rights Claims

San Joaquin River Irrigation Uses	Estimated Face Amount	Point of Diversion	Other Description
USBR Purchase Rights from Miller & Lux Inc.	624,200	Friant Dam, rediverted at Madera and Friant-Kern Canals	Subject of a water rights purchase contract with US Bureau of Reclamation, and appraised at this quantity of water (Etcheverry, 1936; California Water Project Authority, 1936).Originally grassland and "uncontrolled" riparian flood flows. Grassland flows were pre-1914 appropriative rights of the Miller & Lux canal company; "uncontrolled" flows were riparian rights associated with lands adjacent to the San Joaquin River owned by Miller & Lux cattle business for grazing.
San Joaquin River Exchange Contractors Rights - exchange/easement on cropland water rights	840,000	USBR diverts these flows from the San Joaquin River into Madera and Friant-Kern Canals	Subject of a water rights exchange contract with US Bureau of Reclamation (Engle, Part Two, 1957). Originally "cropland" rights owned by Miller & Lux Inc. on which permanent and other crops were cultivated with highly reliable senior appropriative and riparian water rights. The Exchange Contractors having provided USBR with an easement for these rights receives in their place flows from Shasta Reservoir via Delta Mendota Canal.
Chowchilla Farms/Water District	49,300	Chowchilla Canal diversion from San Joaquin River upstream of Mendota Pool, east side of the river.	Subject of a water rights purchase contract with US Bureau of Reclamation for appropriative rights via Chowchilla Canal and under appropriative and riparian rights through the Blythe Canal, acquisition of which would be used in storage at Friant Dam and diversion into Madera Canal (California Water Project Authority, No. 6, 1937). The lands from which these rights were purchased lie between Fresno and Chowchilla rivers along the east bank of the San Joaquin River.
Lands Between Chowchilla Farms and Stevinson Colony	40,281	Between Chowchilla River and Merced River along east side of San Joaquin River.	Subject to water rights purchase contracts with US Bureau of Reclamation (including lands of Bloss, Hatfield, Crane, Turner, Erreca and Hansen) (California Water Project Authority, No. 7, 1937). Includes lands formerly owned by Miller & Lux, Inc., conveyed with reservations of easements in and to use of water and upstream storage rights reserved to Miller & Lux. Estimate of water rights shown are for uncontrolled flood and riparian rights as described in 1936, subordinate only to prior appropriative, prescriptive and contractual rights held by Miller & Lux and associated companies.
Stevinson/East Side Canal	20,168	Pre-1914 appropriative and riparian diversions upstream on San Joaquin River from Merced River confluence.	Unclear whether US Bureau of Reclamation entered into a water rights purchase contract with Stevinson. Stevinson's diversion rights were considered subordinated to Edison Securities and Miller & Lux (California Water Project Authority, No. 8, 1939, 18), and Stevinson instead was able to arrange a supply of water for its lands via the Merced River from Merced Irrigation District under the Stevinson Contract. East Side Canal appropriation from the San Joaquin River was found to average 14,268 AF, while residual riparian rights to the San Joaquin averaged 5,900 AF.
Tranquillity & James Irrigation Districts - Fresno Slough	29,300	Riparian diversions along Fresno Slough upstream of Mendota Pool.	Diversions were subordinated to Miller & Lux rights and allowed only when San Joaquin River reached 1,360 cfs and then the districts could take just 12 percent up to a maximum of 140 cfs. Estimated face amount for these districts obtained from Table 5 of California Water Project Authority, 1936.
Edison Securities	33,127	Riparian diversions just upstream of Mendota Pool and Fresno Slough along left (south) bank of San Joaquin River	Subject of a water rights purchase contract with US Bureau of Reclamation for uncontrolled overflow riparian rights from the San Joaquin River and associated sloughs upstream of Mendota Pool, along south bank (California Water Project Authority, No. 8, 1938). Edison Securities purchased these riparian lands from the Herminghaus Estate in January 1928.
Friant to Gravelly Ford right holders	116,741	As many as 198 diversions and/or pumpers of water from lands adjacent to the San Joaquin River	Rights of most of these landowners were acquired by USBR, but some of those not immediately acquired by 1939 became plaintiffs in Rank v. Krug, a suit by water right holders and groundwater pumpers in this area against Friant Dam. Case decided by U.S. Supreme Court in 195?? The court determined that these water right holders collectively used about 200,000 acre-feet per year in this area of the San Joaquin River. This was the section of the river that received releases from Friant under D-990, and below Gravelly Ford, the river dried up through to the confluence with the Merced River. San Joaquin River Restoration Program Settlement Agreement states that riparian releases are now 117,000 to 126,000 acre-feet per year, consistent with "Steiner declaration."
Total Pre-1914 and Riparian Water Rights, Upper San Joaquin River	1,753,117		
Sources: State of California Water Project Authority, 1936-1939; *Rank v. Krug*; San Joaquin River Settlement Agreement, 2006.			

No comments

- n/a -

San Joaquin River Riparian and Pre-1914 Consumptive Water Rights Claims

Lands east of San Joaquin River, Between Chowchilla Farms and Stevinson Colony Assumed Riparian to that Stream or its Branch Channels	Area in Acres	Estimated Average Uncontrolled Diversions, based on 1.65 acre-feet per acre
A.J. Turner	158	261
George J. Hatfield	1,293	2,133
Charles S. Howard	5,514	9,098
Charles A. Crane	2,400	3,960
Ed P. Waltz	2,640	4,356
Fred A Solari and J.A. Turner	861	1,421
Dan L McNamara	1,236	2,039
Dan L McNamara	957	1,579
Martin Erreca	520	858
Nell E Hanson	527	870
Jessie S Potter(1)	2,270	3,746
Jessie S Potter(2)	6,037	9,961
Totals	**24,413**	**40,281**
Source: California Water Project Authority, 1937b, 1937c.		

No comments

- n/a -

No comments

- n/a -

Appendix D

Section D.6
Post-1914 Consumptive Water Rights Claims

Trinity River Watershed - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A029129	20341		BLUE JAY WATER ASSOCIATION	10/19/1987	20.80	Trinity	TRINITY RIVER UNDERFLOW
			BLUE JAY WATER ASSOCIATION Total		20.80		
A027206	18568	12081	BRUCE G HANEY	2/5/1982	0.60	Trinity	TRINITY RIVER
			BRUCE G HANEY Total		0.60		
A021330	14347	10037	Chad Blevins	6/10/1963	5.20	Trinity	TRINITY RIVER
			Chad Blevins Total		5.20		
A017749	11255	6749	CHARLES HIGGS	7/31/1957	16.80	Trinity	TRINITY RIVER
			CHARLES HIGGS Total		16.80		
A027969	19275	12725	CHRISTOPHER T CROSS	2/3/1984	0.20	Trinity	TRINITY RIVER
			CHRISTOPHER T CROSS Total		0.20		
A010791	6398	4625	COVINGTON MUTUAL WATER COMPANY	3/24/1944	2,171.90	Trinity	EAST FORK STUART FORK TRINITY RIVER
			COVINGTON MUTUAL WATER COMPANY Total		2,171.90		
A017743	11178	6988	DAVID COVINGTON	1/28/1964	33.30	Trinity	TRINITY RIVER
			DAVID COVINGTON Total		33.30		
A026530	18389	12111	DAVID L SULLIVAN	9/24/1980	1.10	Trinity	TRINITY RIVER UNDERFLOW
			DAVID L SULLIVAN Total		1.10		
A026529A	18429	12935	GARTH R SUNDBERG	1/22/1982	0.50	Trinity	TRINITY RIVER UNDERFLOW
			GARTH R SUNDBERG Total		0.50		
A021142	14094	8656	GEORGE PAINTER	1/28/1963	0.30	Trinity	TRINITY RIVER
			GEORGE PAINTER Total		0.30		
A029111	20233	13386	GERARD A KAZ	9/16/1987	1.20	Trinity	TRINITY RIVER UNDERFLOW
			GERARD A KAZ Total		1.20		
A029183	20269	13322	HAZEL J SCHOTT	2/3/1988	2.30	Trinity	TRINITY RIVER
			HAZEL J SCHOTT Total		2.30		
A029336	20343	13616	James Lee and Billie Jo Bonk Revocable Trust	11/9/2005	0.30	Trinity	TRINITY RIVER
			James Lee and Billie Jo Bonk Revocable Trust Total		0.30		
A026660	18369	12082	JEFFREY J BUTLER	12/10/1980	0.60	Trinity	TRINITY RIVER
			JEFFREY J BUTLER Total		0.60		
A029302	20344	13485	KATHERINE L RIDENOUR	7/18/1988	1.80	Trinity	TRINITY RIVER UNDERFLOW
			KATHERINE L RIDENOUR Total		1.80		
A024059	16579	10904	KATHY WATSON	5/3/1972	1.40	Trinity	TRINITY RIVER UNDERFLOW
			KATHY WATSON Total		1.40		
A027867	19134	12721	Ken Tamplen	9/14/1983	1.10	Trinity	TRINITY RIVER UNDERFLOW
			Ken Tamplen Total		1.10		
A017669	11106	6566	Lewiston Community Service District	6/21/1957	543.00	Trinity	TRINITY RIVER
			Lewiston Community Service District Total		543.00		
A018177	11654	6612	LEWISTON PARK MUTUAL WATER COMPANY, INC	6/11/1958	311.30	Trinity	ALDER GULCH, TRINITY RIVER
			LEWISTON PARK MUTUAL WATER COMPANY, INC Total		311.30		
A027639	18898	12674	MADELINA CORONA	1/24/1983	0.30	Trinity	TRINITY RIVER
			MADELINA CORONA Total		0.30		

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A020923	13998	8410	MARCIA OSA COATES	9/4/1962	0.30	Humboldt	TRINITY RIVER
			MARCIA OSA COATES Total		0.30		
A023097	15783	10384	MARK GIBERSON	7/25/1968	5.60	Trinity	TRINITY RIVER
			MARK GIBERSON Total		5.60		
A028907	20081	13096	NOELLE ROGET	9/25/1986	2.00	Trinity	TRINITY RIVER
			NOELLE ROGET Total		2.00		
A015365	9527	5059	NORMAN EVANS	6/3/1953	0.80	Trinity	TRINITY RIVER
A015366	9528	5060	NORMAN EVANS	6/3/1953	0.30	Trinity	TRINITY RIVER
			NORMAN EVANS Total		1.10		
A027855	19198	12716	RALPH M MCCOMB	8/31/1983	0.50	Trinity	TRINITY RIVER UNDERFLOW
			RALPH M MCCOMB Total		0.50		
A020084	13120	7920	ROGER F KENDELL	4/13/1961	2.20	Trinity	TRINITY RIVER
			ROGER F KENDELL Total		2.20		
A016087	10146	5302	RONALD JURIN	10/13/1954	1,642.50	Humboldt	TRINITY RIVER
			RONALD JURIN Total		1,642.50		
A015227	9531	5145	RUSSELL H HAGEN JR	3/9/1953	2.30	Humboldt	TRINITY RIVER
			RUSSELL H HAGEN JR Total		2.30		
A026531	18390	12060	STAN POFF	9/24/1980	0.40	Trinity	TRINITY RIVER UNDERFLOW
			STAN POFF Total		0.40		
A022840	15541	10386	STEPHEN DUTTON	6/30/1967	3.40	Trinity	TRINITY RIVER
			STEPHEN DUTTON Total		3.40		
A021166	14149	8631	STEVEN B PETERSON	2/18/1963	7.60	Trinity	TRINITY RIVER
			STEVEN B PETERSON Total		7.60		
A024462	17650		TRINITY VILLAGE WATER COMPANY	9/19/1973	360.00	Trinity	TRINITY RIVER
			TRINITY VILLAGE WATER COMPANY Total		360.00		
A011927	7140	3513	U S SHASTA-TRINITY NATL FOREST	6/9/1947	852.90	Trinity	EAST FORK STUART FORK TRINITY RIVER
			U S SHASTA-TRINITY NATL FOREST Total		852.90		
A021019	14077	8386	U S SIX RIVERS NATL FOREST	11/16/1962	29.00	Trinity	TRINITY RIVER
			U S SIX RIVERS NATL FOREST Total		29.00		
A005628	11967		U.S. BUREAU OF RECLAMATION	7/30/2027	3,349,943.80	Contra Costa, Trinity	OLD RIVER, TRINITY RIVER
A015374	11968		U.S. BUREAU OF RECLAMATION	7/29/2002	417,193.30	Contra Costa, Trinity	OLD RIVER, TRINITY RIVER
A015375	11969		U.S. BUREAU OF RECLAMATION	9/16/1959	3,030,761.80	Contra Costa, Trinity	Old River, TRINITY RIVER
A016767	11971		U.S. BUREAU OF RECLAMATION	7/29/2002	700,000.00	Contra Costa, Trinity	TRINITY RIVER
A017374	11973		U.S. BUREAU OF RECLAMATION	7/29/2002	1,085,966.30	Contra Costa, Trinity	TRINITY RIVER
			U.S. BUREAU OF RECLAMATION Total		8,583,865.20		
A023882	16413	10503	WADE AMMON SR	10/1/1971	4.00	Trinity	SOUTH FORK TRINITY RIVER
			WADE AMMON SR Total		4.00		

No comments

- n/a -

Trinity River Watershed - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A029410	20757		WEAVERVILLE COMMUNITY SERVICES DISTRICT	2/14/1989	870.00	Trinity	TRINITY RIVER
			WEAVERVILLE COMMUNITY SERVICES DISTRICT Total		870.00		
A028537	19864	12946	WILLIAM E HOYER	8/14/1985	0.10	Trinity	TRINITY RIVER UNDERFLOW
			WILLIAM E HOYER Total		0.10		
			Grand Total		8,590,763.10		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A001300	1360	2302	1994 ORAL BABCOCK LIVING TRUST	05/29/19	3,600.00	Lassen	EAST FORK JUNIPER CREEK
A001696	1361	2595	1994 ORAL BABCOCK LIVING TRUST	03/01/20	892.60	Lassen	DARK CANYON CREEK
			1994 ORAL BABCOCK LIVING TRUST Total		4,492.60		
A005549	2891	1366	AGENCY 5	06/28/27	282.40	Siskiyou	SOUTH FORK BEAR CREEK
			AGENCY 5 Total		282.40		
A004554	2316	1602	Alan K. Nelson	11/14/35	185.00	Modoc	DUTCH FLAT CREEK
			Alan K. Nelson Total		185.00		
A002383	1170	2169	ALTURAS RANCHES LLC	06/07/21	900.00	Modoc	JUNIPER GULCH
A010079	8453	4291	ALTURAS RANCHES LLC	12/05/40	745.00	Modoc	CROOKS CANYON
A013339	7970	6443	ALTURAS RANCHES LLC	09/07/49	470.00	Modoc	BIG JUNIPER CREEK
A013526	8456	4294	ALTURAS RANCHES LLC	12/29/49	113.80	Modoc	CROOKS CANYON
A014759	9219	6071	ALTURAS RANCHES LLC	04/17/52	93.50	Modoc	CROOKS CANYON
A016047	10304	6951	ALTURAS RANCHES LLC	09/15/54	204.00	Modoc	CROOKS CANYON
A016048	10305	6952	ALTURAS RANCHES LLC	09/15/54	204.00	Modoc	CROOKS CANYON
A021557	14924	9579	ALTURAS RANCHES LLC	11/27/63	1,370.00	Modoc	UNST, UNXX
			ALTURAS RANCHES LLC Total		4,100.30		
A020606	13624	8511	ANTHONY BOKARES	02/13/62	15.00	Lassen	UNST
A022408	15210	9918	ANTHONY BOKARES	02/28/66	14.00	Lassen	UNST, UNST (2)
			ANTHONY BOKARES Total		29.00		
A027640	18903	12948	AUGUSTINO DE MARIA	01/27/83	4.20	Modoc	UNST
			AUGUSTINO DE MARIA Total		4.20		
A021194	14258	9878	BECKETT TRUST	03/14/63	0.10	Siskiyou	LAVA CRACK SPRINGS
			BECKETT TRUST Total		0.10		
A011646	8075	4939	BETTY ANN CARROLL	12/04/46	750.00	Lassen	HOLBROOK CANYON STREAM
A015526	9636	4938	BETTY ANN CARROLL	09/03/53	215.00	Lassen	HOLBROOK CANYON STREAM
			BETTY ANN CARROLL Total		965.00		
A002093	872	4360	BIG VALLEY MUTUAL WATER COMPANY	11/22/20	2,635.00	Modoc	ANTELOPE FLAT DRAINAGE AREA
A010109	6084	4361	BIG VALLEY MUTUAL WATER COMPANY	02/05/41	100.00	Modoc	ANTELOPE FLAT DRAINAGE
A010407	6083	4362	BIG VALLEY MUTUAL WATER COMPANY	03/17/42	2,865.00	Modoc	LAST CHANCE CREEK, WHALEN CREEK
			BIG VALLEY MUTUAL WATER COMPANY Total		5,600.00		
A010866	6319	4442	Black Ranch, LLC	08/22/44	184.50	Shasta	BURNEY CREEK
			Black Ranch, LLC Total		184.50		
A014605	9028	4968	BO THORENFELT	12/18/51	200.00	Lassen	UNST
			BO THORENFELT Total		200.00		
A026030	17951	11911	BRIAN J VANVORIS	06/20/79	1.90	Shasta	UNST
			BRIAN J VANVORIS Total		1.90		
A014689	9035	5250	BRYON E GIBBONS	02/27/52	30.00	Modoc	NORTH FORK GLEASON CREEK
			BRYON E GIBBONS Total		30.00		
A012845	7485	4429	CALIF DEPT OF FORESTRY & FIRE PROTECTION	12/03/48	72.40	Shasta	HATCHET CREEK
			CALIF DEPT OF FORESTRY & FIRE PROTECTION Total		72.40		
A022921	15644	9980	CALIFORNIA PINES PROPERTY OWNERS' ASSOCIATION	10/09/67	16.00	Modoc	SOUTH FORK FITZHUGH CREEK
A022922	15645	9979	CALIFORNIA PINES PROPERTY OWNERS' ASSOCIATION	10/09/67	11.00	Modoc	MIDDLE FORK FITZHUGH CREEK
			CALIFORNIA PINES PROPERTY OWNERS' ASSOCIATION Total		27.00		
A015331	9762	7286	CHARLENE E STONE	05/04/53	353.50	Shasta	HALL CREEK

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			CHARLENE E STONE Total		353.50		
A029440	20654		CHARLES A ORWICK	03/17/89	49.00	Lassen	UNST
			CHARLES A ORWICK Total		49.00		
A011102	6482	3952	CLARK FRONTIN	07/09/45	325.80	Shasta	LITTLE ROARING CREEK
			CLARK FRONTIN Total		325.80		
A026068	18571		CLEO V HUNT	08/21/79	49.00	Lassen	WILLOW CREEK
			CLEO V HUNT Total		49.00		
A025835	18599	12335	CLIFFORD DE WITT	09/27/78	38.00	Modoc	UNST
			CLIFFORD DE WITT Total		38.00		
A020320	13198	8334	CORY BOSCHEE	07/24/61	5.00	Lassen	UNST
A025713	17569	12905	CORY BOSCHEE	04/07/78	9.00	Lassen	UNST
			CORY BOSCHEE Total		14.00		
A029694	20696		CRAIG HERMSMEYER	06/03/02	27.00	Lassen	UNSP
			CRAIG HERMSMEYER Total		27.00		
A014927	9196	5036	DANIEL TANKERSLEY	07/28/52	190.00	Lassen	UNST
			DANIEL TANKERSLEY Total		190.00		
A021750	14649	9048	DANIEL K DAVIS	04/21/64	25.00	Shasta	UNST
			DANIEL K DAVIS Total		25.00		
A016506	10376	9234	DARAN V MYERS	08/08/55	279.00	Lassen	UNST, WILLOW CREEK
			DARAN V MYERS Total		279.00		
A020366	13402	9254	DAVID CRAWFORD	08/22/61	49.00	Lassen	UNST
			DAVID CRAWFORD Total		49.00		
A021064	14089	8630	David Hunt	12/06/62	24.00	Lassen	UNST
			David Hunt Total		24.00		
A022637	15852	10320	David King	11/14/66	10.00	Lassen	UNST
			David King Total		10.00		
A022762	15472	9137	DAVID E LLOYD	04/06/67	3.00	Modoc	UNST
			DAVID E LLOYD Total		3.00		
A022887	15562	10015	DELBERT GOULD	08/22/67	12.00	Modoc	UNST
			DELBERT GOULD Total		12.00		
A028571	20220		DENNIS DAUGHERTY	10/02/85	1,237.50	Lassen	CEDAR CREEK
			DENNIS DAUGHERTY Total		1,237.50		
A025231	18834	13011	DIXIE VALLEY RANCH	01/04/77	49.90	Lassen	RUSSELL DAIRY CREEK, UNST
			DIXIE VALLEY RANCH Total		49.90		
A025522	17921	11827	DON A GORDON	10/11/77	6.60	Shasta	UNST
A026108	17978	11826	DON A GORDON	10/09/79	8.00	Shasta	UNST
			DON A GORDON Total		14.60		
A021059	14056	8335	DONALD B MCKERN	12/03/62	49.00	Lassen	UNST
			DONALD B MCKERN Total		49.00		
A001503	660	531	DONALD J MARTIN	04/29/26	158.80	Shasta	FALL RIVER
			DONALD J MARTIN Total		158.80		
A013095	8315	4236	EDWARD MOHR	05/16/49	22.10	Modoc	PIT RIVER
			EDWARD MOHR Total		22.10		
A018923	12202	6637	EDWARD F BRUCE	08/19/59	4.00	Shasta	UNST
			EDWARD F BRUCE Total		4.00		

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A022804	15612	9565	ELLEN E TAYLOR	06/06/67	228.00	Shasta	UNST
			ELLEN E TAYLOR Total		228.00		
A026243	18595	13611	ELWOOD FORD	09/13/05	3.80	Shasta	UNST
			ELWOOD FORD Total		3.80		
A017857	11414	6589	ERNEST W BRUCE	10/23/57	135.00	Shasta	PIT RIVER
			ERNEST W BRUCE Total		135.00		
A020025	13599	10798	EUGENE M BREZNOCK	03/09/61	198.00	Lassen	UNST
A020085	13600	8348	EUGENE M BREZNOCK	04/13/61	3.50	Lassen	UNST
			EUGENE M BREZNOCK Total		201.50		
A025806A	018103 A	13107	FRED A COLLINS	07/29/91	3.80	Shasta	UNST
			FRED A COLLINS Total		3.80		
A013659	8943	6444	FREDRICK ANKLIN	03/29/50	840.00	Modoc	HILTON DAIRY CREEK
A014070	8975	9266	FREDRICK ANKLIN	11/22/50	22.50	Modoc	HILTON CREEK
			FREDRICK ANKLIN Total		862.50		
A011557	7210	6446	FROSTY ACRES INCORPORATED	09/18/46	200.00	Lassen	UNST
A011736	7052	4435	FROSTY ACRES INCORPORATED	02/18/47	40.00	Lassen	UNST, WILLOW CREEK
A011737	7053	4436	FROSTY ACRES INCORPORATED	02/18/47	3.00	Lassen	UNST
A019491	13360	8102	FROSTY ACRES INCORPORATED	06/16/60	50.00	Lassen	UNST
A021478	14999	10108	FROSTY ACRES INCORPORATED	09/26/63	230.00	Lassen	WILLOW CREEK
			FROSTY ACRES INCORPORATED Total		523.00		
A025856	20266		GENELLE VOORHEES	10/16/78	14.40	Shasta	UNST, WILLOW CREEK
			GENELLE VOORHEES Total		14.40		
A022399	15231	9037	GEORGE SHEPHERD	02/21/66	15.00	Modoc	UNST
			GEORGE SHEPHERD Total		15.00		
A023826	16662	10945	GEORGE R WRIGHT	07/27/71	17.00	Modoc	CROOKS CANYON, UNST
			GEORGE R WRIGHT Total		17.00		
A000930	428	330	GERALDINE SILVA	02/18/18	142.00	Modoc	UNST
			GERALDINE SILVA Total		142.00		
A025073	17557		GL JOHNS 2002 LIVING TRUST	05/24/76	49.00	Lassen	UNST
			GL JOHNS 2002 LIVING TRUST Total		49.00		
A019145	12799	8943	GOOSE VALLEY RANCH	04/04/07	4,000.00	Shasta	GOOSE CREEK
			GOOSE VALLEY RANCH Total		4,000.00		
A013524	8454	4292	GREEN VALLEY ENTERPRISES	12/29/49	227.50	Modoc	CROOKS CANYON
A014757	9217	4295	GREEN VALLEY ENTERPRISES	04/17/52	187.00	Modoc	CROOKS CANYON
A016046	10303	6950	GREEN VALLEY ENTERPRISES	07/18/63	408.00	Modoc	CROOKS CANYON
			GREEN VALLEY ENTERPRISES Total		822.50		
A026116	17974	13640	GREGORY R CALDWELL	04/11/06	20.00	Shasta	UNST
			GREGORY R CALDWELL Total		20.00		
A015339	9569	7237	HALCUMB CEMETERY DISTRICT	05/12/53	21.30	Shasta	MONTGOMERY CREEK
A021917	15596	10655	HALCUMB CEMETERY DISTRICT	09/25/64	22.00	Shasta	MONTGOMERY CREEK
			HALCUMB CEMETERY DISTRICT Total		43.30		
A019724	12980	9231	HAROLD W SIEMER	09/01/60	49.00	Lassen	UNCR
			HAROLD W SIEMER Total		49.00		
A029085	20238	13367	HARRY C BRAFF	08/10/87	1.10	Modoc	UNST

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			HARRY C BRAFF Total		1.10		
A017256	10861	6858	HARRY J & MILI TURIELLO TRUST	08/27/56	13.50	Shasta	PEACOCK CREEK
A022452	15675	10435	HARRY J & MILI TURIELLO TRUST	04/25/66	36.00	Shasta	PEACOCK CREEK
			HARRY J & MILI TURIELLO TRUST Total		49.50		
A025783	17641	12731	Henrich 2002 Trust	07/13/78	14.90	Shasta	UNSP
A028219	19379	12733	Henrich 2002 Trust	08/15/84	3.60	Shasta	UNSP
A025784A	017642 A	12732	Henrich 2002 Trust	09/16/86	5.00	Shasta	UNST
			Henrich 2002 Trust Total		23.50		
A018783	12140	8414	HOMER J ROBERTS	06/11/59	85.00	Modoc	UNST
A021280	14409	8415	HOMER J ROBERTS	05/13/63	85.00	Modoc	UNST
			HOMER J ROBERTS Total		170.00		
A003353	1768	9722	HOT SPRINGS VALLEY IRRIGATION DISTRICT	04/12/23	48,400.00	Modoc	RATTLESNAKE CREEK
A022427	15227	9723	HOT SPRINGS VALLEY IRRIGATION DISTRICT	03/17/66	20,000.00	Modoc	RATTLESNAKE CREEK
			HOT SPRINGS VALLEY IRRIGATION DISTRICT Total		68,400.00		
A021252	14278	8912	J A CONNER LIVING TRUST	04/23/63	49.00	Lassen	UNST
			J A CONNER LIVING TRUST Total		49.00		
A008627	4736	2378	J SCOTT & ELEANOR J VERMILYEA REVOCABLE TRUST 2000	04/03/36	457.00	Shasta	SHOTGUN CREEK
A021240	14262	9047	J SCOTT & ELEANOR J VERMILYEA REVOCABLE TRUST 2000	04/15/63	42.30	Shasta	UNSP, UNST
			J SCOTT & ELEANOR J VERMILYEA REVOCABLE TRUST 2000 Total		499.30		
A025000	17278	11664	JAMES H BICKFORD	02/23/76	200.00	Lassen	BEAVER CREEK, UNST
			JAMES H BICKFORD Total		200.00		
A002878	2026	1196	JANET PERRY	04/27/32	232.70	Shasta	HAT CREEK
			JANET PERRY Total		232.70		
A009609	5445	4437	JOE RUSS	06/06/39	100.00	Modoc	FRANKLIN CREEK
A009610	5446	4438	JOE RUSS	06/06/39	400.00	Siskiyou	FRANKLIN CREEK
A012005	7349	5491	JOE RUSS	07/24/47	120.00	Modoc	DRY CREEK
A020109	13413	8895	JOE RUSS	05/04/61	110.00	Modoc	UNST
A020936	14192	8896	JOE RUSS	09/11/62	20.00	Modoc	UNST
A021454	14575	8985	JOE RUSS	09/06/63	619.00	Modoc	LINNVILLE CREEK
A024016	16809	12904	JOE RUSS	04/03/72	568.00	Modoc	LINNVILLE CREEK
			JOE RUSS Total		1,937.00		
A022761	15471	9136	JOHN KAHL	04/06/67	2.00	Modoc	UNST
			JOHN KAHL Total		2.00		
A023950	16457	10697	JOHN A YOUNGER	12/16/71	680.00	Modoc	UNDR
			JOHN A YOUNGER Total		680.00		
A016857	10677	5720	JOHN ASKEW	01/27/56	2.00	Lassen	UNST
A026194	18410	13346	JOHN ASKEW	02/01/80	0.80	Lassen	UNST
			JOHN ASKEW Total		2.80		
A002227	1893	4940	JOHN B CROOK	02/23/21	5,250.00	Lassen	COYOTE FLAT DRAINAGE AREA
			JOHN B CROOK Total		5,250.00		
A004700	2608	2083	JOHN F PARRISH	09/04/40	381.80	Shasta	HAT CREEK
			JOHN F PARRISH Total		381.80		
A029321	20792		JOHN W CAPIK	08/19/88	45.00	Modoc	LINNVILLE CREEK, UNST

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			JOHN W CAPIK Total		45.00		
A030251	21250		JOHNSON CREEK DITCH USER'S ASSOCIATION	10/19/09	181.00	Shasta	UNST
			JOHNSON CREEK DITCH USER'S ASSOCIATION Total		181.00		
A025931	18350	13252	JOSEPH LOUIS OSA	02/28/79	27.00	Shasta	UNST
			JOSEPH LOUIS OSA Total		27.00		
A009761	5494	3318	JUANITA C GARDNER TRUST	11/04/39	492.50	Modoc	UNST
			JUANITA C GARDNER TRUST Total		492.50		
A021664	14735	10181	JUNIPER ACRES WATER ASSOCIATION	03/02/64	2.80	Modoc	UNSP
			JUNIPER ACRES WATER ASSOCIATION Total		2.80		
A026244	18418	12315	KEITH MACDONALD	03/03/80	1.10	Shasta	UNST
			KEITH MACDONALD Total		1.10		
A005812	3592	2179	KRAMER RANCH LLC	01/28/28	2,563.40	Lassen, Modoc	WIDOW VALLEY CREEK
A017267	10726	5192	KRAMER RANCH LLC	09/07/56	27.80	Modoc	WIDOW VALLEY CREEK
			KRAMER RANCH LLC Total		2,591.20		
A000245	190	250	LARRY R WILLMORE	02/03/16	181.00	Shasta	CLARK CREEK
			LARRY R WILLMORE Total		181.00		
A026038	18018	11918	LASSEN GOLD MINING INC	06/29/79	55.00	Lassen	UNST
A027034	18637	11923	LASSEN GOLD MINING INC	10/05/81	20.00	Lassen	UNST
			LASSEN GOLD MINING INC Total		75.00		
A024977	17063	11560	LEON URRUTIA	01/20/76	49.00	Modoc	UNST
			LEON URRUTIA Total		49.00		
A013207	8000	5072	LOOKOUT RANCH & LODGE LP	07/05/49	1,500.00	Modoc	TAYLOR CREEK
			LOOKOUT RANCH & LODGE LP Total		1,500.00		
A028610	20217		LOWELL L NOVY	10/31/85	2,790.00	Lassen	CEDAR CREEK
			LOWELL L NOVY Total		2,790.00		
A010820	6290	4188	M D & N L MYERS FAMILY 1986 REVOCABLE TR	05/18/44	90.00	Lassen	CHACE VALLEY CREEK
A013504	8430	6063	M D & N L MYERS FAMILY 1986 REVOCABLE TR	12/09/49	50.00	Lassen	UNST
			M D & N L MYERS FAMILY 1986 REVOCABLE TR Total		140.00		
A022750	15460	9138	MANUEL SOUZA	04/06/67	3.00	Modoc	UNST
A022751	15461	9169	MANUEL SOUZA	04/06/67	3.00	Modoc	UNST
A022752	15462	9172	MANUEL SOUZA	04/06/67	2.50	Modoc	UNST
A022753	15463	9212	MANUEL SOUZA	04/06/67	2.00	Modoc	UNST
A022754	15464	9131	MANUEL SOUZA	04/06/67	1.50	Modoc	UNST
A022755	15465	9139	MANUEL SOUZA	04/06/67	1.70	Modoc	UNST
A022756	15466	9128	MANUEL SOUZA	04/06/67	0.60	Modoc	UNST
A022757	15467	9168	MANUEL SOUZA	04/06/67	2.40	Modoc	UNST
A022758	15468	9175	MANUEL SOUZA	04/06/67	1.00	Modoc	UNST
A022759	15469	9135	MANUEL SOUZA	04/06/67	1.40	Modoc	UNST
A022760	15470	9134	MANUEL SOUZA	04/06/67	1.60	Modoc	UNST
			MANUEL SOUZA Total		20.70		
A020398	13622	9332	MANUEL A MORRIS	09/14/61	38.00	Modoc	KRESGE CANYON
			MANUEL A MORRIS Total		38.00		
A006398	3672	1554	MAPES RANCH, INC	08/07/29	4.30	Lassen	UNST
A019286	12548	7836	MAPES RANCH, INC	03/07/60	1.00	Lassen	UNST
			MAPES RANCH, INC Total		5.30		

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A013525	8455	4293	MCGARVA RANCH	12/29/49	113.80	Modoc	CROOKS CANYON
A014758	9218	6070	MCGARVA RANCH	04/17/52	93.50	Modoc	CROOKS CANYON
			MCGARVA RANCH Total		207.30		
A019743	13039	10035	MELVIN D MYERS	09/19/60	142.00	Lassen	BUTTE CREEK
			MELVIN D MYERS Total		142.00		
A028518	20218		MERRILL DAUGHERTY	04/14/88	315.00	Lassen	CEDAR CREEK
			MERRILL DAUGHERTY Total		315.00		
A000772	384	67	MICHAEL L SPAETH	10/09/19	22.30	Shasta	BY GONNY CREEK
			MICHAEL L SPAETH Total		22.30		
A026520	18999	13439	MILANO LAND AND CATTLE CO LLC	09/13/99	49.00	Modoc	BLACKS CANYON
A026521	19000	13440	MILANO LAND AND CATTLE CO LLC	09/13/99	142.00	Modoc	BLACKS CANYON
			MILANO LAND AND CATTLE CO LLC Total		191.00		
A021448	14429	10822	MONTGOMERY CREEK COMMUNITY CHURCH	09/03/63	0.20	Shasta	MONTGOMERY CREEK
			MONTGOMERY CREEK COMMUNITY CHURCH Total		0.20		
A016216	10191	5073	MORGAN RANCH COMPANY INC	01/24/55	200.00	Modoc	UNST
			MORGAN RANCH COMPANY INC Total		200.00		
A026197	18187	12069	NELLIE M DUNBAR	02/11/80	1.00	Shasta	UNST
			NELLIE M DUNBAR Total		1.00		
A015902	9988	5233	NELSON RANCHES	06/10/54	515.00	Modoc	JIM CREEK
A021318	14730	9346	NELSON RANCHES	05/31/63	215.00	Modoc	JIM CREEK
			NELSON RANCHES Total		730.00		
A016855	10715	5989	NOR CAL LAND & CATTLE CO	01/26/56	2.00	Lassen	UNST
			NOR CAL LAND & CATTLE CO Total		2.00		
A030720	20995		OAK RUN LUMBER CO LLC	06/23/98	3.00	Shasta	UNST
			OAK RUN LUMBER CO LLC Total		3.00		
A003566	1567	627	PARKS FAMILY 1995 REVOCABLE TRUST	08/04/23	3.00	Lassen	UNXX
			PARKS FAMILY 1995 REVOCABLE TRUST Total		3.00		
A008649	4793	2440	Patricia H Bushey	04/27/36	0.60	Modoc	UNSP
			Patricia H Bushey Total		0.60		
A027005	19072	12821	PAUL R JOLLY	09/15/81	3.90	Shasta	UNST
			PAUL R JOLLY Total		3.90		
A028892	20279		Peter D Stent	06/11/91	25.00	Shasta	BEAR CREEK
			Peter D Stent Total		25.00		
A026239	18761		PHILIP R GUNSAULS	02/28/80	35.00	Modoc	HALLS CANYON
			PHILIP R GUNSAULS Total		35.00		
A008194	4668	2076	PHYLLIS A HARRIS	12/22/34	200.00	Modoc	CLEAR LAKE
			PHYLLIS A HARRIS Total		200.00		
A001538	697	353	Pickering Family Trust	05/12/24	456.20	Shasta	FALL RIVER
			Pickering Family Trust Total		456.20		
A028570	20219		Pine Creek Cattle Company	10/02/85	157.50	Lassen	CEDAR CREEK
			Pine Creek Cattle Company Total		157.50		
A024696	18118	11874	R A STANFORD	10/17/74	23.00	Modoc	THOMAS & BAYNES DITCH, UNST
			R A STANFORD Total		23.00		
A014474	8866	6313	RAMIRO CHAVEZ	09/11/51	14.00	Lassen, Modoc	KELLY DRAW, UNKNOWN
			RAMIRO CHAVEZ Total		14.00		

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A000992	2307	1711	RAY BREINER	05/29/18	837.00	Modoc	FITZHUGH CREEK
A000993	2308	1712	RAY BREINER	05/29/18	457.00	Modoc	FITZHUGH CREEK
A000994	2309	1713	RAY BREINER	05/29/18	157.00	Modoc	FITZHUGH CREEK
A001252	2310	1714	RAY BREINER	04/21/19	400.00	Modoc	UNST
A007458	4506	4879	RAY BREINER	12/08/32	706.00	Modoc	FITZHUGH CREEK
			RAY BREINER Total		2,557.00		
A027787	19030	11857	REDWOOD ROD & GUN CLUB	06/30/83	3.30	Modoc	BOWMAN SPRINGS
			REDWOOD ROD & GUN CLUB Total		3.30		
A025806B	018103 B	13132	RICHARD D WILLARD	08/11/78	2.50	Shasta	UNST
			RICHARD D WILLARD Total		2.50		
A019517	13969	9567	RICHARD E SHOEMAKER	07/06/60	44.00	Lassen	FRAZIER CREEK
			RICHARD E SHOEMAKER Total		44.00		
A000135	69	284	RICHARD L JENNINGS	09/16/15	1,428.00	Modoc	PORTUGE FLAT DRAINAGE
A000486	202	53	RICHARD L JENNINGS	09/27/16	146.00	Modoc	RALSTON CREEK
A010835	6340	3101	RICHARD L JENNINGS	07/07/44	149.00	Modoc	RALSTON GULCH
			RICHARD L JENNINGS Total		1,723.00		
A019209	13968	8686	RICHARD W CALLISON	02/02/60	126.30	Lassen	FRAZIER CREEK
			RICHARD W CALLISON Total		126.30		
A014321	8871	5241	ROBERT HEATON	07/01/58	47.10	Shasta	ROARING CREEK
			ROBERT HEATON Total		47.10		
A022203	15185	9750	ROBERT C MCDONALD	06/23/65	20.00	Lassen	UNST
			ROBERT C MCDONALD Total		20.00		
A013466	8323	6293	ROBERT C PEDOTTI	11/16/49	565.00	Modoc	RYE GRASS SWALE
A018851	12597	9869	ROBERT C PEDOTTI	07/10/59	669.00	Modoc	RYE GRASS SWALE
			ROBERT C PEDOTTI Total		1,234.00		
A002237	987	444	Robert C. Mann	01/11/26	153.30	Modoc	PIT RIVER
			Robert C. Mann Total		153.30		
A021090	14039	8599	ROBERT H MACKEY & SONS INC	12/21/62	3.50	Modoc	UNST
A021091	14040	8600	ROBERT H MACKEY & SONS INC	12/21/62	11.00	Modoc	UNST
			ROBERT H MACKEY & SONS INC Total		14.50		
A026159	18367	12239	ROGER ERICKSON	12/28/79	0.50	Modoc	CANTRELL CREEK
			ROGER ERICKSON Total		0.50		
A001164	573	318	ROLLIE L GILLIAM	02/03/19	400.00	Modoc	RYE GRASS SWALE
A003398	1769	1813	ROLLIE L GILLIAM	05/04/23	130.00	Modoc	RYE GRASS SWALE
			ROLLIE L GILLIAM Total		530.00		
A021444	14410	10692	Ronald M LaGrande	08/27/63	93.00	Modoc	COOLEY GULCH
			Ronald M LaGrande Total		93.00		
A025784B	017642 B	12412	RONALD STICE	09/16/86	3.40	Shasta	UNST
			RONALD STICE Total		3.40		
A022562	15288	9753	RONALD VIERRA	08/29/66	24.00	Lassen	UNST
			RONALD VIERRA Total		24.00		
A000596	346	252	RONALD L SCHLUTER	02/24/17	563.00	Modoc	EMIGRANT CREEK
A003050	1396	1039	RONALD L SCHLUTER	09/22/22	295.00	Modoc	UNST

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			RONALD L SCHLUTER Total		858.00		
A020754	14061	9326	RONALD WESLEY KETLER	04/24/62	180.60	Modoc	UNST
A021405	14789	9325	RONALD WESLEY KETLER	07/23/63	55.00	Modoc	UNST, UNXX
A021908	15045	9336	RONALD WESLEY KETLER	09/17/64	45.00	Modoc	UNST
			RONALD WESLEY KETLER Total		280.60		
A000065	630	1146	SARAH WADE	03/15/32	30.70	Lassen	WILLOW CREEK
			SARAH WADE Total		30.70		
A021346	14382	8764	SHIRLEY A HUGHES TRUSTOR	06/18/63	18.00	Modoc	UNST
			SHIRLEY A HUGHES TRUSTOR Total		18.00		
A003220	1453	411	SIERRA PACIFIC INDUSTRIES	01/12/23	135.80	Shasta	NELSON CREEK
			SIERRA PACIFIC INDUSTRIES Total		135.80		
A014477	9129	4385	SL RANCH	05/21/56	200.00	Modoc	CROOKS CANYON
			SL RANCH Total		200.00		
A007860	4477	2474	SOUTH FORK IRRIGATION DISTRICT	03/05/34	17,000.00	Modoc	SOUTH FORK PIT RIVER, WEST VALLEY CREEK
A019309	12963	10603	SOUTH FORK IRRIGATION DISTRICT	03/14/60	2,240.00	Modoc	SOUTH FORK PIT RIVER, WEST VALLEY CREEK
			SOUTH FORK IRRIGATION DISTRICT Total		19,240.00		
A026955	18635	13409	Stephen Lyon	08/11/81	0.40	Shasta	UNSP
			Stephen Lyon Total		0.40		
A026795	18852	12922	STEPHEN C NELSON	04/20/81	49.00	Modoc	UNST
			STEPHEN C NELSON Total		49.00		
A016526	10828	8665	Steven Barber	08/15/55	5.40	Modoc	UNSP
A021923	14862	9173	Steven Barber	10/06/64	20.00	Modoc	UNSP
			Steven Barber Total		25.40		
A000338	137	54	SX Lowry Ranch	05/15/16	550.00	Modoc	GOVERNMENT CORRALS FLAT
A000421	885	1401	SX Lowry Ranch	08/03/16	1,550.00	Modoc	ANTELOPE PLAINS
A001108	568	4410	SX Lowry Ranch	10/05/18	380.00	Modoc	UNST
A023280	16046	10913	SX Lowry Ranch	05/15/79	2,000.00	Modoc	DOBE SWALE
A020904	14743	12437	SX Lowry Ranch	04/24/89	970.00	Modoc	UNST
			SX Lowry Ranch Total		5,450.00		
A006291	3873		TERRAL C YORK	05/17/29	500.00	Modoc	PARKER CREEK
			TERRAL C YORK Total		500.00		
A006290	3872		TERRY YORK	05/17/29	180.00	Modoc	PARKER CREEK
			TERRY YORK Total		180.00		
A021455	14781	11127	THE DENIS M ROUSE 1993 TRUST	09/10/63	34.00	Lassen	UNST (AKA HOMER JACK DITCH)
			THE DENIS M ROUSE 1993 TRUST Total		34.00		
A030197	20842	13614	THE HUNT FAMILY TRUST	11/08/05	4.50	Modoc	UNST
			THE HUNT FAMILY TRUST Total		4.50		
A020916	14574	10783	THE MCARTHUR 1989 TRUST	08/29/62	1,800.00	Lassen	EAST FORK JUNIPER CREEK, UNST
			THE MCARTHUR 1989 TRUST Total		1,800.00		
A025081	16924	11432	THOMAS M ORIGER	06/08/76	0.90	Modoc	UNST
			THOMAS M ORIGER Total		0.90		
A022935	15594	9632	TIM D BABCOCK	10/23/67	10.50	Lassen	UNST
			TIM D BABCOCK Total		10.50		
A028656	20237	13590	TIMOTHY W SKALLAND	03/19/04	6.00	Shasta	UNST (AKA INDIAN CREEK)
			TIMOTHY W SKALLAND Total		6.00		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A020062	13147	8361	TOM GIFFORD	03/31/61	30.00	Modoc	UNST
A020063	13148	9260	TOM GIFFORD	03/31/61	42.00	Modoc	TURNER CREEK
			TOM GIFFORD Total		72.00		
A019862	13061	9279	TOMMY B. ESPERANCE	04/09/70	30.00	Lassen	UNST
			TOMMY B. ESPERANCE Total		30.00		
A000420	188	298	TRINITY MEADOWS LP	11/13/23	553.40	Shasta	HATCHET CREEK
			TRINITY MEADOWS LP Total		553.40		
A000760	852	465	U S FISH & WILDLIFE SERVICE	12/29/03	2,709.00	Modoc	PINE CREEK
A001042	853	466	U S FISH & WILDLIFE SERVICE	12/29/03	1,191.00	Modoc	PINE CREEK, STOCKDILL SLOUGH
A001321	854	13528	U S FISH & WILDLIFE SERVICE	12/29/03	6,100.00	Modoc	PARKER CREEK, STOCKDILL SLOUGH
A012263	7291	4822	U S FISH & WILDLIFE SERVICE	12/29/03	1,100.00	Modoc	PINE CREEK
			U S FISH & WILDLIFE SERVICE Total		11,100.00		
A012068	7103	3978	U S LASSEN NATL FOREST	09/04/47	1.10	Lassen	BOARD CABIN SPRING
A012069	7104	4001	U S LASSEN NATL FOREST	09/04/47	0.50	Lassen	FIVE TROUGHS SPRING
A014978	9234	4535	U S LASSEN NATL FOREST	08/19/52	0.80	Lassen	PAT MORRIS SPRING
A018840	12883	9191	U S LASSEN NATL FOREST	07/01/59	650.00	Lassen	LITTLE DAVIS CREEK, UNST
A019698	12777	7758	U S LASSEN NATL FOREST	08/22/60	0.40	Shasta	COBBLE SPRING
A019699	12778	7759	U S LASSEN NATL FOREST	08/22/60	0.40	Lassen	CONE CACHE SPRING
A019700	12779	7760	U S LASSEN NATL FOREST	08/22/60	1.10	Shasta	COYOTE SPRING
A021662	14493	8914	U S LASSEN NATL FOREST	03/02/64	1.90	Lassen	WILLOW SPRING
A021663	14494	8915	U S LASSEN NATL FOREST	03/02/64	1.30	Siskiyou	WILEY RANCH SPRINGS
A025248	17964	12076	U S LASSEN NATL FOREST	01/19/77	650.00	Lassen	BIG JACK LAKE
A025660	17965	12077	U S LASSEN NATL FOREST	01/27/78	50.00	Lassen	BIG JACK LAKE
A018105A01	14822	11220	U S LASSEN NATL FOREST	04/30/82	190.00	Shasta	PROCTOR CREEK, UNST
A018105A02	14822	11220	U S LASSEN NATL FOREST	04/30/82	40.00	Shasta	PROCTOR CREEK, UNST
A027411	20039	12932	U S LASSEN NATL FOREST	07/13/82	0.10	Shasta	SOLDIER CREEK
A027412	20040	12933	U S LASSEN NATL FOREST	07/13/82	0.20	Shasta	SOLDIER CREEK
A029987	20731		U S LASSEN NATL FOREST	08/09/91	2.80	Siskiyou	MAYFIELD SPRING
A030254	20752		U S LASSEN NATL FOREST	05/07/93	73.50	Shasta	UNST
			U S LASSEN NATL FOREST Total		1,664.10		
A009132	5320	3945	U S MODOC NATL FOREST	09/29/37	0.70	Siskiyou	HEMLOCK SPRING
A009202	5239	4577	U S MODOC NATL FOREST	12/10/37	0.70	Siskiyou	SCHONCHIN SPRING
A010841	6296	5038	U S MODOC NATL FOREST	07/18/44	0.80	Modoc	HARRIS SPRING
A012708	7536	3580	U S MODOC NATL FOREST	09/23/48	0.30	Modoc	BOTTLE CREEK, BOTTLE SPRING
A013190	7748	3581	U S MODOC NATL FOREST	06/30/49	0.40	Modoc	LAYTON SPRING
A013194	7751	4023	U S MODOC NATL FOREST	06/30/49	0.40	Modoc	COTTONWOOD FLAT SPRING
A013213	7752	4401	U S MODOC NATL FOREST	07/08/49	0.20	Lassen	UNSP
A013214	7753	4402	U S MODOC NATL FOREST	07/08/49	0.20	Modoc	UNSP
A013215	7754	4396	U S MODOC NATL FOREST	07/08/49	0.70	Lassen	UNSP
A013821	8359	3894	U S MODOC NATL FOREST	06/28/50	0.20	Modoc	HOWARDS GULCH CAMPGROUND SPRING
A014088	8664	4277	U S MODOC NATL FOREST	12/04/50	0.10	Modoc	WEST VALLEY SPRING
A014089	8665	4986	U S MODOC NATL FOREST	12/04/50	0.10	Modoc	FITZHUGH SPRING
A014090	8666	4484	U S MODOC NATL FOREST	12/04/50	0.30	Modoc	GROUSE SPRING
A014091	8742	4281	U S MODOC NATL FOREST	12/04/50	0.20	Modoc	COWHEAD SPRING
A018091	11574	6605	U S MODOC NATL FOREST	04/09/58	8.50	Modoc	UNST

Pit River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A018203	11655	6376	U S MODOC NATL FOREST	06/30/58	0.10	Modoc	UNSP
A018204	11656	6377	U S MODOC NATL FOREST	06/30/58	0.10	Modoc	UNSP
A018636	12026	6619	U S MODOC NATL FOREST	04/10/59	0.30	Lassen	RICHMAN SPRING
A019163	12503	7311	U S MODOC NATL FOREST	01/04/60	0.50	Lassen	SUMMIT SPRING
A019164	12504	6712	U S MODOC NATL FOREST	01/04/60	0.10	Modoc	HUNTER SPRING
A019165	12467	7467	U S MODOC NATL FOREST	01/04/60	0.10	Modoc	HIDDEN SPRING
A019166	12468	6713	U S MODOC NATL FOREST	01/04/60	0.20	Modoc	QUAIL SPRING
A019189	12469	7312	U S MODOC NATL FOREST	01/25/60	0.20	Lassen	CHICKEN SPRING
A019283	12505	7532	U S MODOC NATL FOREST	03/07/60	0.40	Modoc	RONEY SPRING
A019284	12506	6714	U S MODOC NATL FOREST	03/07/60	0.40	Modoc	STUDLEY SPRING
A019285	12507	7533	U S MODOC NATL FOREST	03/07/60	0.20	Modoc	HORSEHEAD SPRING
A019340	12470	6715	U S MODOC NATL FOREST	04/04/60	0.30	Modoc	HARPER SPRING
A019365	12508	7534	U S MODOC NATL FOREST	04/20/60	0.20	Modoc	FERN SPRING
A019367	12510	7314	U S MODOC NATL FOREST	04/20/60	0.20	Lassen	MUD SPRING
A019368	12511	6716	U S MODOC NATL FOREST	04/20/60	0.20	Lassen	WATER CANYON SPRING
A019369	12512	7535	U S MODOC NATL FOREST	04/20/60	0.20	Modoc	HOG GULCH SPRING
A019370	12557	6717	U S MODOC NATL FOREST	04/20/60	0.20	Lassen	DAGO SPRINGS
A019970	13069	8052	U S MODOC NATL FOREST	02/07/61	0.30	Modoc	FOX MOUNTAIN SPRING
A019971	13070	8053	U S MODOC NATL FOREST	02/07/61	0.40	Modoc	PLUM SPRING
A019972	13071	8333	U S MODOC NATL FOREST	02/07/61	7.50	Lassen	UNSP
A019973	13072	8054	U S MODOC NATL FOREST	02/07/61	0.20	Lassen	SCHOTT SPRING
A020112	13484	8055	U S MODOC NATL FOREST	05/08/61	0.10	Lassen	DEER SPRING
A020113	13485	8056	U S MODOC NATL FOREST	05/08/61	0.10	Lassen	STUMP SPRING
A020716	13706	8558	U S MODOC NATL FOREST	04/10/62	0.20	Lassen	WALKER FLAT DRAW SPRING
A020717	13707	8559	U S MODOC NATL FOREST	04/10/62	0.30	Lassen	INDIAN SPRING
A021095	14181	8841	U S MODOC NATL FOREST	01/02/63	0.20	Lassen	UNSP
A021097	14183	8842	U S MODOC NATL FOREST	01/02/63	0.20	Modoc	UNSP
A021099	14185	8843	U S MODOC NATL FOREST	01/02/63	0.20	Lassen	UNSP
A021100	14095	8653	U S MODOC NATL FOREST	01/02/63	0.20	Modoc	UNSP
A021101	14096	8592	U S MODOC NATL FOREST	01/02/63	0.30	Modoc	MUD SPRING
A021102	14097	8643	U S MODOC NATL FOREST	01/02/63	0.30	Modoc	PINE SPRING
A021103	14098	8622	U S MODOC NATL FOREST	01/02/63	0.60	Modoc	HOSKINS SPRING
A021104	14099	8623	U S MODOC NATL FOREST	01/02/63	0.80	Modoc	HEAD OF RUSH CREEK SPRING
A021105	14100	8654	U S MODOC NATL FOREST	01/02/63	0.50	Modoc	CHALK SPRING
A021165	14101	8659	U S MODOC NATL FOREST	02/18/63	0.70	Modoc	RONEY FLAT SPRING
A021491	14341	8773	U S MODOC NATL FOREST	10/07/63	0.50	Lassen	DEER SPRING
A021492	14342	8838	U S MODOC NATL FOREST	10/07/63	0.50	Lassen	BUNSELMEIER SPRING
A021501	14422	8840	U S MODOC NATL FOREST	10/15/63	0.50	Lassen	JIMMY PACKWOOD SPRING
A021502	14489	8906	U S MODOC NATL FOREST	10/15/63	0.50	Lassen	GERIG SPRING
A021503	14536	8907	U S MODOC NATL FOREST	10/15/63	0.40	Modoc	DEEP CUT SPRING
A026211	17982	12567	U S MODOC NATL FOREST	02/20/80	0.20	Lassen	UNST
A026216	17985	12091	U S MODOC NATL FOREST	02/20/80	0.20	Lassen	UNST
A026217	17986	12092	U S MODOC NATL FOREST	02/20/80	0.20	Lassen	UNST
A026218	17987	12093	U S MODOC NATL FOREST	02/20/80	0.20	Lassen	UNST
A026220	17989	12094	U S MODOC NATL FOREST	02/20/80	0.20	Lassen	UNST

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A026221	17990	12095	U S MODOC NATL FOREST	02/20/80	0.20	Lassen	WINDMILL FLAT
A026222	17991	12096	U S MODOC NATL FOREST	02/20/80	0.10	Lassen	UNSP
A026288	18180	12097	U S MODOC NATL FOREST	04/10/80	0.20	Lassen	UNST
A026290	18182	12098	U S MODOC NATL FOREST	04/10/80	0.20	Lassen	UNST
A026348	18251	12090	U S MODOC NATL FOREST	05/14/80	0.20	Modoc	UNST
A026405	18265	12099	U S MODOC NATL FOREST	06/06/80	0.10	Modoc	SHAKE CANYON
A026477	18381	12100	U S MODOC NATL FOREST	07/29/80	0.20	Lassen	UNST
A026897	19797	13446	U S MODOC NATL FOREST	06/30/81	0.10	Modoc	UNST
A026893	19794		U S MODOC NATL FOREST	06/30/81	0.20	Modoc	UNST
A026894	19795		U S MODOC NATL FOREST	06/30/81	0.20	Modoc	UNST
A026898	19798		U S MODOC NATL FOREST	06/30/81	0.20	Lassen	UNST
A027231	18659	12568	U S MODOC NATL FOREST	03/09/82	0.20	Lassen	UNST
A027233	18661	12568	U S MODOC NATL FOREST	03/09/82	0.20	Lassen	UNST
A027234	18662	12570	U S MODOC NATL FOREST	03/09/82	0.20	Lassen	UNST
A027235	18663	12571	U S MODOC NATL FOREST	03/09/82	0.20	Lassen	COYOTE FLAT DRAW
A027236	18664	12572	U S MODOC NATL FOREST	03/09/82	0.20	Lassen	UNST
A027237	18665	12573	U S MODOC NATL FOREST	03/09/82	0.20	Lassen	UNST
A027238	18666	12574	U S MODOC NATL FOREST	03/09/82	0.20	Lassen	UNST
A027431	18853	13495	U S MODOC NATL FOREST	07/15/82	0.10	Modoc	UNST
A027647	19599		U S MODOC NATL FOREST	02/01/83	102.00	Lassen	UNST
A027648	19600		U S MODOC NATL FOREST	02/01/83	96.50	Lassen	UNST
A027732	19288	12746	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027733	19289	12747	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027734	19290	12748	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027735	19291	12749	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027737	19293	12750	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027738	19294	12738	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027739	19295	12752	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027740	19296	12753	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027741	19297	12754	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027742	19298	12755	U S MODOC NATL FOREST	04/27/83	0.20	Lassen	UNST
A027999	19750	13062	U S MODOC NATL FOREST	03/15/84	0.10	Modoc	UNST
A028001	19752	13359	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028002	19753	13360	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028004	19755	13015	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028006	19757	13016	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028007	19758	13017	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028008	19759	13018	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028009	19760	13019	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028011	19762	13361	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028012	19763	13362	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028014	19765	13020	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028019	19770	13021	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028021	19772	13493	U S MODOC NATL FOREST	03/15/84	0.20	Lassen	UNST
A028022	19773	13022	U S MODOC NATL FOREST	03/15/84	0.20	Lassen	COYOTE FLAT DRAW

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A028024	19775	13023	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	STONE COAL CREEK
A028027	19778	13466	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	STONE COAL CREEK
A028028	19779	13024	U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028030	19781	13025	U S MODOC NATL FOREST	03/15/84	0.20	Lassen	WALKER DRAW
A028031	19782	13397	U S MODOC NATL FOREST	03/15/84	0.20	Lassen	UNST
A028000	19751		U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028005	19756		U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028015	19766		U S MODOC NATL FOREST	03/15/84	0.20	Lassen	UNST
A028016	19767		U S MODOC NATL FOREST	03/15/84	0.20	Lassen	UNST
A028017	19768		U S MODOC NATL FOREST	03/15/84	0.20	Lassen	CARY SPRING
A028018	19769		U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028026	19777		U S MODOC NATL FOREST	03/15/84	0.20	Modoc	MUD SPRING
A028029	19780		U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028032	19783		U S MODOC NATL FOREST	03/15/84	0.20	Modoc	UNST
A028033	19784		U S MODOC NATL FOREST	03/15/84	0.20	Modoc	DEEP CUT SPRINGS
A028398	19671	13366	U S MODOC NATL FOREST	02/26/85	0.10	Lassen	UNST
A028400	19673	13374	U S MODOC NATL FOREST	02/26/85	0.10	Modoc	UNST
A028838	20023	13496	U S MODOC NATL FOREST	05/20/86	0.20	Lassen	UNST
A028841	20026	13453	U S MODOC NATL FOREST	05/20/86	0.20	Lassen	AMBROSE CANYON
A028845	20030	13365	U S MODOC NATL FOREST	05/20/86	0.20	Lassen	UNST
A028846	20031	13392	U S MODOC NATL FOREST	05/20/86	0.20	Lassen	UNST
A028837	20022		U S MODOC NATL FOREST	05/20/86	0.20	Modoc	UNST
A028839	20024		U S MODOC NATL FOREST	05/20/86	0.20	Modoc	UNST
A028840	20025		U S MODOC NATL FOREST	05/20/86	0.20	Modoc	UNST
A028842	20027		U S MODOC NATL FOREST	05/20/86	0.20	Lassen	UNST
A028843	20028		U S MODOC NATL FOREST	05/20/86	0.20	Lassen	SOUTH FORK JUNIPER CREEK
A028844	20029		U S MODOC NATL FOREST	05/20/86	0.20	Lassen	UNST
A028847	20032	13545	U S MODOC NATL FOREST	07/11/03	0.20	Lassen	UNST
A026899	19799	13550	U S MODOC NATL FOREST	07/22/03	0.20	Lassen	UNST
A026895	19796	13556	U S MODOC NATL FOREST	09/10/03	0.20	Modoc	ROCK SPRINGS
A028399	19672	13567	U S MODOC NATL FOREST	09/24/03	0.10	Lassen	UNST
A027432	18854	13574	U S MODOC NATL FOREST	11/24/03	0.10	Modoc	YELLOWJACKET SPRING
A028836	20021	13573	U S MODOC NATL FOREST	11/24/03	0.20	Lassen	UNST
			U S MODOC NATL FOREST Total		247.00		
A013019	7741	3782	U S SHASTA-TRINITY NATL FOREST	04/05/49	0.20	Shasta	DEEP CREEK
A013186	8047	3783	U S SHASTA-TRINITY NATL FOREST	06/30/49	1.60	Siskiyou	SLAGGER CAMP SPRING
A013187	8048	3784	U S SHASTA-TRINITY NATL FOREST	06/30/49	1.60	Siskiyou	LOST SPRINGS
A013189	8050	3786	U S SHASTA-TRINITY NATL FOREST	06/30/49	1.40	Siskiyou	BEAR SPRINGS
A020670	13640	8641	U S SHASTA-TRINITY NATL FOREST	03/21/62	1.00	Siskiyou	BELNAP SPRING
A020671	13641	8674	U S SHASTA-TRINITY NATL FOREST	03/21/62	0.90	Siskiyou	HARRIS SPRING
			U S SHASTA-TRINITY NATL FOREST Total		6.70		
A016866	10676	6381	US BUREAU OF LAND MANAGEMENT	01/31/56	1.50	Lassen	UNST
A016868	10689	6382	US BUREAU OF LAND MANAGEMENT	01/31/56	10.80	Lassen	UNST
A016869	10639	6078	US BUREAU OF LAND MANAGEMENT	01/31/56	2.90	Lassen	BALD MOUNTAIN LAKE, UNST
A016870	10640	6079	US BUREAU OF LAND MANAGEMENT	01/31/56	0.20	Lassen	UNDR

No comments

- n/a -

Pit River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A016871	10641	6080	US BUREAU OF LAND MANAGEMENT	01/31/56	4.00	Lassen	UNST
A016873	10643	6081	US BUREAU OF LAND MANAGEMENT	01/31/56	4.40	Lassen	NORTH GULCH, SPRING GULCH, UNST
A016899	10719	6540	US BUREAU OF LAND MANAGEMENT	02/20/56	10.00	Shasta	UNST
A018105B	14823	11219	US BUREAU OF LAND MANAGEMENT	04/24/58	180.00	Shasta	PROCTER CREEK, UNST
A020527	13928	8530	US BUREAU OF LAND MANAGEMENT	12/15/61	54.70	Shasta	UNST
A020528	13601	8140	US BUREAU OF LAND MANAGEMENT	12/15/61	6.00	Shasta	UNST
A020933	13992	8568	US BUREAU OF LAND MANAGEMENT	09/06/62	6.70	Shasta	UNST
A020998	14034	8590	US BUREAU OF LAND MANAGEMENT	10/29/62	4.70	Shasta	UNST
A021060	14078	8581	US BUREAU OF LAND MANAGEMENT	12/03/62	0.10	Shasta	UNST
A021774	14725	9233	US BUREAU OF LAND MANAGEMENT	05/18/64	6.40	Shasta	UNST
A027616	19354	12775	US BUREAU OF LAND MANAGEMENT	12/23/82	1,533.00	Lassen	DRY CREEK
A028088	19503	13261	US BUREAU OF LAND MANAGEMENT	03/29/84	0.80	Modoc	UNST
A028091	19506	13085	US BUREAU OF LAND MANAGEMENT	03/29/84	0.60	Modoc	UNST
A028093	19508	13371	US BUREAU OF LAND MANAGEMENT	03/29/84	0.90	Lassen	UNST
A028095	19510	13086	US BUREAU OF LAND MANAGEMENT	03/29/84	1.00	Modoc	UNST
A028096	19511	13087	US BUREAU OF LAND MANAGEMENT	03/29/84	0.40	Modoc	UNST
A028098	19512	13303	US BUREAU OF LAND MANAGEMENT	03/29/84	0.80	Lassen	UNST
A028099	19513	13262	US BUREAU OF LAND MANAGEMENT	03/29/84	1.20	Lassen	UNST
A028089	19504		US BUREAU OF LAND MANAGEMENT	03/29/84	3.00	Modoc	UNST
A028090	19505		US BUREAU OF LAND MANAGEMENT	03/29/84	1.00	Modoc	UNST
A028094	19509		US BUREAU OF LAND MANAGEMENT	03/29/84	1.10	Lassen	UNST
A028261	19536	13349	US BUREAU OF LAND MANAGEMENT	10/01/84	1.20	Modoc	UNST
A028264	19539	13370	US BUREAU OF LAND MANAGEMENT	10/01/84	0.90	Lassen	UNST
A028265	19540	13373	US BUREAU OF LAND MANAGEMENT	10/01/84	0.30	Lassen	UNST
A028270	19545	13364	US BUREAU OF LAND MANAGEMENT	10/01/84	0.50	Modoc	UNST
A028271	19546	13391	US BUREAU OF LAND MANAGEMENT	10/01/84	1.20	Modoc	UNST
A028272	19547	13358	US BUREAU OF LAND MANAGEMENT	10/01/84	0.20	Modoc	UNST
A028273	19548	13338	US BUREAU OF LAND MANAGEMENT	10/01/84	0.50	Lassen	UNST
A028274	19549	13335	US BUREAU OF LAND MANAGEMENT	10/01/84	0.40	Lassen	UNST
A028275	19550	13376	US BUREAU OF LAND MANAGEMENT	10/01/84	0.80	Lassen	UNST
A028276	19551	13334	US BUREAU OF LAND MANAGEMENT	10/01/84	0.40	Lassen	UNST
A028262	19537		US BUREAU OF LAND MANAGEMENT	10/01/84	1.10	Lassen	UNST
A028701	19953	13464	US BUREAU OF LAND MANAGEMENT	01/03/86	1.00	Modoc	UNST
A028702	19954	13327	US BUREAU OF LAND MANAGEMENT	01/03/86	1.20	Lassen	UNST
A028703	19955	13330	US BUREAU OF LAND MANAGEMENT	01/03/86	0.70	Lassen	UNST
A028704	19956	13336	US BUREAU OF LAND MANAGEMENT	01/03/86	0.40	Modoc	UNST
A028709	19961	13319	US BUREAU OF LAND MANAGEMENT	01/03/86	0.60	Lassen	UNST
A028706	19958		US BUREAU OF LAND MANAGEMENT	01/03/86	5.20	Lassen	UNST
A028717	19946	13341	US BUREAU OF LAND MANAGEMENT	01/14/86	0.50	Lassen	UNST
A028718	19947	13084	US BUREAU OF LAND MANAGEMENT	01/14/86	0.80	Lassen	UNST
A028721	19950	13343	US BUREAU OF LAND MANAGEMENT	01/14/86	1.10	Modoc	UNST
A028893	20111	13372	US BUREAU OF LAND MANAGEMENT	09/08/86	0.40	Modoc	UNST
A028894	20112	13297	US BUREAU OF LAND MANAGEMENT	09/08/86	1.10	Modoc	UNST
A029230	20724		US BUREAU OF LAND MANAGEMENT	04/19/88	1.30	Lassen	UNST
A029232	20725		US BUREAU OF LAND MANAGEMENT	04/19/88	1.30	Lassen	UNST

No comments

- n/a -

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Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A029589	20649	13333	US BUREAU OF LAND MANAGEMENT	10/16/89	0.40	Lassen	UNST
A031051	21129		US BUREAU OF LAND MANAGEMENT	05/12/00	6.00	Modoc	UNST
A031052	21130		US BUREAU OF LAND MANAGEMENT	05/12/00	9.00	Modoc	UNST
A031053	21131		US BUREAU OF LAND MANAGEMENT	05/12/00	15.00	Modoc	UNST
A028258	19533	13555	US BUREAU OF LAND MANAGEMENT	09/10/03	0.40	Lassen	UNST
A028257	19532	13572	US BUREAU OF LAND MANAGEMENT	11/24/03	0.60	Lassen	UNST
A028259	19534	13652	US BUREAU OF LAND MANAGEMENT	06/30/06	0.80	Lassen	UNST
A028256	19531	13673	US BUREAU OF LAND MANAGEMENT	10/23/06	0.60	Lassen	UNST
			US BUREAU OF LAND MANAGEMENT Total		1,892.10		
A005804	3240	1087	WARREN L WEBER	01/13/28	136.20	Modoc	DRY CREEK
			WARREN L WEBER Total		136.20		
A025140	17110	11557	WILLIAM PAPEZ	09/01/76	8.50	Modoc	UNST
A027961	19258	12760	WILLIAM PAPEZ	01/26/84	3.50	Modoc	UNST
			WILLIAM PAPEZ Total		12.00		
A027438	19320		WILLIAM C PROCK	07/16/82	229.00	Modoc	UNST
			WILLIAM C PROCK Total		229.00		
			Grand Total		166,380.90		

No comments

- n/a -

Feather River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A013398	8208	5317	AMY POWELL-REILLY	10/13/49	0.30	Plumas	UNSP
			AMY POWELL-REILLY Total		0.30		
A028202	19382	12743	APRIL L KEENAN	08/01/84	0.30	Plumas	UNST
			APRIL L KEENAN Total		0.30		
A010025	5864	4105	ASSOCIATION OF THOMPSON LAKE	10/02/40	5.10	Plumas	THOMPSON LAKE
A029432	20487		ASSOCIATION OF THOMPSON LAKE	03/08/89	20.00	Plumas	THOMPSON LAKE
			ASSOCIATION OF THOMPSON LAKE Total		25.10		
A009275	5190	2732	BERNICE C TERRY	04/15/38	4.50	Plumas	CROMBERG SPRING
			BERNICE C TERRY Total		4.50		
A012394	7599	3752	BIG MEADOWS INC	03/09/48	41.30	Plumas	UNSP
			BIG MEADOWS INC Total		41.30		
A015111	9442	6153	BOB CARTER	12/10/52	1.70	Plumas	UNSP
			BOB CARTER Total		1.70		
A010349	5964	2936	BRYAN P PITCAVAGE	12/31/41	21.30	Plumas	CLEAR CREEK
			BRYAN P PITCAVAGE Total		21.30		
A020786	14328	8802	BUCKS LAKE LODGE	05/22/62	0.10	Plumas	UNSP, UNST
			BUCKS LAKE LODGE Total		0.10		
A014583	9845	8347	BUCKS LAKE LODGES INCORPORATED	11/20/51	4.20	Plumas	UNST
			BUCKS LAKE LODGES INCORPORATED Total		4.20		
A011477	6689	3505	BUCKS LAKE SUMMER WATER ASSOCIATION	07/22/46	0.60	Plumas	UNST
A021842	14893	9171	BUCKS LAKE SUMMER WATER ASSOCIATION	07/09/64	0.40	Plumas	UNST
			BUCKS LAKE SUMMER WATER ASSOCIATION Total		1.00		
A007370	4083	2235	CALIF DEPT OF TRANSPORTATION	09/08/32	2.20	Plumas	UNSP
A016380	10367	5872	CALIF DEPT OF TRANSPORTATION	05/17/55	3.40	Sierra	UNSP
			CALIF DEPT OF TRANSPORTATION Total		5.60		
A005630	16478		CALIF DEPT OF WATER RESOURCES	07/30/27	1,393,568.50	Butte, Contra Costa, Sacramento	FEATHER RIVER, ITALIAN SLOUGH, SACRAMENTO RIVER DELTA CHANNELS
A014443	16479		CALIF DEPT OF WATER RESOURCES	08/24/51	9,004,510.20	Butte, Contra Costa	FEATHER RIVER, SACRAMENTO SAN JOAQUIN DELTA CHANNELS

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A016951	14587	9389	CALIF DEPT OF WATER RESOURCES	03/20/56	18,200.00	Plumas	INDIAN CREEK
A016952	12945	9182	CALIF DEPT OF WATER RESOURCES	03/20/56	30,000.00	Plumas	LITTLE LAST CHANCE CREEK
A018844	12946	9928	CALIF DEPT OF WATER RESOURCES	07/06/59	4,962.00	Plumas	LITTLE LAST CHANCE CREEK
A020117	14588	10975	CALIF DEPT OF WATER RESOURCES	05/09/61	3,400.00	Plumas	INDIAN CREEK
A016950	15254		CALIF DEPT OF WATER RESOURCES	01/05/67	49,000.00	Plumas	BIG GRIZZLY CREEK
A021443	15255		CALIF DEPT OF WATER RESOURCES	01/05/67	34,000.00	Plumas	BIG GRIZZLY CREEK
			CALIF DEPT OF WATER RESOURCES Total		10,537,640.70		
A012548	7491	3530	CAMP TIMBERWOLF IMPROVEMENT COMMITTEE	06/16/48	0.40	Plumas	UNSP
			CAMP TIMBERWOLF IMPROVEMENT COMMITTEE Total		0.40		
A007003	3866	1575	CAROL A RHODEHOUSE	07/10/31	3,330.30	Plumas	BLACKHAWK CREEK
			CAROL A RHODEHOUSE Total		3,330.30		
A019730	12871	10458	CASIMIR JATCZAK	09/07/60	0.20	Plumas	UNST
			CASIMIR JATCZAK Total		0.20		
A010011	9685	2581	CITY OF PORTOLA	04/08/43	875.90	Plumas	WILLOW CREEK
A017069	12282	10013	CITY OF PORTOLA	05/03/56	600.00	Plumas	UNSP (5), UNSP (7)
			CITY OF PORTOLA Total		1,475.90		
A012900	7594	4841	Collin Harris	01/17/49	126.00	Sierra	ANTELOPE CREEK
			Collin Harris Total		126.00		
A029127	20591		COZETTE E GRAHAM	10/19/87	18.70	Plumas	TWELVE MILE RAVINE, UNST
			COZETTE E GRAHAM Total		18.70		
A007978	4430	2682	DANIEL WILSON	06/15/34	2.20	Plumas	INDIAN CREEK
			DANIEL WILSON Total		2.20		
A019121	13930	8392	DANIEL H CLIFTON	12/04/59	0.40	Sierra	TREASURE SPRING, TREASURE SPRING CREEK
			DANIEL H CLIFTON Total		0.40		
A015567	10328	7268	DANNY WILSON	10/05/53	0.20	Butte	BALSAM CREEK
			DANNY WILSON Total		0.20		
A017314	11155	8371	DARLA J WOJCIK FAMILY TRUST	10/08/56	1.90	Butte	OREGON GULCH

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			DARLA J WOJCIK FAMILY TRUST Total		1.90		
A009972	5640	3476	DAVID C NORTON	08/09/40	16.20	Plumas	UNSP
A014016	8784	9609	DAVID C NORTON	10/25/50	3.50	Plumas	UNSP
			DAVID C NORTON Total		19.70		
A004122	2107	2023	DAVID K LEE	05/15/40	135.80	Plumas	COLD SPRING, KINGS CREEK
A005171	2866	2024	DAVID K LEE	05/15/40	91.70	Plumas	SUNFLOWER FLAT CREEK
			DAVID K LEE Total		227.50		
A017739	11215	6958	DAVID ROBERT OSTLER	07/24/57	1.10	Sierra	UNSP
			DAVID ROBERT OSTLER Total		1.10		
A006728	3882	2143	DAWN INSTITUTE OF SCIENCE & ART	07/11/30	8.40	Plumas	UNSP
A009968	5684		DAWN INSTITUTE OF SCIENCE & ART	07/22/93	1.30	Plumas	UNSP
			DAWN INSTITUTE OF SCIENCE & ART Total		9.70		
A017195	11014	5884	DAWN M JONES	07/20/56	0.20	Plumas	UNST
			DAWN M JONES Total		0.20		
A016436	10623	6036	DEAN PANFILI	06/23/55	630.80	Plumas	LONG VALLEY CREEK
			DEAN PANFILI Total		630.80		
A001024	497	217	DELBERT H LEHR	07/17/18	108.60	Plumas	UNXX
A011786	6906	3421	DELBERT H LEHR	03/19/47	312.00	Plumas	EAST BRANCH OF NORTH FORK FEATHER RIVER
			DELBERT H LEHR Total		420.60		
A016583	10536	7291	Derek C Anderson	06/07/65	3.50	Plumas	UNST
			Derek C Anderson Total		3.50		
A021361	14791	9026	DEWEY S RAVENSCROFT	06/25/63	5.00	Plumas	FERN CANYON
			DEWEY S RAVENSCROFT Total		5.00		
A029537	20577	13827	DIANE MONTGOMERY	01/10/11	35.00	Sierra	UNST
			DIANE MONTGOMERY Total		35.00		
A026571	18470	13246	Donald A Wallace	10/07/80	89.00	Sierra	SIERRA VALLEY CHANNELS
			Donald A Wallace Total		89.00		
A017963	11625	6601	DUSTIN F DOYLE	01/28/58	0.10	Plumas	UNST
			DUSTIN F DOYLE Total		0.10		
A011271	6536	3737	ELLIOT P SMART	01/31/46	1.60	Plumas	WATERING TROUGH SPRING
			ELLIOT P SMART Total		1.60		
A008964	4958	2564	EST OF WILLIAM JAMES DAWSON JR	05/06/37	5.60	Plumas	UNST
			EST OF WILLIAM JAMES DAWSON JR Total		5.60		
A017132	10832	5918	Est. of Martin A. Poss	06/14/56	0.20	Plumas	UNST
			Est. of Martin A. Poss Total		0.20		
A008460	4682	2223	Feather River Land Trust, a Cal Nonprofit	10/03/35	200.00	Plumas	TAYLOR LAKE
A012844	7617	9165	Feather River Land Trust, a Cal Nonprofit	12/03/48	100.00	Plumas	TAYLOR LAKE
			Feather River Land Trust, a Cal Nonprofit Total		300.00		

No comments

- n/a -

Feather River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A026942	20121		FIVE BEARS HYDRO, INC	08/06/81	1,448.00	Plumas	SOUTH BRANCH WARD CREEK
A027349	20122		FIVE BEARS HYDRO, INC	06/03/82	5,791.80	Plumas	SOUTH BRANCH WARD CREEK
			FIVE BEARS HYDRO, INC Total		7,239.80		
A009616	5470	2570	FRAZIER CREEK WATER ASSOCIATION	06/14/39	112.20	Butte	EAST BRANCH FRAZIER CREEK, WEST BRANCH FRAZIER CREEK
			FRAZIER CREEK WATER ASSOCIATION Total		112.20		
A008996	5022	4494	FREELANDER TRUST	06/14/37	412.70	Plumas	CLEAR CREEK, OWL CREEK
A017303	12796	7821	FREELANDER TRUST	08/03/66	467.50	Plumas	CLEAR CREEK, OWL CREEK
			FREELANDER TRUST Total		880.20		
A015571	10136	7056	GARY L BROWN	10/07/53	607.00	Plumas	INDIAN CREEK
			GARY L BROWN Total		607.00		
A018968	13221	7798	GENE ALEXANDER	09/04/59	0.10	Plumas	UNST
			GENE ALEXANDER Total		0.10		
A010963	6386	3323	GENE H FISHER	01/26/45	27.40	Butte	ROMA CREEK
			GENE H FISHER Total		27.40		
A008495	4785	2340	GRAEAGLE LAND & WATER COMPANY	11/14/35	11,454.70	Plumas	GRAY EAGLE CREEK, LONG LAKE
A008496	4786	2341	GRAEAGLE LAND & WATER COMPANY	11/14/35	2,895.50	Plumas	GRAY EAGLE CREEK
A025030	17676	12546	GRAEAGLE LAND & WATER COMPANY	03/26/76	196.00	Plumas	FRAZIER CREEK
			GRAEAGLE LAND & WATER COMPANY Total		14,546.20		
A004022	1978	2010	GRAY EAGLE LODGE	06/11/24	5.40	Plumas	UNSP
A004023	1979	1042	GRAY EAGLE LODGE	05/14/31	610.90	Plumas	GRAY EAGLE CREEK
			GRAY EAGLE LODGE Total		616.30		
A021216	14766	9215	GRIZZLY LAKE RESORT IMPROVEMENT DISTRICT	04/01/63	42.00	Plumas	HUMBUG CREEK
			GRIZZLY LAKE RESORT IMPROVEMENT DISTRICT Total		42.00		
A017171	11030	6181	HAROLD D FRANCIS	07/11/56	0.20	Plumas	UNST
			HAROLD D FRANCIS Total		0.20		
A017471	11399	7881	HYDE FAMILY 1990 TRUST	02/20/57	5.40	Plumas	UNST
			HYDE FAMILY 1990 TRUST Total		5.40		
A023364	16585		JAMES D BAKER	10/07/69	0.40	Sierra	TREASURE SPRING, TREASURE SPRING CREEK
			JAMES D BAKER Total		0.40		
A017160	10997	5889	JAMES F RUTHERFORD	12/02/04	0.20	Plumas	UNST
			JAMES F RUTHERFORD Total		0.20		
A027754	19252	12757	JAMES P ROBBINS	05/12/83	3.40	Plumas	UNSP
			JAMES P ROBBINS Total		3.40		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A012122	7659	3486	JEANNETTE S SASSER	10/08/47	0.50	Plumas	CROMBERG SPRING
			JEANNETTE S SASSER Total		0.50		
A017231	10894	6053	JEFFERY L WILSON	08/10/56	22.40	Plumas	JACKASS CREEK
			JEFFERY L WILSON Total		22.40		
A001712	730	1128	JOAN ESCALANTE	03/06/20	1.10	Butte	UNST
			JOAN ESCALANTE Total		1.10		
A015071	9532	5288	JOHN J GILLAM	11/03/52	144.80	Plumas	HARVEY RAVINE
			JOHN J GILLAM Total		144.80		
A020468	13751	8748	JOHN P SCHMIDT	11/06/61	0.20	Plumas	UNST
			JOHN P SCHMIDT Total		0.20		
A024048	16589	11004	Kathy L. McDonell	05/05/80	0.30	Plumas	CROMBERG SPRING
A025089	17679	11695	Kathy L. McDonell	02/26/85	1.00	Plumas	CROMBERG SPRING
			Kathy L. McDonell Total		1.30		
A006723	3634	2560	Kovach Trust	07/08/30	1,809.00	Butte	EMPIRE CREEK
			Kovach Trust Total		1,809.00		
A011753	7180	5086	LAKE MADRONE WATER DISTRICT	03/04/47	1.70	Butte	FERN DELL CREEK
A030657	21027		LAKE MADRONE WATER DISTRICT	10/07/97	200.00	Butte	BERRY CREEK
			LAKE MADRONE WATER DISTRICT Total		201.70		
A023580	16107	10828	LAKE OROVILLE INVESTMENT GROUP LLC	08/14/70	9.50	Butte	UNST
			LAKE OROVILLE INVESTMENT GROUP LLC Total		9.50		
A018149	11610	7646	LARRY MCMULLAN	05/22/58	0.20	Plumas	UNSP
			LARRY MCMULLAN Total		0.20		
A012117	7658	3484	Laura Rowan Peake	10/02/47	0.30	Plumas	CROMBERG SPRING
			Laura Rowan Peake Total		0.30		
A023924	16402	10760	LDS Recreation Properties LLC	11/18/71	57.70	Sierra	BONTA CREEK, UNST
			LDS Recreation Properties LLC Total		57.70		
A029501	20707		Lewis Van Vleck	06/12/89	44.50	Sierra	SIERRA VALLEY CHANNELS
			Lewis Van Vleck Total		44.50		
A005996	3203	1067	LOREN PERKINS	07/27/28	217.20	Plumas	UNCR
A009886	5589	2625	LOREN PERKINS	04/29/40	202.70	Plumas	UNCR
			LOREN PERKINS Total		419.90		
A016529A	10428	007026A	LOREN V PERKINS LIVING TRUST	08/17/55	5.10	Butte	CARTER RAVINE
A016530	10429	7027	LOREN V PERKINS LIVING TRUST	08/17/55	0.70	Butte	CARTER RAVINE
			LOREN V PERKINS LIVING TRUST Total		5.80		
A005015	2623	2118	LOTTS LAKE ASSOCIATION	05/13/26	0.20	Plumas	UNSP
			LOTTS LAKE ASSOCIATION Total		0.20		
A023564	16180	10365	LOUIS A PAYEN	07/22/70	403.00	Sierra	BIG SPRING, SMALL SPRING

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			LOUIS A PAYEN Total		403.00		
A011713	6995	3586	MARGUERITE A MOHIUDDIN	02/03/47	7.70	Plumas	UNSP
			MARGUERITE A MOHIUDDIN Total		7.70		
A016529B	10428	007026B	MARK PHILLIPS	08/17/55	6.50	Butte	UNSP
			MARK PHILLIPS Total		6.50		
A022485	15693	10425	MARK A GLOISTEIN	06/06/66	20.00	Sierra	UNST
			MARK A GLOISTEIN Total		20.00		
A014807	9846	4942	MARK D EVANS	05/15/52	0.20	Plumas	UNST
			MARK D EVANS Total		0.20		
A023260A	15932	11069	MARK L SCOTT	11/26/80	17.00	Butte	UNST
			MARK L SCOTT Total		17.00		
A008422	4644	2423	Mary Ann Nash	08/21/35	9.00	Butte	OGDEN CREEK
			Mary Ann Nash Total		9.00		
A000685	312	166	MASSACK WATER USERS ASSOCIATION	05/18/17	5.60	Plumas	UNSP
A029544	20513		MASSACK WATER USERS ASSOCIATION	08/18/89	1.70	Plumas	UNSP
			MASSACK WATER USERS ASSOCIATION Total		7.30		
A015570	10135	7055	MC INTYRE RANCHING INC	10/07/53	758.70	Plumas	INDIAN CREEK
			MC INTYRE RANCHING INC Total		758.70		
A019090	13222	7708	MICHAEL MONAHAN	11/20/59	0.20	Plumas	UNST
			MICHAEL MONAHAN Total		0.20		
A011243	6994	4540	MICHAEL NEWSOM	12/26/45	0.10	Plumas	UNSP
			MICHAEL NEWSOM Total		0.10		
A006469	3446	1600	MICHAEL D GRANT	10/28/29	0.70	Plumas	UNSP
A011201	6472	3482	MICHAEL D GRANT	11/01/45	17.90	Plumas	UNSP
			MICHAEL D GRANT Total		18.60		
A024815	18294	12167	MIGUEL AUBAN	12/01/08	1.40	Plumas	UNSP
			MIGUEL AUBAN Total		1.40		
A024421	17166	11470	MIGUEL AUBEN	07/26/73	2.00	Plumas	UNST
			MIGUEL AUBEN Total		2.00		
A031433	21285		MINERAL RESOURCES LLC	06/06/11	46.00	Butte	UNST
			MINERAL RESOURCES LLC Total		46.00		
A004281	2443	1232	MIRIAM C BARKER	10/28/24	5.10	Plumas	LITTLE GRAY EAGLE CREEK
			MIRIAM C BARKER Total		5.10		
A030596	20954	13840	NADINE M BASS	11/08/11	19.00	Sierra	UNST
			NADINE M BASS Total		19.00		
A010917	6403	3113	NORMAN F ROBERTS	11/21/44	1.10	Plumas	UNSP
			NORMAN F ROBERTS Total		1.10		
A020303	13390	8417	NORMAN R COTE	07/14/61	0.40	Plumas	UNST
			NORMAN R COTE Total		0.40		

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A014113	11518		North Yuba Water District	08/18/58	624,084.30	Butte, Plumas	LOST CREEK, SOUTH FORK FEATHER RIVER
			North Yuba Water District Total		624,084.30		
A026904	18878		OKIZU FOUNDATION	07/03/81	49.00	Butte	BERRY CREEK, UNST
A031379			OKIZU FOUNDATION	12/17/02	40.00	Butte	BERRY CREEK, UNST
			OKIZU FOUNDATION Total		89.00		
A019233	13931	8393	PAUL CUETO	02/15/60	0.40	Sierra	TREASURE SPRING, TREASURE SPRING CREEK
			PAUL CUETO Total		0.40		
A011397	6637	3381	PERRY GREENE	05/14/46	2.40	Plumas	UNSP
			PERRY GREENE Total		2.40		
A012279	7286	3603	PETER SENTER	01/30/48	0.10	Plumas	UNSP
			PETER SENTER Total		0.10		
A014653	9216	4183	PG&E	01/22/52	0.60	Plumas	UNST
			PG&E Total		0.60		
A011585	6666	3638	R C K RANCH LLC	10/09/46	464.10	Plumas	MORRIS SLOUGH
			R C K RANCH LLC Total		464.10		
A017776	11243	6014	RALPH F BECKER	08/16/57	2.20	Plumas	UNSP
			RALPH F BECKER Total		2.20		
A019265	13932	8394	RANDY JENSEN	02/28/60	0.40	Sierra	TREASURE SPRING, TREASURE SPRING CREEK
			RANDY JENSEN Total		0.40		
A007526	4213	2065	REGENTS OF THE UNIVERSITY OF CALIFORNIA	03/29/33	1.50	Plumas	SCHNEIDER CREEK
			REGENTS OF THE UNIVERSITY OF CALIFORNIA Total		1.50		
A019750	13241	8020	RICHARD GREIN	09/23/60	0.10	Plumas	UNSP
			RICHARD GREIN Total		0.10		
A004234	2125	631	RICHARD L SCHIWENDINGER	09/24/24	1.70	Plumas	RUSSEL SPRING, UNSP (3)
			RICHARD L SCHIWENDINGER Total		1.70		
A009207	5218	2284	ROBERT RITTER	12/22/37	0.30	Plumas	CROMBERG SPRING
			ROBERT RITTER Total		0.30		
A023260C	15932	11071	ROBERT TEICHMAN	11/26/80	0.20	Butte	UNST
			ROBERT TEICHMAN Total		0.20		
A011976	7075	6880	ROBERT A JONES	06/10/63	18.80	Plumas	UNSP
			ROBERT A JONES Total		18.80		
A004261	2148	732	ROBERT B BECKWITH	10/16/24	0.70	Plumas	UNSP
A020432	13824	9217	ROBERT B BECKWITH	01/18/91	0.50	Plumas	UNSP

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			ROBERT B BECKWITH Total		1.20		
A027688	19665	13174	ROBERT J PALOWODA	03/11/83	0.10	Plumas	UNST
			ROBERT J PALOWODA Total		0.10		
A025500	17476	11505	ROBERT S CONOVER	09/02/77	0.50	Plumas	UNST
			ROBERT S CONOVER Total		0.50		
A009274	5189	2193	ROBERT W ELFEN	04/15/38	0.60	Plumas	CROMBERG SPRING
A009392	5316	2572	ROBERT W ELFEN	08/18/38	0.60	Plumas	CROMBERG SPRING
			ROBERT W ELFEN Total		1.20		
A016910	10730	5905	ROBERT W STEIN	02/28/56	140.00	Plumas	BIG GRIZZLY CREEK
			ROBERT W STEIN Total		140.00		
A019653	12990	9223	RON CARPENTER	08/09/60	166.50	Plumas	HAUNS CREEK
			RON CARPENTER Total		166.50		
A020911	14297	8961	RONALD DREISBACH	08/27/62	76.00	Butte	GRIZZLY CREEK
			RONALD DREISBACH Total		76.00		
A014760	9210	5515	RUSSELL C WESTOVER JR	04/17/52	0.60	Plumas	UNSP
			RUSSELL C WESTOVER JR Total		0.60		
A022855	15751	10561	SEAN CUNNINGHAM	12/31/75	452.40	Plumas	MILL CREEK
			SEAN CUNNINGHAM Total		452.40		
A017870	11564	9566	SHIRLEY ISHAM	11/01/57	33.00	Plumas	MOSQUITO SPRINGS
			SHIRLEY ISHAM Total		33.00		
A016520	10670	9872	SIERRA BIBLE CAMP INC	08/12/55	19.20	Plumas	UNSP
			SIERRA BIBLE CAMP INC Total		19.20		
A009690	5443	3114	SIERRA PACIFIC HOLDING COMPAMY	08/08/39	150.00	Butte	GRUBBS CREEK, LITTLE FREY CREEK
			SIERRA PACIFIC HOLDING COMPAMY Total		150.00		
A006412	3643	1485	SOPER COMPANY	08/17/29	17.00	Yuba	STICKNER SPRING
A014218	8611	4300	SOPER COMPANY	03/29/51	3.40	Plumas	UNSP
A014219	8612	4301	SOPER COMPANY	03/29/51	48.00	Plumas	MOSES CREEK
			SOPER COMPANY Total		68.40		
A021440	14485	10038	SOPER COMPANY, A DELAWARE CORPORATION	08/22/63	2.20	Plumas	UNSP
			SOPER COMPANY, A DELAWARE CORPORATION Total		2.20		
A002142	1268		SOUTH FEATHER WATER & POWER AGENCY	12/17/20	5,000.00	Butte	LOST CREEK
A002778	2492		SOUTH FEATHER WATER & POWER AGENCY	03/06/22	31,148.90	Butte	LOST CREEK
A002979	1271		SOUTH FEATHER WATER & POWER AGENCY	08/12/22	133,935.80	Butte	LOST CREEK
A001651	1267		SOUTH FEATHER WATER & POWER AGENCY	01/05/23	145,508.40	Plumas	SOUTH FORK FEATHER RIVER
			SOUTH FEATHER WATER & POWER AGENCY Total		315,593.10		
A029060	20656		Squirrel Creek, LLC	07/07/87	9.00	Plumas	BEAR CREEK
			Squirrel Creek, LLC Total		9.00		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A014864	9192	6512	THE CAMP TIMBERWOLF IMPROVMENT COMM, INC	06/18/52	1.50	Plumas	UNSP
			THE CAMP TIMBERWOLF IMPROVMENT COMM, INC Total		1.50		
A001739	1911	845	THERMALITO WATER AND SEWER DISTRICT	03/25/20	8,200.00	Butte	CONCOW CREEK
A003040	1912	737	THERMALITO WATER AND SEWER DISTRICT	09/16/22	8,200.00	Butte	CONCOW CREEK
			THERMALITO WATER AND SEWER DISTRICT Total		16,400.00		
A011205	6989	3483	THOMAS E NOLTE	11/07/45	1.10	Plumas	CROMBERG SPRING
			THOMAS E NOLTE Total		1.10		
A014810	9849	5616	TIME EADE	05/15/52	0.10	Plumas	UNST
			TIME EADE Total		0.10		
A016582	10535	6631	TOMMIE D MASSSENGILL	09/06/55	2.30	Plumas	UNST
			TOMMIE D MASSSENGILL Total		2.30		
A006171	3243	1089	TRAVIS O MCWILLIAMS	01/28/29	36.70	Butte	BRANCH OF BUSHMAN CREEK
			TRAVIS O MCWILLIAMS Total		36.70		
A009293	5181	2548	U S FOREST SERVICE	05/16/38	17.90	Sierra	UNSP
A014228	8709	3968	U S FOREST SERVICE	04/04/51	0.30	Sierra	UNSP
A014281	8800	4915	U S FOREST SERVICE	05/02/51	0.30	Sierra	UNSP
A014282	8801	4947	U S FOREST SERVICE	05/02/51	1.50	Sierra	LEWIS MILL GUARD STATION SPRING
A014283	8802	5334	U S FOREST SERVICE	05/02/51	0.50	Sierra	SARDINE LOOKOUT SPRING
A014284	8803	4701	U S FOREST SERVICE	05/02/51	0.30	Sierra	UNSP
A014285	8804	4186	U S FOREST SERVICE	05/02/51	0.70	Plumas	UNSP
A014286	8805	5013	U S FOREST SERVICE	05/02/51	1.30	Sierra	UNSP
A014287	8806	4922	U S FOREST SERVICE	05/02/51	0.60	Sierra	UNSP
A023225	16015	10230	U S FOREST SERVICE	01/30/69	0.60	Plumas	HORSETROUGH SPRING
A023226	16014	10274	U S FOREST SERVICE	01/30/69	0.80	Plumas	BECKWOURTH SPRING
A027284	18875		U S FOREST SERVICE	04/07/82	32.00	Sierra	CARMAN CREEK, UNST
			U S FOREST SERVICE Total		56.80		

Feather River - Post-1914 Appropriative Water Rights

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A019416	12655	8021	U S LASSEN NATL FOREST	05/05/60	120.00	Plumas	MORRIS LAKE
A019417	12656	8022	U S LASSEN NATL FOREST	05/05/60	27.00	Plumas	GRASSY LAKE
A019418	12657	8023	U S LASSEN NATL FOREST	05/05/60	27.00	Plumas	SADDLE LAKE
A019419	12658	8024	U S LASSEN NATL FOREST	05/05/60	8.00	Plumas	LONG LAKE
A020429	13430	8025	U S LASSEN NATL FOREST	10/06/61	3.40	Butte	UNSP
A021083	14154	8026	U S LASSEN NATL FOREST	12/14/62	34.00	Plumas	SPRING VALLEY LAKE
			U S LASSEN NATL FOREST Total		219.40		
A008990	5028	2332	U S PLUMAS NATL FOREST	06/05/37	3.10	Plumas	UNCR
A008991	5029	2930	U S PLUMAS NATL FOREST	06/05/37	0.70	Plumas	UNSP
A009514	5369	3736	U S PLUMAS NATL FOREST	03/01/39	33.60	Butte	FOLEY GULCH, MOUNTAIN HOUSE CREEK
A003918	2625	861	U S PLUMAS NATL FOREST	05/24/39	23.40	Plumas	TOLLGATE CREEK
A009734	5826	3747	U S PLUMAS NATL FOREST	09/22/39	4.50	Plumas	UNST
A009770	5559	4894	U S PLUMAS NATL FOREST	11/21/39	4.70	Plumas	UNSP
A010726	6216	2968	U S PLUMAS NATL FOREST	11/05/43	0.90	Plumas	UNSP
A011146	6509	3339	U S PLUMAS NATL FOREST	09/06/45	3.00	Plumas	UNSP
A011907	7171	6503	U S PLUMAS NATL FOREST	05/27/47	1.70	Plumas	UNST
A012038	7092	5500	U S PLUMAS NATL FOREST	08/13/47	2.80	Plumas	KLING RAVINE
A012535	7401	3605	U S PLUMAS NATL FOREST	06/04/48	6.10	Plumas	UNSP
A013625	8291	5325	U S PLUMAS NATL FOREST	03/10/50	4.70	Plumas	COLD SPRINGS
A014761	9211	5070	U S PLUMAS NATL FOREST	04/17/52	0.30	Plumas	UNST
A014815	10916	6076	U S PLUMAS NATL FOREST	05/20/52	540.00	Plumas	SNAKE LAKE
A015676	9796	5371	U S PLUMAS NATL FOREST	01/08/54	0.30	Plumas	FANT SPRING
A016200	10940	8222	U S PLUMAS NATL FOREST	01/12/55	12.30	Plumas	CUB CREEK

No comments

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Feather River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A017074	10784	6101	U S PLUMAS NATL FOREST	05/04/56	0.70	Plumas	UNSP
A017832	11562	6924	U S PLUMAS NATL FOREST	09/23/57	0.20	Plumas	UNSP
A018185	11617	6281	U S PLUMAS NATL FOREST	07/17/58	0.20	Plumas	UNST
A018413	11822	6885	U S PLUMAS NATL FOREST	11/14/58	0.70	Butte	UNSP
A019239	12414	10956	U S PLUMAS NATL FOREST	02/16/60	0.90	Plumas	WEST BRANCH WHITEHORSE CREEK
A019586	12604	7673	U S PLUMAS NATL FOREST	07/28/60	0.70	Butte	BEAR RANCH L O SPRING
A019587	12605	7674	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	RIDGE SPRING
A019588	12606	7675	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	STONY CREEK SPRING
A019589	12607	7676	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	CHIPMUNK SPRING
A019590	12608	7677	U S PLUMAS NATL FOREST	07/28/60	0.20	Plumas	POISON CREEK SPRING
A019591	12609	8061	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	BEAR SPRING
A019592	12610	7678	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	CROCKER CUT-OFF SPRING
A019593	12611	7679	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	LITTLE DIXIE SPRING
A019594	12612	7680	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	DOYLE SPRING
A019596	12614	7682	U S PLUMAS NATL FOREST	07/28/60	0.20	Plumas	JENKINS #3 SPRING
A019597	12615	7683	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	GRANITE SPRING
A019598	12616	7684	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	PLINCO SPRING
A019599	12617	7685	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	CHASE SPRING
A019600	12618	8062	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	COYOTE SPRING
A019601	12619	7686	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	SQUAW CAMP SPRING
A019602	12620	7687	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	HORSE SHOE SPRING
A019603	12621	7688	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	HORTON CANYON SPRING
A019604	12622	8063	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	JUNIPER SPRING

No comments

- n/a -

Feather River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A019605	12623	7689	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	FITCH CANYON SPRING
A019606	12624	7690	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	MAHOGANY SPRING
A019607	12625	7691	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	JENKINS #2 SPRING
A019608	12626	8064	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	MIDWAY HOUSE SPRING
A019609	12627	7692	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	DOWNING CABIN SPRING
A019610	12628	7693	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	JUNIPER SPRING
A019611	12629	8065	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	HOG SPRING
A019612	12630	7694	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	JOHNSON MILL SPRING
A019613	12631	7695	U S PLUMAS NATL FOREST	07/28/60	0.70	Butte	SPOON RAVINE SPRING
A019614	12632	7696	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	LONE SPRING
A019615	12633	7697	U S PLUMAS NATL FOREST	07/28/60	0.40	Plumas	SECTION 15 SPRING
A019617	12635	7699	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	SQUAW SUPPRESSION CAMP SPRING
A019619	12637	8066	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	RATTLESNAKE SPRING
A019620	12638	8067	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	CEDAR SPRING
A019621	12639	8068	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	PINE TREE SPRING
A019622	12640	7700	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	GALEPPI SPRING
A019623	12641	7701	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	MURDOCK CROSSING SPRING
A019624	12642	7702	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	SQUAW VALLEY SPRING
A019625	12643	7703	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	BASS #1 SPRING
A019626	12644	7704	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	SOUTH TROUGH SPRING
A019627	12645	7710	U S PLUMAS NATL FOREST	07/28/60	0.70	Plumas	DAVIDSON MINE SPRING
A019628	12646	8305	U S PLUMAS NATL FOREST	07/28/60	0.30	Plumas	SQUAW CANYON SPRING
A020852	13951	8617	U S PLUMAS NATL FOREST	07/12/62	1.60	Plumas	UNSP

No comments

- n/a -

Feather River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A021295	14364	8995	U S PLUMAS NATL FOREST	05/29/63	0.20	Plumas	BLAKELESS SPRING #2
A021296	14365	8982	U S PLUMAS NATL FOREST	05/29/63	0.80	Plumas	CHASE ENCLOSURE SPRING #2
A021297	14366	8996	U S PLUMAS NATL FOREST	05/29/63	0.80	Plumas	CHASE ENCLOSURE SPRING #1
A021304	14367	8968	U S PLUMAS NATL FOREST	05/29/63	0.80	Plumas	BULSON SPRING NO 3
A021305	14368	8969	U S PLUMAS NATL FOREST	05/29/63	0.80	Plumas	BULSON SPRING NO 2
A021306	14369	8970	U S PLUMAS NATL FOREST	05/29/63	0.80	Plumas	BULSON SPRING NO 1
A021307	14370	8971	U S PLUMAS NATL FOREST	05/29/63	0.60	Plumas	BLAKELESS SPRING NO 4
A021308	14371	8972	U S PLUMAS NATL FOREST	05/29/63	0.30	Plumas	BLAKELESS SPRING NO 1
A021312	14372	8984	U S PLUMAS NATL FOREST	05/29/63	0.50	Plumas	BIG BUCK SPRING
A021313	14373	9004	U S PLUMAS NATL FOREST	05/29/63	1.70	Plumas	HEADQUARTERS SPRING #1, HEADQUARTERS SPRINGS #2&3
A021314	14244	8997	U S PLUMAS NATL FOREST	05/29/63	0.80	Plumas	TROSI CANYON SPRING
A021316	14374	8998	U S PLUMAS NATL FOREST	05/29/63	1.50	Plumas	BIG PINE SPRING
A021317	14375	8999	U S PLUMAS NATL FOREST	05/29/63	0.40	Plumas	CEDAR CANYON SPRING
A022187	15225	8986	U S PLUMAS NATL FOREST	06/10/65	0.10	Plumas	UNST
A024263	16728	10955	U S PLUMAS NATL FOREST	12/19/72	9.00	Plumas	UNSP
A026877	18796		U S PLUMAS NATL FOREST	06/17/81	42.00	Plumas	DOTTA CANYON
			U S PLUMAS NATL FOREST Total		720.60		
A019565	12818	9877	USA-USDA FOREST SERVICE	01/02/09	0.80	Plumas	UNNAMED SPRING
			USA-USDA FOREST SERVICE Total		0.80		
A020529	13891	9187	VERDA F LEE FAMILY DATED 4/11/2001	12/18/61	54.00	Plumas	UNSP
			VERDA F LEE FAMILY DATED 4/11/2001 Total		54.00		
A028992	20339		WALLACE FAMILY TRUST	03/20/87	184.00	Sierra	SIERRA VALLEY CHANNELS
			WALLACE FAMILY TRUST Total		184.00		
A011316	7110	3738	WAYNE RANKIN	05/20/53	108.60	Plumas	BERRY CREEK
			WAYNE RANKIN Total		108.60		
A014113	11518		Yuba County Water District	12/28/50	330,861.98	Butte, Sutter, Plumas	SOUTH FORK FEATHER RIVER, LOST CREEK, FEATHER RIVER

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			Yuba County Water District Total		330,861.98		
			Grand Total		11,862,602.48		

No comments

- n/a -

No comments

- n/a -

Yuba River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A003126	1371	1140	Appropriative	Licensed	ALBERT P STIEFEL	11/08/22	87.10	Butte	UNST, WYMAN RAVINE
					ALBERT P STIEFEL Total		87.10		
A016725	10685	6660	Appropriative	Licensed	ALLEGHANY COUNTY WATER DISTRICT	04/18/02	12.00	Sierra	UNSP
					ALLEGHANY COUNTY WATER DISTRICT Total		12.00		
A016724	10441	7079	Appropriative	Licensed	ALLEN C UPTON	11/08/55	1.00	Butte	WYANDOTTE CREEK
					ALLEN C UPTON Total		1.00		
A028395	20887		Appropriative	Permitted	ALLEN F MOORE	02/22/85	3.00	Yuba	DRY CREEK, UNSP
					ALLEN F MOORE Total		3.00		
A025086	17517	11958	Appropriative	Licensed	ANANDA CHURCH OF SELF REALIZATION	06/16/76	43.20	Nevada	UNST
A028680	20373		Appropriative	Permitted	ANANDA CHURCH OF SELF REALIZATION	12/24/85	29.30	Nevada	UNST
					ANANDA CHURCH OF SELF REALIZATION Total		72.50		
A024824	17031	13124	Appropriative	Licensed	ANDERSON AND ANDERSON INC	06/25/75	25.00	Nevada	UNST
A027748	19166	13125	Appropriative	Licensed	ANDERSON AND ANDERSON INC	05/05/83	1.00	Nevada	UNST
					ANDERSON AND ANDERSON INC Total		26.00		
A028403	20927		Appropriative	Permitted	ANNA MAY ROSE	03/07/85	2.00	Yuba	DRY CREEK, UNST
					ANNA MAY ROSE Total		2.00		
A030234	21008		Appropriative	Permitted	AUBURN SKI CLUB INC	03/15/93	122.00	Nevada	UPPER CASTLE CREEK
					AUBURN SKI CLUB INC Total		122.00		
A025584	17400	11440	Appropriative	Licensed	Bank of America	11/29/77	9.60	Yuba	UNST
					Bank of America Total		9.60		
A006099	3220	1080	Appropriative	Licensed	BENJAMIN N BORSOFF	10/19/28	17.90	Yuba	EAST BRANCH RICH GULCH
					BENJAMIN N BORSOFF Total		17.90		
A018175	11802	6611	Appropriative	Licensed	BERNICE ROSENLOF	06/10/58	12.50	Nevada	UNST
					BERNICE ROSENLOF Total		12.50		
A019562	12917	7493	Appropriative	Licensed	BILL AABERG	07/20/60	0.30	Sierra	UNST
					BILL AABERG Total		0.30		
A024530	17274	11238	Appropriative	Licensed	BILLY G CAROTHERS	01/21/74	10.00	Nevada	SWEETLAND CREEK
					BILLY G CAROTHERS Total		10.00		
A020521	13657	8703	Appropriative	Licensed	BITNEY SPRINGS LLC	12/11/61	14.00	Nevada	UNST
					BITNEY SPRINGS LLC Total		14.00		
A026408	18310	12153	Appropriative	Licensed	BOB LATTA	06/06/80	0.80	Sierra	HOWARD CREEK, NORTH YUBA RIVER
					BOB LATTA Total		0.80		

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A005590	2913	814	Appropriative	Licensed	BRADLEY T SHARPE	07/01/27	2.20	Yuba	WEST BRANCH RICH GULCH
A005677	2914	815	Appropriative	Licensed	BRADLEY T SHARPE	09/07/27	18.10	Yuba	WEST BRANCH RICH GULCH
A006096	3218	1084	Appropriative	Licensed	BRADLEY T SHARPE	10/19/28	1.00	Yuba	WEST BRANCH RICH GULCH
A006097	3219	1085	Appropriative	Licensed	BRADLEY T SHARPE	10/19/28	17.90	Yuba	WEST BRANCH RICH GULCH
					BRADLEY T SHARPE Total		39.20		
A020485	13927	8368	Appropriative	Licensed	Brian Brackbill	11/08/61	0.60	Sierra	Unnamed Stream
					Brian Brackbill Total		0.60		
A019560	12915	7492	Appropriative	Licensed	BRIAN G JACOBS	07/20/60	0.20	Sierra	UNST
					BRIAN G JACOBS Total		0.20		
A008986	5083	2182	Appropriative	Licensed	BROWNS VALLEY IRRIGATION DISTRICT	03/01/41	2,171.90	Yuba	TENNESSEE CREEK
A013130	8649	13608	Appropriative	Licensed	BROWNS VALLEY IRRIGATION DISTRICT	08/31/05	20,000.00	Yuba	DRY CREEK
A013873	9703	13609	Appropriative	Licensed	BROWNS VALLEY IRRIGATION DISTRICT	08/31/05	31,900.00	Yuba	DRY CREEK
A023757	16792	13610	Appropriative	Licensed	BROWNS VALLEY IRRIGATION DISTRICT	08/31/05	11,000.00	Yuba	DRY CREEK
					BROWNS VALLEY IRRIGATION DISTRICT Total		65,071.90		
A023135	15964	10995	Appropriative	Licensed	BRUCE K JORDAN	09/18/68	0.90	Nevada	UNSP
					BRUCE K JORDAN Total		0.90		
A024293	16636	10700	Appropriative	Licensed	BRUCE L RAYNER	01/30/73	1.80	Nevada	MOSQUITO CREEK
					BRUCE L RAYNER Total		1.80		
A029103	20530	13712	Appropriative	Licensed	CAL-WESTERN RECONVEYANCE CORPORATION	05/09/07	6.70	Butte	ROBINSON RAVINE
					CAL-WESTERN RECONVEYANCE CORPORATION Total		6.70		
A013870	8369	4804	Appropriative	Licensed	CALIF DEPT OF FORESTRY AND FIRE PROTECTION	07/27/50	2.40	Nevada	UNSP
					CALIF DEPT OF FORESTRY AND FIRE PROTECTION Total		2.40		
A020427	13564	7019	Appropriative	Licensed	CAROL BROOKS	10/05/61	0.60	Sierra	UNSP
					CAROL BROOKS Total		0.60		
A016874	10804	9323	Appropriative	Licensed	CAROL B DARDICK	01/31/56	21.40	Nevada	UNST
					CAROL B DARDICK Total		21.40		
A019282	12436	7169	Appropriative	Licensed	CATHOLIC YOUTH ORGANIZATION	03/04/60	3.40	Yuba	UNSP
					CATHOLIC YOUTH ORGANIZATION Total		3.40		
A024183	16604	10883	Appropriative	Licensed	CHARLES FOWLER	09/15/72	0.10	Nevada	LEFT OVER SPRING
					CHARLES FOWLER Total		0.10		
A024559	16997	13267	Appropriative	Licensed	CHARLES A JOHNSON	02/21/74	2.20	Nevada	UNSP

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
					CHARLES A JOHNSON Total		2.20		
A028191	20013		Appropriative	Permitted	CHEROKEE NEVADA CORPORATION	11/21/94	1,445.00	Sierra	UNST
					CHEROKEE NEVADA CORPORATION Total		1,445.00		
A019561	12916	7540	Appropriative	Licensed	CHRISTIAN HUNTINGTON	07/20/60	0.20	Sierra	UNST
					CHRISTIAN HUNTINGTON Total		0.20		
A014960	9302	7082	Appropriative	Licensed	Christopher W Miller	08/12/52	0.40	Placer	UNSP
					Christopher W Miller Total		0.40		
A026117	18434	12293	Appropriative	Licensed	CITY OF NEVADA CITY	10/17/79	53.70	Nevada	LITTLE DEER CREEK, UNST
					CITY OF NEVADA CITY Total		53.70		
A021158	14239	9010	Appropriative	Licensed	CONSTANCE C CLOVER	02/13/63	1.00	Sierra	UNSP
					CONSTANCE C CLOVER Total		1.00		
A005880	3102	2172	Appropriative	Licensed	COUGHLAN FAMILY RANCH	04/16/28	1,013.60	Nevada	BONNIE RAVINE, GLENNON RAVINE, ROBERTS CREEK
					COUGHLAN FAMILY RANCH Total		1,013.60		
A023111	15803	10206	Appropriative	Licensed	CRAIG LABADIE	08/13/68	0.80	Sierra	UNST
					CRAIG LABADIE Total		0.80		
A004731	2393	735	Appropriative	Licensed	CYRUS M ROLLINS	08/12/25	2.40	Sierra	UNSP
A006120	3232	1309	Appropriative	Licensed	CYRUS M ROLLINS	11/13/28	1.70	Sierra	UNST
					CYRUS M ROLLINS Total		4.10		
A023082	15977	10901	Appropriative	Licensed	DAN T THOMPSON	07/10/68	10.20	Nevada	KENTUCKY RAVINE
					DAN T THOMPSON Total		10.20		
A021554	14793	9832	Appropriative	Licensed	DANIEL MASON	11/27/63	18.00	Nevada	FRENCH CORRAL CREEK
					DANIEL MASON Total		18.00		
A021672	14830	9700	Appropriative	Licensed	DANIEL J GUYER	03/05/64	140.00	Sierra	UNST
					DANIEL J GUYER Total		140.00		
A017285	11045	7214	Appropriative	Licensed	DAVE KING	09/20/56	37.00	Nevada	KENTUCKY RAVINE
					DAVE KING Total		37.00		
A019710	12873	10129	Appropriative	Licensed	David Grenell	08/24/60	1.10	Sierra	THOMAS ELLIS SPRING #3, THOMAS ELLIS SPRING #4
					David Grenell Total		1.10		
A023514	16108	10245	Appropriative	Licensed	DAVID HERSHBERGER	05/20/70	0.30	Nevada	UNSP
A026065	17908	12157	Appropriative	Licensed	DAVID HERSHBERGER	08/14/79	0.60	Nevada	UNSP
					DAVID HERSHBERGER Total		0.90		
A019025	12515	7832	Appropriative	Licensed	DAVID RUMSEY	10/09/59	0.20	Sierra	UNSP
					DAVID RUMSEY Total		0.20		
A020313	13946	8660	Appropriative	Licensed	DAVID WALSH	07/21/61	0.20	Sierra	UNST
					DAVID WALSH Total		0.20		
A022928	15954	10996	Appropriative	Licensed	DAVID B JORDON	10/13/67	0.90	Nevada	UNSP
					DAVID B JORDON Total		0.90		
A027876	19125	12696	Appropriative	Licensed	DAVID B PEDERSON	09/15/83	1.40	Yuba	UNST
					DAVID B PEDERSON Total		1.40		
A016558	11367	8127	Appropriative	Licensed	DAVID C BREWER	08/29/55	4.20	Nevada	LITTLE ROCK CREEK
					DAVID C BREWER Total		4.20		

No comments

- n/a -

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A022898	15669	11110	Appropriative	Licensed	DAVID K DAVISON	08/28/67	4.70	Sierra	HUNGRY MOUTH CANYON
					DAVID K DAVISON Total		4.70		
A025105	17076	11251	Appropriative	Licensed	DAVID W MARKS	07/19/76	11.00	Nevada	KENTUCKY RAVINE
					DAVID W MARKS Total		11.00		
A021598	14416	8825	Appropriative	Licensed	DAWN B VINJE	01/15/64	18.00	Yuba	UNST
					DAWN B VINJE Total		18.00		
A019390	12911	8810	Appropriative	Licensed	DENISE STEBLER	04/26/60	1.60	Sierra	ROCK CREEK
					DENISE STEBLER Total		1.60		
A022566	15575	9896	Appropriative	Licensed	DIANE W ROLLINS	04/14/72	20.00	Sierra	DRURY RAVINE
					DIANE W ROLLINS Total		20.00		
A010009	5687	4866	Appropriative	Licensed	DICKEY EXPLORATION COMPANY	09/23/40	97.00	Sierra	WET RAVINE
					DICKEY EXPLORATION COMPANY Total		97.00		
A023535	16409	11027	Appropriative	Licensed	DIRK C REED	06/24/70	15.70	Nevada	UNST, WILLOW VALLEY CREEK
					DIRK C REED Total		15.70		
A030332	21118		Appropriative	Permitted	DONNER SUMMIT PUBLIC UTILITY DISTRICT	02/08/94	664.00	Nevada	LAKE ANGELA
					DONNER SUMMIT PUBLIC UTILITY DISTRICT Total		664.00		
A025719	17610	12075	Appropriative	Licensed	DOROTHEA SELBY	04/17/78	13.50	Yuba	UNST
					DOROTHEA SELBY Total		13.50		
A028988	20947		Appropriative	Permitted	Dorothy Pencik	03/16/87	24.00	Sierra	OAK VALLEY CREEK
					Dorothy Pencik Total		24.00		
A020808	13929	8700	Appropriative	Licensed	DOROTHY L VENDLEY	07/19/68	9.20	Nevada	SPRING CREEK
					DOROTHY L VENDLEY Total		9.20		
A009827	5663	2650	Appropriative	Licensed	DOWNIEVILLE PUBLIC UTILITY DISTRICT	05/15/01	114.00	Sierra	PAULEY CREEK
					DOWNIEVILLE PUBLIC UTILITY DISTRICT Total		114.00		
A026227	17973	11822	Appropriative	Licensed	DUANE FRED LEE	02/21/80	2.60	Nevada	UNST
					DUANE FRED LEE Total		2.60		
A022735	15630	10005	Appropriative	Licensed	DUANE T NICHOLSON	03/05/73	4.50	Yuba	UNST
					DUANE T NICHOLSON Total		4.50		
A020146	13371	8148	Appropriative	Licensed	DWAYNE M DOBBINS	05/24/61	0.20	Nevada	UNSP
					DWAYNE M DOBBINS Total		0.20		
A024876	17136	11423	Appropriative	Licensed	EDWARD CARTER	09/10/75	2.20	Yuba	UNST
					EDWARD CARTER Total		2.20		
A020291	13386	9922	Appropriative	Licensed	ELLEN DAVIS	05/12/72	102.00	Yuba	LITTLE DRY CREEK
					ELLEN DAVIS Total		102.00		
A015415	9591	5978	Appropriative	Licensed	Eric Christopher Dunisch	07/16/53	0.40	Placer	UNSP
					Eric Christopher Dunisch Total		0.40		
A013594	7966	4185	Appropriative	Licensed	ERMA B BELLETT	02/20/50	61.00	Nevada	UNST

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A013772	8313	4184	Appropriative	Licensed	ERMA B BELLETT	06/05/50	19.00	Nevada	UNST
					ERMA B BELLETT Total		80.00		
A019723	13031	9257	Appropriative	Licensed	ERNEST LOCATELLI	08/31/60	6.50	Sierra	MINE TUNNEL
					ERNEST LOCATELLI Total		6.50		
A020340	13854	8677	Appropriative	Licensed	Estate of Luella Debruin	08/02/61	4.90	Nevada	FRENCH CORRAL CREEK, UNST
A022900	15557	10027	Appropriative	Licensed	Estate of Luella Debruin	09/01/67	5.30	Nevada	UNST
					Estate of Luella Debruin Total		10.20		
A003332	1725	3267	Appropriative	Licensed	FAR VIEW ENTERPRISES INC	03/27/23	191.90	Butte	KINGS CREEK, LINCOLN HOUSE RAVINE
A016151	10611	7713	Appropriative	Licensed	FAR VIEW ENTERPRISES INC	11/23/54	50.00	Butte	LINCOLN HOUSE RAVINE
					FAR VIEW ENTERPRISES INC Total		241.90		
A017887	11400	6918	Appropriative	Licensed	FELLOWSHIP OF FRIENDS, INC	11/20/57	2.40	Yuba	UNST
A022518	15590	9584	Appropriative	Licensed	FELLOWSHIP OF FRIENDS, INC	07/06/66	3.20	Yuba	UNST
A025865	17749	13546	Appropriative	Licensed	FELLOWSHIP OF FRIENDS, INC	07/17/03	40.00	Yuba	WOODS CREEK
A027042	19277	13547	Appropriative	Licensed	FELLOWSHIP OF FRIENDS, INC	07/17/03	16.00	Yuba	UNST
A027043	19278	13548	Appropriative	Licensed	FELLOWSHIP OF FRIENDS, INC	07/17/03	42.00	Yuba	WOODS CREEK
					FELLOWSHIP OF FRIENDS, INC Total		103.60		
A007217	4420	2197	Appropriative	Licensed	FLORENCE B VON PLATEN	03/28/32	9.50	Nevada	UNXX
					FLORENCE B VON PLATEN Total		9.50		
A020310	13945	8349	Appropriative	Licensed	FORREST THOMAS	07/19/61	0.60	Sierra	UNSP
					FORREST THOMAS Total		0.60		
A010186	5823	2957	Appropriative	Licensed	FORSYTHE FAMILY TRUST	04/18/41	3.40	Sierra	UNSP
					FORSYTHE FAMILY TRUST Total		3.40		
A019007	12872	10128	Appropriative	Licensed	FRANCIS B PLANT	09/29/59	1.80	Sierra	SPRING #3, THOMAS ELLIS SPRING #1, THOMAS ELLIS SPRING #2, UNSP
					FRANCIS B PLANT Total		1.80		
A028922	20946		Appropriative	Permitted	Frank Pencik	10/20/86	6.00	Sierra	OAK VALLEY CREEK
					Frank Pencik Total		6.00		
A016792B	10815	008072B	Appropriative	Licensed	FRANK A MACHI	12/06/85	4.70	Nevada	UNST
					FRANK A MACHI Total		4.70		
A023956	16404	12058	Appropriative	Licensed	FRANKLIN JONES	12/30/71	0.60	Nevada	UNST

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
					FRANKLIN JONES Total		0.60		
A012154	7067	7040	Appropriative	Licensed	Gary J. Howsley	11/14/47	120.10	Yuba	LITTLE DRY CREEK
					Gary J. Howsley Total		120.10		
A019827	14390	9729	Appropriative	Licensed	GARY POOR	04/08/71	5.30	Sierra	UNST
					GARY POOR Total		5.30		
A009765	5532	4921	Appropriative	Licensed	GARY ZOLLDAN	11/09/39	1.50	Sierra	HARDY SPRING
					GARY ZOLLDAN Total		1.50		
A014371	9978	5645	Appropriative	Licensed	GARY D SMITH	06/27/51	2,903.80	Yuba	FRENCH DRY CREEK
					GARY D SMITH Total		2,903.80		
A017407	11040	6917	Appropriative	Licensed	GARY W DE MAR	12/26/56	72.50	Sierra	ARIZONA TUNNEL SPRING
					GARY W DE MAR Total		72.50		
A022567	15585	9649	Appropriative	Licensed	GEORGE KOOLERY	09/02/66	1.90	Sierra	UNSP
					GEORGE KOOLERY Total		1.90		
A022341	15153	9652	Appropriative	Licensed	GEORGINE TOMASI	11/23/65	0.80	Nevada	UNST
					GEORGINE TOMASI Total		0.80		
A023893	16447	10718	Appropriative	Licensed	GERALD BROOKS	10/07/71	16.00	Nevada	OWL CREEK
					GERALD BROOKS Total		16.00		
A002696	1200	511	Appropriative	Licensed	GOLD LAKE HOLDINGS LLC	12/21/21	3.00	Sierra	UNCR
					GOLD LAKE HOLDINGS LLC Total		3.00		
A028147	19447		Appropriative	Permitted	GREENE ACRES PROPERTY OWNERS ASSOCIATION	06/04/84	14.00	Sierra	UNSP
					GREENE ACRES PROPERTY OWNERS ASSOCIATION Total		14.00		
A026763	18953	12672	Appropriative	Licensed	GREGORY G KSANDER	03/25/81	0.20	Sierra	UNSP
					GREGORY G KSANDER Total		0.20		
A023470	16259	10568	Appropriative	Licensed	GREGORY L COMBS	03/19/70	5.40	Nevada	UNST
					GREGORY L COMBS Total		5.40		
A015100	9828	5683	Appropriative	Licensed	GUS NORTON	12/01/52	0.80	Sierra	UNST
					GUS NORTON Total		0.80		
A026703	18532	12361	Appropriative	Licensed	Heidi Biber	02/03/81	1.20	Nevada	UNST
					Heidi Biber Total		1.20		
A014962	9304	5295	Appropriative	Licensed	HELENE M WULBERN REVOCABLE TRUST 11/21/02	08/12/52	0.20	Placer	UNSP
					HELENE M WULBERN REVOCABLE TRUST 11/21/02 Total		0.20		
A014390A	008798A	007078A	Appropriative	Licensed	HENRY C LITTLE	07/31/92	20.00	Butte	WYANDOTTE CREEK
					HENRY C LITTLE Total		20.00		
A020243	13943	8370	Appropriative	Licensed	Hilary Winslow	06/01/61	0.60	Sierra	UNSP
					Hilary Winslow Total		0.60		
A030265	20863		Appropriative	Permitted	HOLT FAMILY TRUST	07/07/93	7.00	Sierra	UNST
					HOLT FAMILY TRUST Total		7.00		
A026949	18911	12397	Appropriative	Licensed	HUEY JOHNSON	08/10/81	0.20	Nevada	UNST
					HUEY JOHNSON Total		0.20		

No comments

- n/a -

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A028682	20102		Appropriative	Permitted	HUTCH H HUTCHISON	12/26/85	0.50	Nevada	UNSP
					HUTCH H HUTCHISON Total		0.50		
A010716	6336	3002	Appropriative	Licensed	IRVING N CHRISTENSEN	10/05/43	7.80	Sierra	UNSP
A019279	12546	7168	Appropriative	Licensed	IRVING N CHRISTENSEN	03/04/60	4.50	Sierra	UNSP
					IRVING N CHRISTENSEN Total		12.30		
A011257	6539	3342	Appropriative	Licensed	JACK E BERNDT	01/10/46	4.30	Sierra	UNSP, UNST
					JACK E BERNDT Total		4.30		
A014991	9201	5305	Appropriative	Licensed	JAMES NEWMAN	08/22/52	2.20	Nevada	UNST
					JAMES NEWMAN Total		2.20		
A012118	7160	3884	Appropriative	Licensed	James & Aileen Stevens Revocable Trust	10/03/47	15.00	Yuba	LITTLE DRY CREEK
A014946	9652	5084	Appropriative	Licensed	James & Aileen Stevens Revocable Trust	07/31/52	11.00	Yuba	LITTLE DRY CREEK
					James & Aileen Stevens Revocable Trust Total		26.00		
A019647	12870	8606	Appropriative	Licensed	JAMES K CHRISTENSEN	08/04/60	27.80	Sierra	EMPIRE SPRING
					JAMES K CHRISTENSEN Total		27.80		
A018804	12160	8625	Appropriative	Licensed	JAMES L MOHAN	06/17/59	1.00	Yuba	MOONSHINE CREEK
					JAMES L MOHAN Total		1.00		
A010181	6026	2944	Appropriative	Licensed	James M & Aileen Stevens Rev Tr	04/09/41	98.70	Yuba	LITTLE DRY CREEK
					James M & Aileen Stevens Rev Tr Total		98.70		
A026522	18513	12362	Appropriative	Licensed	JAMES NELSON DEGLANDON	09/11/80	24.00	Nevada	UNST
					JAMES NELSON DEGLANDON Total		24.00		
A026282	18202	12016	Appropriative	Licensed	JAMES R CUMMINS	04/09/80	6.10	Yuba	UNST
					JAMES R CUMMINS Total		6.10		
A021865	14988	8879	Appropriative	Licensed	JAMES S AVILLA	08/05/64	0.30	Placer	UNSP
					JAMES S AVILLA Total		0.30		
A010839	6383	3431	Appropriative	Licensed	Jana Burgess-Henry	07/15/44	29.00	Yuba	WAGNER CREEK
					Jana Burgess-Henry Total		29.00		
A013342	8218	4055	Appropriative	Licensed	Janie Kouch	09/08/49	1.20	Yuba	SOUTH HONCUT CREEK
					Janie Kouch Total		1.20		
A024799	17750	12294	Appropriative	Licensed	JAY CORY	04/14/75	0.20	Sierra	UNSP
					JAY CORY Total		0.20		
A021644	14628	9333	Appropriative	Licensed	JENISE J WARDEN	02/13/64	0.40	Nevada	UNSP
					JENISE J WARDEN Total		0.40		
A010856	6542	3299	Appropriative	Licensed	JERRY DON ELLSWORTH	03/14/01	57.00	Sierra	FIDDLE CREEK
					JERRY DON ELLSWORTH Total		57.00		
A025403	17354	11466	Appropriative	Licensed	JESSIE C TROST	06/23/77	0.10	Yuba	UNST
					JESSIE C TROST Total		0.10		
A020770	14744	9239	Appropriative	Licensed	JO HAMILTON	05/10/62	2.00	Nevada	UNSP (2)
					JO HAMILTON Total		2.00		
A021970	14989	8881	Appropriative	Licensed	JOAN M HANSON	11/23/64	1.00	Placer	UNSP
					JOAN M HANSON Total		1.00		
A025503	18013	13383	Appropriative	Licensed	JOE W ALEXANDER	09/12/77	49.90	Yuba	UNST
A026515A	018442A	13384	Appropriative	Licensed	JOE W ALEXANDER	02/05/92	5.20	Yuba	UNST

No comments

- n/a -

Yuba River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A026515B	018422B	13385	Appropriative	Licensed	JOE W ALEXANDER	02/05/92	6.00	Yuba	UNST
					JOE W ALEXANDER Total		61.10		
A006057	3283	2041	Appropriative	Licensed	JOHN BARKER	09/17/28	5.10	Sierra	UNSP
					JOHN BARKER Total		5.10		
A025542	17408	11250	Appropriative	Licensed	JOHN FARACE	10/27/77	1.80	Yuba	KEYSTONE CREEK
					JOHN FARACE Total		1.80		
A018696	12090	7389	Appropriative	Licensed	JOHN A PARKER	05/07/59	0.20	Sierra	UNST
					JOHN A PARKER Total		0.20		
A013656	8167	5234	Appropriative	Licensed	JOHN H LUNDIN	03/28/50	1.60	Yuba	UNST
					JOHN H LUNDIN Total		1.60		
A026073	18076	12085	Appropriative	Licensed	JOHN R POWERS III & JANEY H POWERS REVOC TRUST DATED 9/6/00	08/24/79	4.20	Nevada	UNST
					JOHN R POWERS III & JANEY H POWERS REVOC TRUST DATED 9/6/00 Total		4.20		
A017288	10935	6019	Appropriative	Licensed	JOHN T SMEE	09/21/56	0.10	Sierra	UNST
					JOHN T SMEE Total		0.10		
A010173	5777	4026	Appropriative	Licensed	JOSEPH E MARCANTONIO	03/29/41	36.50	Sierra	SLATE CASTLE RAVINE
A018484	11894	6979	Appropriative	Licensed	JOSEPH E MARCANTONIO	01/21/59	0.50	Sierra	SLATE CASTLE CREEK
					JOSEPH E MARCANTONIO Total		37.00		
A012700	7530	3719	Appropriative	Licensed	JULI SHAPIRO-ABDEEN	09/15/48	25.00	Nevada	UNST
					JULI SHAPIRO-ABDEEN Total		25.00		
A016732	11900	6537	Appropriative	Licensed	JUNE BURCHAM WILHELM	11/10/55	0.50	Nevada	UNXX
					JUNE BURCHAM WILHELM Total		0.50		
A019448	13768	8041	Appropriative	Licensed	KATHARINE SPIERS	05/24/60	42.00	Yuba	UNST
					KATHARINE SPIERS Total		42.00		
A018914	12417	7415	Appropriative	Licensed	Katherine Greene	08/14/59	17.00	Yuba	GARDEN RAVINE
					Katherine Greene Total		17.00		
A020792	14164	8897	Appropriative	Licensed	KATHLEEN H GOLDEN	05/25/62	0.20	Sierra	UNSP
					KATHLEEN H GOLDEN Total		0.20		
A014740	9017	5273	Appropriative	Licensed	KEITH L DOLAR	04/04/52	85.30	Butte	UNST
					KEITH L DOLAR Total		85.30		
A026245	18702	12528	Appropriative	Licensed	KEN BURKINDINE	03/04/80	0.40	Sierra	UNST
					KEN BURKINDINE Total		0.40		
A027819	19238	12680	Appropriative	Licensed	KEVIN HOMAN	08/04/83	2.00	Nevada	UNST
					KEVIN HOMAN Total		2.00		
A008330	4661	1928	Appropriative	Licensed	KIM HEMSTALK	05/04/35	5.00	Sierra	COYOTE RAVINE
					KIM HEMSTALK Total		5.00		
A023315	16073		Appropriative	Permitted	KINGVALE PROPERTY OWNERS & WATER USERS INC	07/18/69	20.00	Nevada	FOCHETTI SPRING, LOLA MONTEZ SPRING, S P SPRING
					KINGVALE PROPERTY OWNERS & WATER USERS INC Total		20.00		
A026074	18088		Appropriative	Permitted	LA PORTE PINES COUNTRY CLUB	08/24/79	55.00	Plumas	UNSP, UNSP(2), UNST

No comments

- n/a -

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A027273	18597		Appropriative	Permitted	LA PORTE PINES COUNTRY CLUB	09/17/02	54.80	Plumas	UNSP
					LA PORTE PINES COUNTRY CLUB Total		109.80		
A004494	2081	781	Appropriative	Licensed	LAKE VERA MUTUAL WATER COMPANY	03/06/25	70.00	Nevada	ROCK CREEK
A005719	2979	782	Appropriative	Licensed	LAKE VERA MUTUAL WATER COMPANY	10/13/27	729.90	Nevada	ROCK CREEK
					LAKE VERA MUTUAL WATER COMPANY Total		799.90		
A023047	15779	10779	Appropriative	Licensed	LAKE WILDWOOD ASSOCIATION	05/17/68	3,840.00	Nevada	DEER CREEK
					LAKE WILDWOOD ASSOCIATION Total		3,840.00		
A007657	4239	6379	Appropriative	Licensed	LANCE BARLEAN	08/28/33	3.40	Yuba	UNSP
					LANCE BARLEAN Total		3.40		
A028134	20886	13842	Appropriative	Licensed	LEAH M STOCKER	11/08/11	5.00	Yuba	UNST
					LEAH M STOCKER Total		5.00		
A018396	11929	7012	Appropriative	Licensed	LEONARD C FUQUA	11/05/58	0.20	Sierra	COLD SPRING
					LEONARD C FUQUA Total		0.20		
A029180	20522		Appropriative	Permitted	LINDA BATES	03/19/02	5.00	Sierra	GRIZZLY GULCH
					LINDA BATES Total		5.00		
A026605	18765	13817	Appropriative	Licensed	LINDA BIRGE	01/05/11	45.00	Nevada	UNST
					LINDA BIRGE Total		45.00		
A024857	17681	12173	Appropriative	Licensed	LOUIS CLIFFORD LESTER SR	08/14/75	14.50	Nevada	UNST
					LOUIS CLIFFORD LESTER SR Total		14.50		
A012025	7313	6960	Appropriative	Licensed	LOWELL G ROBINSON	08/05/47	0.30	Sierra	UNSP
					LOWELL G ROBINSON Total		0.30		
A022801	15654	10430	Appropriative	Licensed	MAPLE GROVE MUTUAL WATER COMPANY	06/05/67	1.10	Sierra	CEDAR SPRING
A023795	16373		Appropriative	Permitted	MAPLE GROVE MUTUAL WATER COMPANY	06/02/71	10.00	Sierra	UNSP, WIXON SPRING
					MAPLE GROVE MUTUAL WATER COMPANY Total		11.10		
A006834	3665	1878	Appropriative	Licensed	MARIE BERTILLION COLLINS	11/19/30	0.70	Sierra	UNSP
A024808	16940	11499	Appropriative	Licensed	MARIE BERTILLION COLLINS	05/07/75	0.70	Sierra	UNSP
A026189	18266		Appropriative	Permitted	MARIE BERTILLION COLLINS	01/08/99	2.00	Sierra	UNSP
					MARIE BERTILLION COLLINS Total		3.40		
A018779	12139	8117	Appropriative	Licensed	MARIE M LANDERS	06/09/59	0.30	Sierra	UNSP
					MARIE M LANDERS Total		0.30		
A013399	8022	3796	Appropriative	Licensed	MARIN COUNCIL BOY SCOUT TRUST FUND #2	10/13/49	42.50	Nevada	CHUBB LAKE
					MARIN COUNCIL BOY SCOUT TRUST FUND #2 Total		42.50		
A014999	9301	5983	Appropriative	Licensed	MARK MOORE	08/12/52	0.40	Placer	UNSP
					MARK MOORE Total		0.40		
A015345	9575	5185	Appropriative	Licensed	MARK ROTH	06/09/58	0.10	Placer	UNSP

Yuba River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
					MARK ROTH Total		0.10		
A018079	11547	6800	Appropriative	Licensed	MARTIN FAMILY TRUST	04/02/58	3.70	Nevada	UNST
					MARTIN FAMILY TRUST Total		3.70		
A027000	18773	13792	Appropriative	Licensed	MAURICE ALTSHULER	05/28/09	20.00	Nevada	UNST
A030728	21195	13793	Appropriative	Licensed	MAURICE ALTSHULER	05/28/09	6.00	Nevada	UNST
					MAURICE ALTSHULER Total		26.00		
A021251	14195	9944	Appropriative	Licensed	MICHAEL CIAFARDONI	04/22/63	17.00	Nevada	UNST
					MICHAEL CIAFARDONI Total		17.00		
A025891	17758	11770	Appropriative	Licensed	MICHAEL K SCHARF	12/26/78	1.70	Nevada	UNST
					MICHAEL K SCHARF Total		1.70		
A009750	5462	3069	Appropriative	Licensed	MILTON R HOLSTROM	10/13/39	726.00	Sierra	EMPIRE CREEK, UNSP
					MILTON R HOLSTROM Total		726.00		
A024730	17134	11755	Appropriative	Licensed	Modern Building Inc.	12/20/74	25.00	Butte	UNST
					Modern Building Inc. Total		25.00		
A001270	2082	12795	Appropriative	Licensed	NEVADA IRRIGATION DISTRICT	07/10/91	130,701.50	Nevada	CANYON CREEK, FALL CREEK, JACKSON CREEK, TEXAS CREEK, TRAP CREEK
A001614	1481		Appropriative	Permitted	NEVADA IRRIGATION DISTRICT	01/08/20	60,000.00	Nevada	DEER CREEK
A001615	5801	8808	Appropriative	Licensed	NEVADA IRRIGATION DISTRICT	01/08/20	36,496.40	Nevada	DEER CREEK, SOUTH FORK DEER CREEK
A002276	2085	12797	Appropriative	Licensed	NEVADA IRRIGATION DISTRICT	03/25/21	60,000.00	Nevada, Sierra	MIDDLE YUBA RIVER
A005193	13770		Appropriative	Permitted	NEVADA IRRIGATION DISTRICT	09/08/26	50,000.00	Nevada, Sierra	MIDDLE YUBA RIVER (@ MILTON DAM), MIDDLE YUBA RIVER (@JACKSON MEADOWS DAM)
A006702	5807	12800	Appropriative	Licensed	NEVADA IRRIGATION DISTRICT	06/16/30	4,889.30	Nevada	CLEAR CREEK, FALL CREEK, TRAP CREEK
A008180	5815		Appropriative	Permitted	NEVADA IRRIGATION DISTRICT	11/27/34	207,894.90	Nevada	CLEAR CREEK, FALL CREEK, RUCKER CREEK, TEXAS CREEK, TRAP CREEK
A020017	13772		Appropriative	Permitted	NEVADA IRRIGATION DISTRICT	03/06/61	101,160.00	Nevada	SOUTH YUBA RIVER
					NEVADA IRRIGATION DISTRICT Total		651,142.10		
A014961	9303	6158	Appropriative	Licensed	NORMAN R PICKLES	08/12/52	0.40	Placer	UNSP
					NORMAN R PICKLES Total		0.40		
A013957	11516		Appropriative	Permitted	North Yuba Water District	08/18/58	145,084.30	Plumas, Yuba	SLATE CREEK
					North Yuba Water District Total		145,084.30		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A013959	8944	4700	Appropriative	Licensed	O'Brien Ranch LLC	09/21/50	983.80	Butte, Yuba	SOUTH HONCUT CREEK
					O'Brien Ranch LLC Total		983.80		
A018565	12005	6754	Appropriative	Licensed	OLIVER G MILHOUS	03/03/59	20.00	Nevada	UNST
					OLIVER G MILHOUS Total		20.00		
A000481	203	368	Appropriative	Licensed	ORIGINAL SIXTEEN TO ONE MINE, INC	07/31/24	724.00	Sierra	BUCKEYE RAVINE
A001193	562	121	Appropriative	Licensed	ORIGINAL SIXTEEN TO ONE MINE, INC	02/25/19	362.00	Sierra	UNSP
					ORIGINAL SIXTEEN TO ONE MINE, INC Total		1,086.00		
A013689	8312	3836	Appropriative	Licensed	OSHA B READER	04/14/50	49.60	Sierra	UNST
A018928	12203	6983	Appropriative	Licensed	OSHA B READER	08/20/59	1.70	Sierra	UNSP
					OSHA B READER Total		51.30		
A011120	6599	3392	Appropriative	Licensed	OSTROM FAMILY TRUST	07/27/45	12.00	Sierra	UNSP
A011501	6713	3393	Appropriative	Licensed	OSTROM FAMILY TRUST	08/07/46	38.20	Sierra	UNSP
A017135	10850	6922	Appropriative	Licensed	OSTROM FAMILY TRUST	06/14/56	0.20	Sierra	UNSP
A017137	10852	5981	Appropriative	Licensed	OSTROM FAMILY TRUST	06/14/56	0.10	Sierra	UNSP
A018782	12221		Appropriative	Permitted	OSTROM FAMILY TRUST	10/02/01	40.10	Sierra	ANDERSON SPRING
A023778	16372		Appropriative	Permitted	OSTROM FAMILY TRUST	05/04/71	24.10	Sierra	UNSP, WIXON SPRING
					OSTROM FAMILY TRUST Total		114.70		
A024165	16758	11081	Appropriative	Licensed	PACIFIC EDGE INC	08/30/72	9.00	Yuba	UNST
					PACIFIC EDGE INC Total		9.00		
A015542	9622	5189	Appropriative	Licensed	PAUL F BUKENHOFER	09/17/53	72.50	Yuba	UNST
					PAUL F BUKENHOFER Total		72.50		
A020823	13820	8729	Appropriative	Licensed	PAULA M SCHROEDER	06/20/62	0.60	Sierra	UNSP
					PAULA M SCHROEDER Total		0.60		
A018176	11803	8201	Appropriative	Licensed	PHILIP PERSONENI	06/10/58	91.70	Nevada	SHADY CREEK
					PHILIP PERSONENI Total		91.70		
A024842	17048	11439	Appropriative	Licensed	PHILIP J SIMMONS	07/22/75	1.00	Sierra	UNST
					PHILIP J SIMMONS Total		1.00		
A009617	5497	2705	Appropriative	Licensed	PONTA, MELVIN J & MARCELLA M 1984 REVOCABLE TRUST	09/26/44	39.80	Sierra	WOODRUFF CREEK
A011994	7054	3526	Appropriative	Licensed	PONTA, MELVIN J & MARCELLA M 1984 REVOCABLE TRUST	07/16/47	1.60	Sierra	UNSP
					PONTA, MELVIN J & MARCELLA M 1984 REVOCABLE TRUST Total		41.40		
A027638	18933	12446	Appropriative	Licensed	R MARILYN WILSON	01/24/83	2.00	Nevada	KENTUCKY RAVINE
					R MARILYN WILSON Total		2.00		
A018368	11988	8848	Appropriative	Licensed	RAENNE A KALFSBEEK	10/10/58	3.70	Yuba	GOLDEN GATE RAVINE
					RAENNE A KALFSBEEK Total		3.70		
A008343	4680	1903	Appropriative	Licensed	RAINBOW HOLDING COMPANY, LTD	05/25/35	112.90	Placer	UNSP
					RAINBOW HOLDING COMPANY, LTD Total		112.90		
A025997	18129	12158	Appropriative	Licensed	RAMON HERNANDEZ	05/16/79	15.00	Yuba	UNST
					RAMON HERNANDEZ Total		15.00		
A017934	11550	6977	Appropriative	Licensed	RAY COLAIZZI	01/06/58	0.80	Sierra	INDEPENDENCE CREEK

No comments

- n/a -

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
					RAY COLAIZZI Total		0.80		
A022395	15508	10302	Appropriative	Licensed	REGULAR BAPTIST CAMP INCORPORATED	02/18/66	87.00	Sierra	PILOT LAKE (AKA DELAHUNTY LAKE)
A022396	15220	11011	Appropriative	Licensed	REGULAR BAPTIST CAMP INCORPORATED	09/19/02	3.20	Sierra	UNSP (3)
					REGULAR BAPTIST CAMP INCORPORATED Total		90.20		
A018212	11725	9140	Appropriative	Licensed	RENTIER INCORPORATED	07/09/58	0.70	Sierra	UNST
					RENTIER INCORPORATED Total		0.70		
A018279	11926	7127	Appropriative	Licensed	RICHARD L MILLER	08/21/58	0.20	Sierra	UNSP
					RICHARD L MILLER Total		0.20		
A017797	11267	7196	Appropriative	Licensed	RICHARD W WALKER	08/22/57	1.70	Placer	UNST
					RICHARD W WALKER Total		1.70		
A027542	18885	12513	Appropriative	Licensed	RICHARDS LAND & CATTLE CO	09/30/82	12.00	Yuba	WOODS CREEK
A027603	18884	13380	Appropriative	Licensed	RICHARDS LAND & CATTLE CO	12/03/82	49.00	Yuba	WOODS CREEK
					RICHARDS LAND & CATTLE CO Total		61.00		
A019559	12914	7539	Appropriative	Licensed	ROBERT CARLSTROEM	07/20/60	0.20	Sierra	UNST
					ROBERT CARLSTROEM Total		0.20		
A021496	14525	9634	Appropriative	Licensed	ROBERT A HELLER	10/09/63	1.10	Sierra	UNXX
					ROBERT A HELLER Total		1.10		
A026640	18874		Appropriative	Permitted	ROBERT A ROWE	12/02/80	3.20	Nevada	KENTUCKY RAVINE
					ROBERT A ROWE Total		3.20		
A016792A	10815	008072A	Appropriative	Licensed	ROBERT L RYAN	12/06/85	9.40	Nevada	UNST
					ROBERT L RYAN Total		9.40		
A014951	10084	5848	Appropriative	Licensed	ROBERTA D'ARCY	08/06/52	113.10	Yuba	DRY CREEK
					ROBERTA D'ARCY Total		113.10		
A018674	12824	8179	Appropriative	Licensed	ROCHELLE A FLEMING	04/28/59	0.30	Sierra	UNST
					ROCHELLE A FLEMING Total		0.30		
A021562	14484	8801	Appropriative	Licensed	ROGER P VAN CRAEYNEST	12/04/63	2.70	Sierra	UNSP
					ROGER P VAN CRAEYNEST Total		2.70		
A026809	18475	12287	Appropriative	Licensed	RONALD GUILD	04/29/81	4.00	Yuba	PRAIRIE CREEK
					RONALD GUILD Total		4.00		
A027976	19244	12656	Appropriative	Licensed	RONALD L GOODSPEED	02/08/84	0.30	Nevada	UNST
					RONALD L GOODSPEED Total		0.30		
A018286	11774	7006	Appropriative	Licensed	ROSS JACOBS	08/26/58	0.20	Sierra	UNST
					ROSS JACOBS Total		0.20		

No comments

- n/a -

Yuba River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A026365	18355	12070	Appropriative	Licensed	ROY BRAATZ	05/19/80	3.30	Nevada	UNST
					ROY BRAATZ Total		3.30		
A020263	13977	10086	Appropriative	Licensed	ROY RAMEY	06/13/61	24.20	Nevada	WEST BRANCH GOLD RUN CREEK
					ROY RAMEY Total		24.20		
A008984	5142	2367	Appropriative	Licensed	RUBY DEVELOPMENT COMPANY	06/02/37	241.10	Sierra	ROCK CREEK
					RUBY DEVELOPMENT COMPANY Total		241.10		
A024904	17224	11479	Appropriative	Licensed	RUBY J RICKARD	10/17/75	2.00	Nevada	UNSP
					RUBY J RICKARD Total		2.00		
A018252	11757	7003	Appropriative	Licensed	SEGHEZZI INC	03/20/64	51.70	Nevada	UNST
					SEGHEZZI INC Total		51.70		
A020309	13944	8350	Appropriative	Licensed	SHAWN BEACHAMP	07/19/61	0.60	Sierra	UNSP
					SHAWN BEACHAMP Total		0.60		
A021727	14700	9328	Appropriative	Licensed	SHERMAN D WINSHIP	04/07/64	15.00	Nevada	UNST
					SHERMAN D WINSHIP Total		15.00		
A021417	14529	9226	Appropriative	Licensed	SIBLEY HANSEN	08/02/63	0.10	Sierra	SMALL SPRING
					SIBLEY HANSEN Total		0.10		
A006286	3316	2427	Appropriative	Licensed	SIERRA CLUB	05/13/29	2.80	Nevada	ZERO SPRING
A008465	4945	2628	Appropriative	Licensed	SIERRA CLUB	10/05/35	5.60	Nevada	UNSP
					SIERRA CLUB Total		8.40		
A020890	14177	9068	Appropriative	Licensed	SIERRA PACIFIC INDUSTRIES	08/06/62	5.60	Sierra	UNSP, UNST
					SIERRA PACIFIC INDUSTRIES Total		5.60		
A026028	18161	12301	Appropriative	Licensed	SOPER COMPANY	06/18/79	2.50	Nevada	UNST
					SOPER COMPANY Total		2.50		
A026067	18454	11796	Appropriative	Licensed	STARDUSTER LAKE ASSOCIATION	08/17/79	27.00	Nevada	UNST
					STARDUSTER LAKE ASSOCIATION Total		27.00		
A023591	16215	10645	Appropriative	Licensed	STEPHEN MAKI	08/24/70	2.30	Nevada	UNST
					STEPHEN MAKI Total		2.30		
A028615	20873		Appropriative	Permitted	STEVE MEHALAKIS	11/08/85	20.00	Yuba	UNST
A028616	20874		Appropriative	Permitted	STEVE MEHALAKIS	11/08/85	656.00	Yuba	UNST
					STEVE MEHALAKIS Total		676.00		
A016659	10458	6570	Appropriative	Licensed	Steven A Beckwitt	10/10/55	7.00	Nevada	UNCR
					Steven A Beckwitt Total		7.00		
A028564	20071	13055	Appropriative	Licensed	STEVEN NIGHTINGALE	09/26/85	0.40	Sierra	UNST
					STEVEN NIGHTINGALE Total		0.40		
A030074	20797		Appropriative	Permitted	SUGAR BOWL CORPORATION	06/15/95	136.00	Placer	LAKE MARY

No comments

- n/a -

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A030359	20798		Appropriative	Permitted	SUGAR BOWL CORPORATION	06/15/95	136.00	Placer	LAKE MARY
					SUGAR BOWL CORPORATION Total		272.00		
A017808	11602	6617	Appropriative	Licensed	SUSAN TRIMBLE SILVEY	08/30/57	0.30	Nevada	UNSP, UNST
					SUSAN TRIMBLE SILVEY Total		0.30		
A022135	15294	9724	Appropriative	Licensed	SUSAN M FORD	04/30/65	6.00	Sierra	UNSP
					SUSAN M FORD Total		6.00		
A028187	20186		Appropriative	Permitted	SUSAN T TOWNSEND	07/10/84	35.00	Nevada	OWL CREEK
					SUSAN T TOWNSEND Total		35.00		
A017798	11268	6932	Appropriative	Licensed	SUSANNAH SCHROLL	08/22/57	0.90	Placer	UNST
					SUSANNAH SCHROLL Total		0.90		
A010980	6391	3171	Appropriative	Licensed	Terry Mitchell Riley	02/13/45	17.00	Yuba	MOONSHINE CREEK
					Terry Mitchell Riley Total		17.00		
A021079	14144	9865	Appropriative	Licensed	THE KRUMP LIMITED PARTNERSHIP	12/11/62	29.00	Nevada	NORTH CREEK
					THE KRUMP LIMITED PARTNERSHIP Total		29.00		
A011106	6583	4849	Appropriative	Licensed	THOMAS DE JONGHE	07/13/45	19.70	Sierra	UNSP, VAN JOAN CREEK
A018663	12077	6842	Appropriative	Licensed	THOMAS DE JONGHE	04/24/59	796.40	Sierra	SAN JUAN CANYON
					THOMAS DE JONGHE Total		816.10		
A009651	5425	2777	Appropriative	Licensed	THOMAS A JEKYLL	06/30/39	5.60	Yuba	MOONSHINE CREEK
					THOMAS A JEKYLL Total		5.60		
A028126	20885		Appropriative	Permitted	THOMAS R POPE	04/30/84	7.00	Yuba	UNST
					THOMAS R POPE Total		7.00		
A018395	11928	7011	Appropriative	Licensed	TIMOTHY WALKER	11/05/58	0.20	Sierra	COLD SPRING
					TIMOTHY WALKER Total		0.20		
A017142	10833	6907	Appropriative	Licensed	TREVOR D ROBBINS	06/20/56	2.60	Nevada	UNST
					TREVOR D ROBBINS Total		2.60		
A014930	9266	5083	Appropriative	Licensed	TRI-LODGE ASSOCIATION	07/28/52	16.80	Nevada	LYTTON CREEK
					TRI-LODGE ASSOCIATION Total		16.80		
A015246	9585	4864	Appropriative	Licensed	TROY L JONES	03/19/53	2.30	Nevada	UNSP
					TROY L JONES Total		2.30		
A022265	15651	13721	Appropriative	Licensed	TSCHOPP MUTUAL WATER COMPANY	05/30/07	8.40	Sierra	UNSP, WIXON SPRING
					TSCHOPP MUTUAL WATER COMPANY Total		8.40		
A018581	11987	7507	Appropriative	Licensed	TYE ROMMEL	03/10/59	0.10	Sierra	UNST
					TYE ROMMEL Total		0.10		
A006563	3462	4000	Appropriative	Licensed	U S FOREST SERVICE	02/13/30	0.40	Sierra	UNSP
A007608	4266	1863	Appropriative	Licensed	U S FOREST SERVICE	07/05/33	1.80	Sierra	UNSP

Yuba River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A007691	4232	1864	Appropriative	Licensed	U S FOREST SERVICE	09/28/33	0.40	Sierra	GENTLE ANNIE SPRING
A007767	4269	1865	Appropriative	Licensed	U S FOREST SERVICE	11/27/33	0.30	Sierra	UNSP
A008493	4684	2139	Appropriative	Licensed	U S FOREST SERVICE	11/13/35	6.20	Sierra	JERRETT SPRING
A009561	5364	2480	Appropriative	Licensed	U S FOREST SERVICE	04/19/39	8.40	Sierra	BAKER SPRING
A010038	5700	4893	Appropriative	Licensed	U S FOREST SERVICE	10/17/40	5.60	Placer	SUMMIT SPRING NO 1
A010153	5788	2659	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	1.10	Nevada	LOGAN SPRING
A010154	5789	2660	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	1.40	Nevada	BIG LICK SPRINGS
A010155	5790	2661	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	1.00	Nevada	DEMPSEY SPRINGS
A010156	5791	4888	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	9.20	Nevada	WHITE CLOUD SPRINGS
A010158	5793	2662	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	1.40	Nevada	COLEMAN SPRINGS
A010159	5794	4175	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	0.60	Nevada	SKILLMAN FLAT SPRING
A010160	5795	2663	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	0.60	Nevada	DEMORY SPRING
A010161	5796	2664	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	1.40	Nevada	UPPER DERBEC SPRING
A010162	5797	2665	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	9.80	Nevada	SNOWTENT SPRING
A010163	5798	2666	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	2.90	Nevada	DERBEC SPRINGS
A010164	5799	2667	Appropriative	Licensed	U S FOREST SERVICE	03/22/41	4.40	Nevada	WILLOW SPRINGS
A010446	6018	2891	Appropriative	Licensed	U S FOREST SERVICE	05/06/42	3.10	Nevada	THIMBLEBERRY CREEK
A010447	6019	2892	Appropriative	Licensed	U S FOREST SERVICE	05/06/42	3.70	Nevada	JUNCTION HOUSE SPRING
A010448	6020	4895	Appropriative	Licensed	U S FOREST SERVICE	05/06/42	1.10	Nevada	GROUSE RIDGE SPRING NO 3
A010449	6021	3057	Appropriative	Licensed	U S FOREST SERVICE	05/06/42	0.20	Nevada	MOGONIGAL SPRING
A010451	6023	2894	Appropriative	Licensed	U S FOREST SERVICE	05/06/42	3.40	Nevada	BEAR TRAP CREEK
A010452	6024	3058	Appropriative	Licensed	U S FOREST SERVICE	05/06/42	0.20	Nevada	GROUSE RIDGE SPRING NO 1
A010453	6025	3921	Appropriative	Licensed	U S FOREST SERVICE	05/06/42	0.60	Nevada	GROUSE RIDGE SPRING NO 2

No comments

- n/a -

Yuba River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A010496	6091	2895	Appropriative	Licensed	U S FOREST SERVICE	07/15/42	0.90	Nevada	MOBLEY HOMESTEAD SPRING NO 1
A010497	6092	2896	Appropriative	Licensed	U S FOREST SERVICE	07/15/42	4.70	Nevada	HOLDEN SPRING
A010500	6095	2898	Appropriative	Licensed	U S FOREST SERVICE	07/15/42	1.80	Nevada	UNSP
A010502	6099	2899	Appropriative	Licensed	U S FOREST SERVICE	07/15/42	3.20	Nevada	MOBLEY HOMESTEAD SPRING NO 2
A010503	6100	2900	Appropriative	Licensed	U S FOREST SERVICE	07/15/42	4.10	Nevada	INDIAN SPRING
A010506	6103	2902	Appropriative	Licensed	U S FOREST SERVICE	07/15/42	0.90	Nevada	UPPER WOOLSEY SPRING
A010634	6150	2903	Appropriative	Licensed	U S FOREST SERVICE	05/01/43	2.20	Sierra	HALLS RANCH SPRING
A010637	6153	2905	Appropriative	Licensed	U S FOREST SERVICE	05/01/43	2.20	Sierra	WILD PLUM SPRING
A010639	6155	2907	Appropriative	Licensed	U S FOREST SERVICE	05/01/43	1.60	Sierra	DEADWOOD SPRING
A010640	6156	2908	Appropriative	Licensed	U S FOREST SERVICE	05/01/43	2.20	Sierra	GOLD LAKE SPRING
A010642	6158	2910	Appropriative	Licensed	U S FOREST SERVICE	05/01/43	1.50	Sierra	SADDLEBACK SPRING
A011382	6627	7752	Appropriative	Licensed	U S FOREST SERVICE	04/23/46	0.60	Nevada	RED MOUNTAIN SPRING NO 1
A012054	7080	3979	Appropriative	Licensed	U S FOREST SERVICE	08/21/47	210.30	Sierra	BEAR CREEK
A012104	7107	5532	Appropriative	Licensed	U S FOREST SERVICE	09/24/47	5.00	Sierra	HASKELL CREEK
A012105	7197	4210	Appropriative	Licensed	U S FOREST SERVICE	09/24/47	0.10	Sierra	GLEASON SPRING
A012108	7198	8987	Appropriative	Licensed	U S FOREST SERVICE	09/24/47	6.10	Sierra	CARVIN CREEK, UNSP
A012734	7577	4944	Appropriative	Licensed	U S FOREST SERVICE	10/07/48	17.90	Placer	UNSP
A013626	8115	5514	Appropriative	Licensed	U S FOREST SERVICE	03/10/50	8.20	Sierra	GRASSY LAKE CREEK
A013627	8116	4873	Appropriative	Licensed	U S FOREST SERVICE	03/10/50	12.20	Sierra	ORGAN CREEK
A014368	9086	4981	Appropriative	Licensed	U S FOREST SERVICE	06/27/51	0.10	Sierra	INDEPENDENCE RAVINE
A014369	8833	5423	Appropriative	Licensed	U S FOREST SERVICE	06/27/51	1.60	Sierra	FIDDLE CREEK
A014399	8880	5114	Appropriative	Licensed	U S FOREST SERVICE	07/19/51	2.00	Nevada	RATTLESNAKE CREEK
A014400	8830	6972	Appropriative	Licensed	U S FOREST SERVICE	07/19/51	0.60	Nevada	JACKSON CREEK

No comments

- n/a -

No comments

- n/a -

Yuba River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A016642	10775	6162	Appropriative	Licensed	U S FOREST SERVICE	09/30/55	0.90	Sierra	CARVIN CREEK
A017236	14333	9873	Appropriative	Licensed	U S FOREST SERVICE	08/13/56	4,320.00	Nevada	WEAVER LAKE
A017827	11555	6959	Appropriative	Licensed	U S FOREST SERVICE	09/19/57	0.90	Sierra	UNSP (2)
A017867	11386	8642	Appropriative	Licensed	U S FOREST SERVICE	10/31/57	4.00	Nevada	UNSP
A018294	11777	7651	Appropriative	Licensed	U S FOREST SERVICE	08/28/58	0.20	Nevada	MARSH TRACT SPRING
A018744	13212	8632	Appropriative	Licensed	U S FOREST SERVICE	05/28/59	130.00	Sierra	UNST
A018745	13213	8633	Appropriative	Licensed	U S FOREST SERVICE	05/28/59	90.00	Sierra	PACKER CREEK
A018746	13214	8634	Appropriative	Licensed	U S FOREST SERVICE	05/28/59	380.00	Sierra	SALMON CREEK
A018747	13215	8635	Appropriative	Licensed	U S FOREST SERVICE	05/28/59	282.20	Sierra	SARDINE CREEK
A018748	13216	8983	Appropriative	Licensed	U S FOREST SERVICE	05/28/59	350.00	Sierra	SAWMILL CREEK
A018749	13217	8636	Appropriative	Licensed	U S FOREST SERVICE	05/28/59	250.00	Sierra	SALMON CREEK
A021130	14147	8582	Appropriative	Licensed	U S FOREST SERVICE	01/22/63	2.20	Sierra	UNSP
A021420	14530	8940	Appropriative	Licensed	U S FOREST SERVICE	08/06/63	0.20	Sierra	UNSP
A023124	15805	9651	Appropriative	Licensed	U S FOREST SERVICE	09/05/68	0.30	Sierra	UNSP
A028413	19713	13031	Appropriative	Licensed	U S FOREST SERVICE	03/29/85	0.80	Sierra	UNSP
					U S FOREST SERVICE Total		6,170.90		
A024067	16490	11008	Appropriative	Licensed	WALTER BALDAIN	05/12/72	8.00	Yuba	UNST
					WALTER BALDAIN Total		8.00		
A022419	15278	9703	Appropriative	Licensed	WASHINGTON COUNTY WATER DISTRICT	03/11/66	48.00	Nevada	HENDERSON RAVINE
					WASHINGTON COUNTY WATER DISTRICT Total		48.00		
A016823	10823	7089	Appropriative	Licensed	WAYNE L HARSHBARGER	01/09/56	35.00	Nevada	UNST
					WAYNE L HARSHBARGER Total		35.00		
A018170	11648	7666	Appropriative	Licensed	WILLIAM C DOUB II	06/05/58	1.10	Yuba	LITTLE WILLOW CREEK
					WILLIAM C DOUB II Total		1.10		
A026642	18723		Appropriative	Permitted	WILLIAM H CLEMENS	12/03/80	3.00	Nevada	RAPP RAVINE
					WILLIAM H CLEMENS Total		3.00		
A011355	6661	3358	Appropriative	Licensed	WILLIAM R SMITH	03/28/46	0.60	Sierra	JIM CROW CANYON

Yuba River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
					WILLIAM R SMITH Total		0.60		
A002197	1154	435	Appropriative	Licensed	YUBA COUNTY WATER AGENCY	02/11/21	511,784.30	Yuba	NORTH YUBA RIVER
A003026	1354	436	Appropriative	Licensed	YUBA COUNTY WATER AGENCY	09/07/22	10,000.00	Yuba	NORTH YUBA RIVER
A005004	2604	777	Appropriative	Licensed	YUBA COUNTY WATER AGENCY	04/30/26	15,000.00	Yuba	NORTH YUBA RIVER
A005632	15026		Appropriative	Permitted	YUBA COUNTY WATER AGENCY	07/30/27	1,159,000.00	Yuba	NORTH YUBA RIVER, YUBA RIVER
A009516	6106	3050	Appropriative	Licensed	YUBA COUNTY WATER AGENCY	03/01/39	72,397.80	Yuba	NORTH YUBA RIVER
A010282	8330	5544	Appropriative	Licensed	YUBA COUNTY WATER AGENCY	09/12/41	5,335.00	Yuba	NORTH YUBA RIVER
A015204	15027		Appropriative	Permitted	YUBA COUNTY WATER AGENCY	03/28/66	246,000.00	Yuba	NORTH YUBA RIVER, YUBA RIVER
A015574	15030		Appropriative	Permitted	YUBA COUNTY WATER AGENCY	03/28/66	514,000.00	Nevada, Yuba	MIDDLE YUBA RIVER, NORTH YUBA RIVER, OREGON CREEK, YUBA RIVER
A029837	20595		Appropriative	Permitted	YUBA COUNTY WATER AGENCY	10/11/90	21,719.30	Yuba	DEADWOOD CREEK, OWL GULCH
					YUBA COUNTY WATER AGENCY Total		2,555,236.40		
A002978	1270	12984	Appropriative	Licensed	YUBA COUNTY WATER DISTRICT	08/12/22	6,060.00	Yuba	DRY CREEK
A013957	11516		Appropriative	Licensed	YUBA COUNTY WATER DISTRICT	09/20/50	145,082.64	Plumas, Yuba	NORTH YUBA RIVER, YUBA RIVER
					YUBA COUNTY WATER DISTRICT Total		151,142.64		
A011596	7086	4699	Appropriative	Licensed	YUBA INVESTMENT COMPANY	10/28/46	2,558.70	Yuba	DRY CREEK
					YUBA INVESTMENT COMPANY Total		2,558.70		
A026914	18489	12619	Appropriative	Licensed	YUBA RIVER RECREATION GROUP INC	07/13/81	2.60	Nevada	HUMBUG CREEK
					YUBA RIVER RECREATION GROUP INC Total		2.60		
					Grand Total		3,595,920.74		

No comments

- n/a -

Bear River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A029052	20786	13687	ANNE K SOUSA	12/13/06	5.80	Nevada	UNST
			ANNE K SOUSA Total		5.80		
A029455	20562		ARTHUR W ARMSTRONG	3/28/89	7.00	Nevada	IRON CROSS CREEK, ROCK CREEK
			ARTHUR W ARMSTRONG Total		7.00		
A025897	18040	11864	BEN R RAWE	1/5/79	0.30	Nevada	WOLF CREEK
			BEN R RAWE Total		0.30		
A026042	17969	11895	Bethel Church Nevada County	7/5/79	1.50	Nevada	UNST
			Bethel Church Nevada County Total		1.50		
A019535	12763	7754	BETTY THOMAS	7/11/60	20.00	Nevada	UNST
			BETTY THOMAS Total		20.00		
A015964	10090	7264	BLEAU 1989 REVOCABLE TRUST DATED 12/22/89	5/5/65	14.80	Nevada	UNST
			BLEAU 1989 REVOCABLE TRUST DATED 12/22/89 Total		14.80		
A027768	19029	12402	BOB J BALDWIN	6/7/83	2.40	Nevada	UNST
			BOB J BALDWIN Total		2.40		
A000959	743	385	CAMP FAR WEST IRRIGATION DISTRICT	4/1/18	4,832.10	Yuba	BEAR RIVER
A002881	2089	2266	CAMP FAR WEST IRRIGATION DISTRICT	6/13/22	5,000.00	Yuba	BEAR RIVER
A003843	2090	2267	CAMP FAR WEST IRRIGATION DISTRICT	2/11/24	3,592.20	Yuba	BEAR RIVER
A010190	5852	2740	CAMP FAR WEST IRRIGATION DISTRICT	4/28/41	5,000.00	Yuba	BEAR RIVER
			CAMP FAR WEST IRRIGATION DISTRICT Total		18,424.30		
A021821	14841	9992	CITY OF GRASS VALLEY	6/18/64	4.00	Nevada	RHODE ISLAND RAVINE
A025601	17893		CITY OF GRASS VALLEY	12/16/77	2,200.00	Nevada	UNXX
			CITY OF GRASS VALLEY Total		2,204.00		
A029097	20492	13344	COX-HARTLEY FAMILY 1993 TRUST	8/17/87	17.00	Nevada	LONG RAVINE
			COX-HARTLEY FAMILY 1993 TRUST Total		17.00		
A026932	18555	12337	CRAIG FERRARI	7/27/81	1.30	Nevada	LONG RAVINE
A029177	20384	13514	CRAIG FERRARI	1/26/88	3.30	Nevada	LONG RAVINE
			CRAIG FERRARI Total		4.60		
A020794	14711	10153	DANIEL HALE	5/28/62	8.30	Nevada	UNSP, UNST
			DANIEL HALE Total		8.30		
A017495	11042	5812	DARKHORSE GOLF CLUB LLC	3/5/57	9.00	Nevada	UNST
A027767	19028	12401	DARKHORSE GOLF CLUB LLC	6/7/83	1.90	Nevada	UNST
			DARKHORSE GOLF CLUB LLC Total		10.90		
A026161	18143	12136	DAVID MCFARLANE	1/3/80	0.10	Nevada	UNSP
			DAVID MCFARLANE Total		0.10		
A015282	9761	4714	DAVID L FERGUSON	4/7/53	15.00	Nevada	INDIAN RAVINE
			DAVID L FERGUSON Total		15.00		
A025099	16957	11240	DENNIS ACMOODY	7/14/76	0.70	Placer	CAMPBELL CREEK
			DENNIS ACMOODY Total		0.70		
A023012	15728	10361	Dept of Fish and Game	3/27/68	44.00	Yuba	UNST
A023013	15729	10387	Dept of Fish and Game	3/27/68	9.60	Nevada	UNST
A023014	15730	10388	Dept of Fish and Game	3/27/68	21.00	Yuba	UNST

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A024601	16798	11216	Dept of Fish and Game	5/2/74	3.00	Yuba	UNST
A024641	16797	11212	Dept of Fish and Game	4/22/82	5.10	Yuba	UNST
			Dept of Fish and Game Total		82.70		
A021495	14411	9027	DONALD L DAY	10/9/63	9.20	Nevada	UNST
			DONALD L DAY Total		9.20		
A027513	18935	12432	DORIS L MINARD	9/13/82	3.10	Nevada	UNST
			DORIS L MINARD Total		3.10		
A021843	14973	9263	ELIZABETH STREATER	7/10/64	0.10	Nevada	UNSP
			ELIZABETH STREATER Total		0.10		
A017858	11509	6590	GARY M LAUGHLIN	10/23/57	0.80	Nevada	UNSP (2)
			GARY M LAUGHLIN Total		0.80		
A027958	19299	12783	GLADYS MARTINES	1/25/84	3.00	Nevada	UNST
A029895	20705		GLADYS MARTINES	1/25/91	27.00	Nevada	UNST
			GLADYS MARTINES Total		30.00		
A023070	16276	11076	GREGORY W BOCK	6/18/68	52.30	Nevada	UNST
			GREGORY W BOCK Total		52.30		
A014179	8713	4076	HERRMANN GOTTFIELD	3/7/51	21.30	Nevada	UNST
			HERRMANN GOTTFIELD Total		21.30		
A017539	11052	6926	HIDDEN MEADOW RANCH	4/3/57	91.80	Nevada	UNCR
			HIDDEN MEADOW RANCH Total		91.80		
A015879	10532	5520	IKE GOMEZ	5/19/54	18.30	Nevada	LONG HOLLOW
			IKE GOMEZ Total		18.30		
A028605	20716		JACK F ANDERSEN	10/28/85	6.50	Nevada	SOUTH WOLF CREEK, UNST
			JACK F ANDERSEN Total		6.50		
A018371	11846	8036	JAMES C PAGE	10/14/58	90.80	Placer	UNST
A025408	18090	11807	JAMES C PAGE	6/28/77	29.00	Placer	UNST
			JAMES C PAGE Total		119.80		
A030915	21141		JAMES M SILLER	1/2/03	89.00	Yuba	VINEYARD CREEK
			JAMES M SILLER Total		89.00		
A025582	17443	11469	Jape Holley Taylor	11/29/77	15.00	Nevada	UNST
			Jape Holley Taylor Total		15.00		
A030508	20929		JAY BETZ	11/21/95	56.00	Nevada	ROCK CREEK, UNST
			JAY BETZ Total		56.00		
A025502	17606	12279	JAY VICE	9/7/77	9.40	Nevada	MEYER RAVINE
			JAY VICE Total		9.40		
A017437	11015	7742	JEFFREY L FINK	1/28/57	3.50	Nevada	UNST
			JEFFREY L FINK Total		3.50		
A029100	20553	13829	Jim A Nevins	1/11/11	8.40	Placer	UNST
			Jim A Nevins Total		8.40		
A024814	17265	11749	JOHN C HUSMANN	5/23/75	0.50	Nevada	UNST
			JOHN C HUSMANN Total		0.50		
A014896	9165	4969	JOSEPH D LITCHFIELD	7/8/52	10.00	Nevada	UNST
			JOSEPH D LITCHFIELD Total		10.00		
A025493	17730	12042	JOSHUA L WITTLER	8/29/77	21.00	Nevada	INDIAN SPRINGS CREEK, UNST

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			JOSHUA L WITTLER Total		21.00		
A028102	19386	12709	Judy Bauer	4/4/84	4.00	Nevada	UNST
			Judy Bauer Total		4.00		
A017942B	11413	008536B	LADSON I GEDDINGS	10/14/81	9.80	Nevada	LONG HOLLOW RAVINE
			LADSON I GEDDINGS Total		9.80		
A019830	13852	8657	LAKE MANAGEMENT COMMITTEE	10/27/60	35.00	Nevada	BUTLER CREEK
			LAKE MANAGEMENT COMMITTEE Total		35.00		
A017258	11462	6296	LAKE OF THE PINES ASSN INC	8/27/56	17.00	Nevada	RAGSDALE CREEK
A022535	15355	9675	LAKE OF THE PINES ASSN INC	7/27/66	4,150.00	Nevada	MAGNOLIA CREEK
			LAKE OF THE PINES ASSN INC Total		4,167.00		
A018214	11635	6752	LCB PROPERTIES LLC	7/11/58	55.80	Nevada	LONG HOLLOW RAVINE
			LCB PROPERTIES LLC Total		55.80		
A022821A		009610A	Louis BARTOLUCCI	5/6/02	21.00	Nevada	UNST
A023549A		010658A	Louis BARTOLUCCI	12/14/98	14.00	Nevada	UNST
			Louis BARTOLUCCI Total		35.00		
A025375	17757	11924	LUELLA BURTON	6/1/77	23.00	Placer	UNST
A028660	19898	13032	LUELLA BURTON	12/13/85	10.00	Placer	UNST
			LUELLA BURTON Total		33.00		
A017863	11331	9020	MARTIN P & BARBARA C BRUMM JOINT LIVING TRUST	10/25/57	26.80	Nevada	UNST
			MARTIN P & BARBARA C BRUMM JOINT LIVING TRUST Total		26.80		
A017918	11685	10988	MELBA C SMITH	12/17/57	53.00	Nevada	WOLF CREEK
			MELBA C SMITH Total		53.00		
A027040	18782	12458	MICHAEL J BONELLI	10/13/81	14.50	Nevada	UNST
			MICHAEL J BONELLI Total		14.50		
A028348	19601	12817	MICHAEL K SCHARF	12/4/84	3.90	Placer	UNST
			MICHAEL K SCHARF Total		3.90		
A031298	21148		MICHAEL S DICKEY	5/15/03	49.00	Nevada	UNST
			MICHAEL S DICKEY Total		49.00		
A028630	20005	13060	MIKE BASICH	12/2/85	0.10	Placer	CAMPBELL CREEK
			MIKE BASICH Total		0.10		
A019749C		008012C	MOREHEAD LAND LLC	10/13/00	402.40	Nevada, Sutter	EAST BORROW PIT OF SUTTER BYPASS, POODLE CREEK, UNST
			MOREHEAD LAND LLC Total		402.40		
A002652A	5803	10350	NEVADA IRRIGATION DISTRICT	11/22/21	12,500.00	Nevada, Placer	BEAR RIVER
A006229	5804	8809	NEVADA IRRIGATION DISTRICT	3/26/29	50,936.30	Placer	BEAR RIVER
A002652B	11626		NEVADA IRRIGATION DISTRICT	11/22/21	65,000.00	Placer	BEAR RIVER
			NEVADA IRRIGATION DISTRICT Total		128,436.30		
A023107	16058	10594	PATRICK D BRYAN	8/7/68	9.20	Nevada	UNST
			PATRICK D BRYAN Total		9.20		
A028561	19808	12977	PAUL R SEIDER	9/20/85	1.50	Nevada	SOUTH WOLF CREEK
			PAUL R SEIDER Total		1.50		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A026684	18972	12398	PINE LAKE ASSOCIATION	1/13/81	45.00	Nevada	UNST
			PINE LAKE ASSOCIATION Total		45.00		
A025922A	17889	11925	PITTS FAMILY TRUST	3/11/86	18.00	Nevada	UNST
			PITTS FAMILY TRUST Total		18.00		
A017912	11641	7101	RICHARD L BARBER	12/11/57	5.60	Placer	UNSP (2)
A021867	15251	9546	RICHARD L BARBER	8/10/64	358.30	Placer	LITTLE BEAR CREEK, UNST
			RICHARD L BARBER Total		363.90		
A020105	13690	7762	RICHARD P O'NEIL	5/1/61	2.50	Nevada	WOLF CREEK
			RICHARD P O'NEIL Total		2.50		
A021473	14619	8876	ROBERT FORD	9/23/63	0.90	Nevada	UNST
			ROBERT FORD Total		0.90		
A025962	17954	12055	ROBERT C ERDMANN	4/3/79	5.00	Nevada	UNST
			ROBERT C ERDMANN Total		5.00		
A025922B	17889	11926	Robert M Rourke	3/11/86	5.30	Nevada	UNST
			Robert M Rourke Total		5.30		
A003995	1847	1612	ROBERT N CAIN	5/20/24	40.00	Nevada	MAGNOLIA CREEK
A015607	9697	5685	ROBERT N CAIN	11/10/53	91.10	Nevada	MAGNOLIA CREEK
			ROBERT N CAIN Total		131.10		
A017942A	11413	008536A	ROBERT P WADMAN	10/14/81	48.30	Nevada	LONG HOLLOW RAVINE
			ROBERT P WADMAN Total		48.30		
A024624	18166	12199	ROBIN BURKE	4/27/87	8.80	Placer	UNST
			ROBIN BURKE Total		8.80		
A023550	16229	12355	RODRIC ANDERSON	7/10/70	8.00	Nevada	UNST
			RODRIC ANDERSON Total		8.00		
A025226	17450	12339	ROGER C PATTERSON	1/3/77	92.00	Placer	UNST
			ROGER C PATTERSON Total		92.00		
A031859			RON BINGAMAN	10/20/10	2,172.00	Nevada	
A030973	21073		RON BINGAMAN	10/14/99	2,172.00	Nevada	UNST (AKA WOLF HANNAMAN RANDOM DITCH)
			RON BINGAMAN Total		4,344.00		
A026072	18034	11907	RONALD F BURKHARDT	8/24/79	18.00	Nevada	UNST
			RONALD F BURKHARDT Total		18.00		
A017767	11458	8624	Ryan R Say	8/12/57	4.80	Nevada	UNST
			Ryan R Say Total		4.80		
A025492	17729	11941	SARAH JOELSON	8/29/77	15.00	Nevada	INDIAN SPRINGS CREEK
			SARAH JOELSON Total		15.00		
A026100	18035	11880	SCOTT C JASPAR	9/28/79	2.40	Nevada	UNST
			SCOTT C JASPAR Total		2.40		
A019003	12858	7437	SETH NOTO	9/25/59	1.10	Nevada	UNST
			SETH NOTO Total		1.10		
A023549B		010658B	SHARON EARHART	12/14/98	8.00	Nevada	UNST
			SHARON EARHART Total		8.00		
A026876	19442	12618	SHEILA ST GERMAIN	6/17/81	5,166.00	Nevada	UNST
			SHEILA ST GERMAIN Total		5,166.00		

Bear River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A024984	16847	11190	SMITH & SMITH RANCH, A PARTNERSHIP	1/29/76	3.00	Nevada	UNST
A027152	18851	12679	SMITH & SMITH RANCH, A PARTNERSHIP	12/17/81	2.40	Nevada	UNST
			SMITH & SMITH RANCH, A PARTNERSHIP Total		5.40		
A010221	14871	11120	SOUTH SUTTER WATER DISTRICT	5/15/81	130,745.10	Yuba	BEAR RIVER
A014804	11297	11118	SOUTH SUTTER WATER DISTRICT	5/12/52	139,534.80	Yuba	BEAR RIVER
			SOUTH SUTTER WATER DISTRICT Total		270,279.90		
A014773B	9106	006560B	SPRING VALLEY HOMEOWNERS ASSOCIATION	12/10/82	24.00	Placer	UNST
A020632	13760	8381	SPRING VALLEY HOMEOWNERS ASSOCIATION	3/1/62	52.00	Placer	UNST
A025139	17584	13120	SPRING VALLEY HOMEOWNERS ASSOCIATION	8/31/76	4.70	Placer	UNST
			SPRING VALLEY HOMEOWNERS ASSOCIATION Total		80.70		
A017430	11047	6954	STEVE KOTHE	1/23/57	84.90	Nevada	RAGSDALE CREEK
			STEVE KOTHE Total		84.90		
A022382	15366	10099	THE LAKEWOOD ASSOCIATION INC	2/4/66	486.00	Nevada	DRY CREEK
			THE LAKEWOOD ASSOCIATION INC Total		486.00		
A026160	18323	12118	THOMAS S VAN HORNE	12/31/79	3.10	Nevada	UNSP
A027695	19793	12934	THOMAS S VAN HORNE	3/23/83	11.90	Nevada	UNST
			THOMAS S VAN HORNE Total		15.00		
A010150	5785	2656	U S FOREST SERVICE	3/22/41	0.50	Nevada	KING WOOLFORD SPRING
A010439	6011	2888	U S FOREST SERVICE	5/6/42	0.70	Nevada	FOWLER SPRING
A010504	6101	4977	U S FOREST SERVICE	7/15/42	10.50	Nevada	MULE SPRING
			U S FOREST SERVICE Total		11.70		
A025211	17449	12756	UNITED AUBURN INDIAN DEVELOPMENT CORP	12/13/76	49.90	Placer	UNST
			UNITED AUBURN INDIAN DEVELOPMENT CORP Total		49.90		
A028170	19598	13007	William Scott	6/25/84	0.10	Nevada	UNST
			William Scott Total		0.10		
A028138	19417		WILLIAM M DONNELLY JR	5/23/84	2.00	Nevada	UNST
			WILLIAM M DONNELLY JR Total		2.00		
			Grand Total		436,025.40		

No comments

- n/a -

American River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A010397	5958	3042	AL RENKER	3/11/1942	0.10	El Dorado	SOUTH FORK AMERICAN RIVER
			AL RENKER Total		0.10		
A007905	4344	1801	ALBERT E CASH	4/12/1934	0.20	El Dorado	BULL CREEK
			ALBERT E CASH Total		0.20		
A027366	19846		ALBERT R DAVIDSON	6/21/1982	30.00	El Dorado	UNST
			ALBERT R DAVIDSON Total		30.00		
A016894	11321	7150	ALLEN E NEWTON	2/14/1956	18.20	Placer	UNST
			ALLEN E NEWTON Total		18.20		
A013649	8397	5518	ALLEN FAMILY TRUST	7/17/1950	53.30	Placer	UNST
			ALLEN FAMILY TRUST Total		53.30		
A026457	18473	12786	American River Conservancy	7/15/1980	49.00	El Dorado	GRANITE CREEK
			American River Conservancy Total		49.00		
A013296	8191	6304	ANN BATEY	8/15/1949	137.00	El Dorado	INDIAN CREEK
			ANN BATEY Total		137.00		
A029219	20482		ANTHONY J FREITAS	4/7/1988	21.20	El Dorado	JOHNTOWN CREEK
			ANTHONY J FREITAS Total		21.20		
A027928	19263	12703	APPLE MOUNTAIN LP	12/7/1983	11.80	El Dorado	SOUTH CANYON, UNST
			APPLE MOUNTAIN LP Total		11.80		
A011184	6479	3390	ARDEN HALL	10/16/1945	0.10	El Dorado	SOUTH FORK AMERICAN RIVER
			ARDEN HALL Total		0.10		
A011516	6699	3383	ARTHUR S DEAN	8/15/1946	36.20	El Dorado	UNSP
			ARTHUR S DEAN Total		36.20		
A021648	14938	11111	AUBURN LAKE TRAILS PROPERTY OWNERS ASSOC	2/21/1964	34.00	El Dorado	MAINE BAR CANYON
A023556	16296	11112	AUBURN LAKE TRAILS PROPERTY OWNERS ASSOC	7/14/1970	20.00	El Dorado	MAINE BAR CANYON
A026410	18279	12013	AUBURN LAKE TRAILS PROPERTY OWNERS ASSOC	6/10/1980	14.00	El Dorado	MAINE BAR CANYON
			AUBURN LAKE TRAILS PROPERTY OWNERS ASSOC Total		68.00		
A011817	6920	6045	BAKER FAMILY TRUST 1999	4/8/1947	13.70	El Dorado	HANGTOWN CREEK
A011850	6959	3357	BAKER FAMILY TRUST 1999	5/1/1947	3.40	El Dorado	HANGTOWN CREEK
			BAKER FAMILY TRUST 1999 Total		17.10		
A019125	12391	7458	BARBARA ELLEN HOLLAND	12/8/1959	5.30	El Dorado	UNSP, UNST
			BARBARA ELLEN HOLLAND Total		5.30		
A020256B	13189	9778	BARBAREE JERNIGAN	5/5/1971	2.20	El Dorado	WHITE ROCK CREEK
			BARBAREE JERNIGAN Total		2.20		
A017420	11173	6289	BEADLE LIVING TRUST DATED SEPTEMBER 12,1995	1/11/1957	5.90	Placer	UNST
			BEADLE LIVING TRUST DATED SEPTEMBER 12,1995 Total		5.90		
A027752	19827		BEAR STATE WATER WORKS	5/10/1983	37.00	El Dorado	UNSP
			BEAR STATE WATER WORKS Total		37.00		
A021855	14852	9503	BENJAMIN KEH	7/20/1964	4.00	Placer	MINERS RAVINE
			BENJAMIN KEH Total		4.00		
A022037	15105	9621	Berry Patty LLC	2/4/1965	2.20	El Dorado	UNSP (2)
			Berry Patty LLC Total		2.20		
A018182	11853	6484	BERTABELLE STEAD	6/13/1958	0.50	El Dorado	NEW WORLD TUNNEL
			BERTABELLE STEAD Total		0.50		
A014263	8672	4696	BISHOP FAMILY TRUST	4/20/1951	0.30	El Dorado	UNSP

No comments

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Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A015346	9640	7253	BISHOP FAMILY TRUST	5/18/1953	0.40	El Dorado	UNSP
A016123	10244	10898	BISHOP FAMILY TRUST	11/4/1954	2.20	El Dorado	UNSP
A018515	13834	10899	BISHOP FAMILY TRUST	2/3/1959	1.20	El Dorado	UNSP
			BISHOP FAMILY TRUST Total		4.10		
A010731	6307	5449	BLACK ROCK RANCH	11/17/1943	715.10	El Dorado	HASTINGS CREEK (AKA BLACK ROCK CREEK)
A013123	7488	5450	BLACK ROCK RANCH	5/31/1949	52.00	El Dorado	HASTING CREEK (AKA BLACK ROCK CREEK)
A019943	13983	9915	BLACK ROCK RANCH	1/31/1961	104.60	El Dorado	BLACK ROCK CREEK
			BLACK ROCK RANCH Total		871.70		
A023438	16059	10241	BLUE CANYON PROPERTIES INC	1/16/1970	15.00	Placer	UNST
			BLUE CANYON PROPERTIES INC Total		15.00		
A004365	2048	1112	BORIS T YEN	12/15/1924	2.80	El Dorado	EVANS CREEK
			BORIS T YEN Total		2.80		
A025841	17711	12427	BRETTE MARK GREEN	10/3/1978	1.30	El Dorado	UNST
			BRETTE MARK GREEN Total		1.30		
A016974	10644	5862	Brian P Tucker	3/28/1956	9.60	Placer	UNDR
			Brian P Tucker Total		9.60		
A006999	2797	1419	BRIAN K BRAY	7/7/1931	0.30	El Dorado	UNST
			BRIAN K BRAY Total		0.30		
A014138	8583	4878	BURNS LIVING TRUST	1/22/1951	0.20	El Dorado	BULL CREEK
A020543	13567	9133	BURNS LIVING TRUST	12/29/1961	0.40	El Dorado	UNSP (3)
			BURNS LIVING TRUST Total		0.60		
A013971	8391	6961	BYRON D SHER	9/29/1950	76.00	El Dorado	UNXX
			BYRON D SHER Total		76.00		
A004868	2458	945	BYRON W BACCHI IRREVOCABLE TRUST, THE	12/19/1925	36.20	El Dorado	NORTH INDIAN CREEK
			BYRON W BACCHI IRREVOCABLE TRUST, THE Total		36.20		
A013766	8755	5825	C A JONES	5/31/1950	12.00	El Dorado	NORTON RAVINE
			C A JONES Total		12.00		
A021806	15127	9611	CARDWELL R CURREN	6/8/1964	4.70	El Dorado	WEST FORK SAWMILL CREEK
			CARDWELL R CURREN Total		4.70		
A022052	15107	9622	CAROL BERCIER	2/24/1965	1.00	El Dorado	UNSP (2)
			CAROL BERCIER Total		1.00		
A005806	3036	1071	CAROL WARD	1/16/1928	79.60	Placer	ANTELOPE CREEK
A009500	5335	3137	CAROL WARD	1/31/1939	90.30	Placer	ANTELOPE CREEK
			CAROL WARD Total		169.90		
A007586	4189	3154	CECIL L WESTEL JR	6/14/1933	5.00	El Dorado	LONG CANYON
			CECIL L WESTEL JR Total		5.00		
A026475	18404	12899	CHARLES DAVIS	7/28/1980	0.30	Placer	UNST
			CHARLES DAVIS Total		0.30		
A023990	16722	10947	CHARLES D BRADARIC	3/7/1972	4.50	Placer	UNST
			CHARLES D BRADARIC Total		4.50		
A018053	11628	10069	CHARLES K MCCLATCHY	3/17/1958	6.00	El Dorado	UNST
			CHARLES K MCCLATCHY Total		6.00		
A026380	19259		CHI WEST INC	5/22/1980	72,397.80	El Dorado	ROCK CREEK
A027353	19260		CHI WEST INC	6/4/1982	67,478.70	El Dorado	ROCK CREEK
			CHI WEST INC Total		139,876.50		
A023939	16492	11032	CHRIS BEAUCHAMP	12/6/1971	3.90	El Dorado	UNST
			CHRIS BEAUCHAMP Total		3.90		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A018929	12275	10064	CHRISTIAN CHURCHES OF N CALIF-W NEVADA	8/20/1959	12.30	Placer	UNSP
			CHRISTIAN CHURCHES OF N CALIF-W NEVADA Total		12.30		
A025097	17594	11694	CINDY WHITE	7/9/1976	0.60	El Dorado	UNST
			CINDY WHITE Total		0.60		
A012149	7201	4847	CITY OF PLACERVILLE	11/4/1947	10.00	El Dorado	UNST
A014708	9209	6282	CITY OF PLACERVILLE	3/11/1952	6.60	El Dorado	BIG CANYON CREEK
			CITY OF PLACERVILLE Total		16.60		
A001853	859	1070	CITY OF SACRAMENTO	5/29/1920	2.10	El Dorado	SAYLES CANYON
A012140	11358		CITY OF SACRAMENTO	10/29/1947	271,739.50	Sacramento	AMERICAN RIVER
A012321	11359		CITY OF SACRAMENTO	2/13/1948	443,476.50	El Dorado	BRUSH CREEK, SILVER CREEK, SOUTH FORK SILVER CREEK
A016060	11361		CITY OF SACRAMENTO	5/7/1958	95,108.80	Sacramento	AMERICAN RIVER
A012622	11360		CITY OF SACRAMENTO	10/30/2000	966,174.80	El Dorado	BRUSH CREEK, GERLE CREEK, LOON LAKE, ROCKBOUND LAKE, RUBICON RIVER, SILVER CREEK, SOUTH FORK RUBICON RIVER
			CITY OF SACRAMENTO Total		1,776,503.70		
A004062	1853	1434	CITY OF STOCKTON	9/21/1939	12.20	Amador	UNCR
A007952	4514	2248	CITY OF STOCKTON	5/25/1934	0.40	Amador	UNCR
			CITY OF STOCKTON Total		12.60		
A025809	17623	12579	CLARENCE DILTS	8/21/1978	2.40	El Dorado	UNSP
			CLARENCE DILTS Total		2.40		
A019791	12964	8081	CLARIS GOULART	10/4/1960	62.40	Placer	UNST
			CLARIS GOULART Total		62.40		
A029657			COUNTY OF SAN JOAQUIN	2/9/1990	147,000.00		
			COUNTY OF SAN JOAQUIN Total		147,000.00		
A017398	10943	6893	Dale Capper	12/17/1956	31.00	El Dorado	UNST
			Dale Capper Total		31.00		
A019975	13230	10022	DALE B COOK	3/16/1973	14.70	El Dorado	UNST
			DALE B COOK Total		14.70		
A024427	16890	11259	DANIEL E LITTLE	8/3/1973	2.80	El Dorado	UNST
			DANIEL E LITTLE Total		2.80		
A013521	8424	4467	Daniel J Peterson	12/27/1949	145.00	El Dorado	UNST
			Daniel J Peterson Total		145.00		
A024575	16850	11161	DARREL PEARSON	3/21/1974	2.90	El Dorado	KELLEY CREEK
			DARREL PEARSON Total		2.90		
A017571B	11120	9732	DAVE TOGNETTI	4/25/1957	4.10	Placer	ANTELOPE CREEK
			DAVE TOGNETTI Total		4.10		
A005704	3038	1884	DAVID B BARTHOLOMEW	9/30/1927	0.30	El Dorado	UNSP (2)
			DAVID B BARTHOLOMEW Total		0.30		
A017571A	11120	9731	DAVID C MOORE	4/25/1957	3.90	Placer	ANTELOPE CREEK
			DAVID C MOORE Total		3.90		
A005024	2663	857	DAVID HAYNES MERING	5/18/1926	0.30	El Dorado	UNSP
			DAVID HAYNES MERING Total		0.30		
A012462	7434	3529	DAVID W GIRARD	4/6/1948	4.00	El Dorado	CHUNK RAVINE
			DAVID W GIRARD Total		4.00		
A016289	10247	5507	David William Barton	3/18/1955	14.60	Placer	UNSP
			David William Barton Total		14.60		
A026778	19076	12620	DE ANZA PLACER GOLD MINING COMPANY	4/6/1981	9.80	Placer	PAGGE CREEK

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A027566	19829	13841	DE ANZA PLACER GOLD MINING COMPANY	11/8/2011	215.20	Placer	NORTH FORK FORBES CREEK
A029364	20777	13844	DE ANZA PLACER GOLD MINING COMPANY	12/9/2011	11.20	Placer	PAGGE CREEK
			DE ANZA PLACER GOLD MINING COMPANY Total		236.20		
A021763	15075	8882	DEAN P A ELBERT	5/6/1964	9.00	El Dorado	THIRD OTTER CREEK
			DEAN P A ELBERT Total		9.00		
A011689	6706	5205	DEER HILLS PROPERTY OWNERS ASSN	1/9/1947	45.00	El Dorado	UNST
			DEER HILLS PROPERTY OWNERS ASSN Total		45.00		
A016995	11491	7992	DENNIS R DALTON	4/9/1956	3.00	Placer	UNST
			DENNIS R DALTON Total		3.00		
A018211B	11657	9367	DIAMANTE DEVELOPMENT LLC	7/9/1958	0.50	El Dorado	UNSP
A022791	15500	10062	DIAMANTE DEVELOPMENT LLC	5/18/1967	0.30	El Dorado	UNST
			DIAMANTE DEVELOPMENT LLC Total		0.80		
A009134	5059	3790	DIANE COSGROVE	10/2/1937	0.10	El Dorado	COLD STREAM
			DIANE COSGROVE Total		0.10		
A021857	15201	10018	DIANE W BUCHHOLZ	7/20/1964	16.00	El Dorado	BEAR CREEK
			DIANE W BUCHHOLZ Total		16.00		
A028208A	019433A	13035	DIANNA NEWBORN	3/6/1991	5.50	El Dorado	UNST
A029958	20856	13724	DIANNA NEWBORN	6/6/2007	14.50	El Dorado	UNST
			DIANNA NEWBORN Total		20.00		
A004357	2047	1348	DINO E ANDREOTTI	12/9/1924	1.80	El Dorado	UNCR
A022596	15410	9637	DINO E ANDREOTTI	9/30/1966	0.20	El Dorado	UNST
			DINO E ANDREOTTI Total		2.00		
A026436	18729	12676	DOBBAS RANCH	6/30/1980	0.50	El Dorado	UNSP
A026438	18731	12677	DOBBAS RANCH	6/30/1980	0.40	El Dorado	UNSP
			DOBBAS RANCH Total		0.90		
A005413	2955	3008	DON K AND J A TAYLOR, TRUSTEES	4/11/1927	137.60	Placer	RED RAVINE (AKA BUCKEYE RAVINE)
			DON K AND J A TAYLOR, TRUSTEES Total		137.60		
A023032	15758	10314	Donald Ray Neal	4/19/1968	12.60	Placer	UNST
			Donald Ray Neal Total		12.60		
A014328	9289	5017	DONALD DEAN HUTCHISON	5/29/1951	43.90	Placer	ANTELOPE CREEK
			DONALD DEAN HUTCHISON Total		43.90		
A012598	7431	4049	DONALD G RHODES	7/19/1948	2.50	El Dorado	UNSP
A018559	12063	8421	DONALD G RHODES	2/26/1959	2.50	El Dorado	UNST
			DONALD G RHODES Total		5.00		
A013752	8200	4756	DONALD W FIELDS	5/23/1950	4.10	El Dorado	WEBER CREEK
			DONALD W FIELDS Total		4.10		
A009952	5622	2563	DONNA MCTAGGART	7/12/1940	0.20	El Dorado	PYRAMID CREEK
			DONNA MCTAGGART Total		0.20		
A024705	17798	12232	DOROTHY A MARTIN	11/6/1974	1.80	El Dorado	WHITE ROCK CREEK
			DOROTHY A MARTIN Total		1.80		
A028159	20087	13231	DOUGLAS A NICKELL	6/12/1984	0.10	Placer	UNSP
			DOUGLAS A NICKELL Total		0.10		
A030352	20882		DOUGLAS B VEERKAMP	4/14/1994	88.00	El Dorado	UNST
			DOUGLAS B VEERKAMP Total		88.00		
A021696	14623	9202	Douglas R. Gingerich	3/17/1964	20.00	Placer	UNST
			Douglas R. Gingerich Total		20.00		
A018590	13585	8107	DRONE GRANT INVESTMENT GROUP	3/12/1959	61.30	El Dorado, Placer	DEVILS CANYON CREEK
			DRONE GRANT INVESTMENT GROUP Total		61.30		

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A024514C	16976	11411	DWIGHT R DENTON	1/25/1984	6.00	El Dorado	SWEETWATER CREEK
A024514D	16976	11412	DWIGHT R DENTON	1/25/1984	20.00	El Dorado	SWEETWATER CREEK
A027630	18901	12613	DWIGHT R DENTON	1/13/1983	9.00	El Dorado	SWEETWATER CREEK
A027703	19034	12615	DWIGHT R DENTON	4/4/1983	5.00	El Dorado	SWEETWATER CREEK
			DWIGHT R DENTON Total		40.00		
A025711	17843	12515	ECHO LANE INVESTORS	4/6/1978	110.00	El Dorado	INDIAN CREEK
			ECHO LANE INVESTORS Total		110.00		
A013369	8403	5210	EDWARD MACKAY	9/28/1949	9.50	El Dorado	UNCR
			EDWARD MACKAY Total		9.50		
A026573	19066	12660	EDWARD L PURKEY	10/8/1980	1.40	El Dorado	UNST
			EDWARD L PURKEY Total		1.40		
A012475	7386	3889	EDWARD P AKIN	4/14/1948	40.00	El Dorado	UNST
			EDWARD P AKIN Total		40.00		
A001692	1053	2184	EL DORADO IRRIGATION DISTRICT	3/25/2008	1,125.00	El Dorado	NORTH FORK WEBER CREEK
			EL DORADO IRRIGATION DISTRICT Total		1,125.00		
A019532	13536	8231	ELAINE BARKER	7/6/1960	1.20	Placer	UNST
			ELAINE BARKER Total		1.20		
A012875	7654	4021	ELISABETH MILLER	12/23/1948	25.00	El Dorado	COLD SPRINGS CREEK
A014603	8953	5587	ELISABETH MILLER	12/14/1951	15.00	El Dorado	UNST
			ELISABETH MILLER Total		40.00		
A022364	15320	9022	ELIZABETH CRONIN	1/13/1966	0.10	El Dorado	UNST
			ELIZABETH CRONIN Total		0.10		
A011628	6789	3206	ELIZABETH A NILES	11/18/1946	0.80	El Dorado	UNSP
			ELIZABETH A NILES Total		0.80		
A018541	12027	9676	EMIGRANT GAP MUTUAL WATER CO	2/19/1959	73.00	Placer	BLUE CANYON CREEK, UNST
			EMIGRANT GAP MUTUAL WATER CO Total		73.00		
A024535	17217	11424	ERLINE M MELLO	1/25/1974	16.00	El Dorado	COLOMA CANYON CREEK
			ERLINE M MELLO Total		16.00		
A011523B	6700	005447B	Estate of Rudolf K. Sachau	8/21/1946	36.40	Placer	UNSP
A025016	17647	11750	Estate of Rudolf K. Sachau	3/5/1976	1.00	Placer	UNSP
			Estate of Rudolf K. Sachau Total		37.40		
A026825	18611	12395	ESTHER E TOWNZEN	5/11/1981	2.10	El Dorado	UNST
			ESTHER E TOWNZEN Total		2.10		
A019826	12972	9337	EUGENE FILEV	10/24/1960	2.00	El Dorado	UNSP (3)
			EUGENE FILEV Total		2.00		
A006431	3395	1267	EUGENE LANGENBACH	9/10/1929	0.10	El Dorado	UNST
			EUGENE LANGENBACH Total		0.10		
A016037	10068	5822	EUGENE A WILSON	9/8/1954	1.40	El Dorado	UNST
			EUGENE A WILSON Total		1.40		
A025631	17347	11246	EUGENE H MEYER	1/3/1978	0.20	El Dorado	BURNT SHANTY CREEK
			EUGENE H MEYER Total		0.20		
A000548	258	176	EVELYN T WICKS	12/28/1916	53.70	Placer	SECRET RAVINE
			EVELYN T WICKS Total		53.70		
A012318	7162	4341	EVERETT B DYER III	2/11/1948	2.00	El Dorado	SOUTH FORK TENNESSEE CREEK
			EVERETT B DYER III Total		2.00		
A019553	12930	7751	FARHAD MORTAZAVI	7/18/1960	1.70	Placer	UNST
			FARHAD MORTAZAVI Total		1.70		
A016544	10554	6167	FAY F CARVER	8/23/1955	1.60	Placer	UNST
			FAY F CARVER Total		1.60		
A018211A	11657	9366	FAY LOUIE LIVING REVOCABLE TRUST OF 5/11/01	7/9/1958	10.00	El Dorado	GREEN SPRING CREEK

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A022226	15448	9324	FAY LOUIE LIVING REVOCABLE TRUST OF 5/11/01	7/16/1965	17.00	El Dorado	GREEN SPRINGS CREEK
			FAY LOUIE LIVING REVOCABLE TRUST OF 5/11/01 Total		27.00		
A031074	21172		FLA Roseville LP	8/5/2005	49.00	Placer	UNST
			FLA Roseville LP Total		49.00		
A018551	13584	9959	FORESTHILL PUBLIC UTILITY DISTRICT	2/24/1959	81.00	Placer	MILL CREEK
A021945	15375		FORESTHILL PUBLIC UTILITY DISTRICT	10/22/1964	24,075.80	Placer	NORTH SHIRTTAIL CANYON
A024596	16644	13038	FORESTHILL PUBLIC UTILITY DISTRICT	4/22/1974	166.80	Placer	MILL CREEK
			FORESTHILL PUBLIC UTILITY DISTRICT Total		24,323.60		
A012131	7200	5976	FOUR CORNERS LANDOWNERS ASSOC	10/16/1947	587.00	El Dorado	JACOBS CREEK
			FOUR CORNERS LANDOWNERS ASSOC Total		587.00		
A007776	4364	2233	FRANCINE MARQUIS	12/5/1933	0.40	El Dorado	UNST
			FRANCINE MARQUIS Total		0.40		
A029955	20661		FRANCIS P ALLEN TRUST	5/15/1991	2.50	El Dorado	PEACOCK RAVINE
			FRANCIS P ALLEN TRUST Total		2.50		
A006540	3509	1119	FRANK D MORILLAS	1/20/1930	61.10	Placer	SECRET RAVINE
			FRANK D MORILLAS Total		61.10		
A020339	13427	8239	FRANK P ROMANO	8/2/1961	3.40	El Dorado	UNSP
			FRANK P ROMANO Total		3.40		
A024683	17146	11477	FRED H RUSSELL III	8/30/1974	6.00	El Dorado	UNST
			FRED H RUSSELL III Total		6.00		
A011588A	6729	003374A	FREDERICK R MCLAREN	9/20/1982	8.80	El Dorado	INDIAN CREEK
A011588B	6729	003374B	FREDERICK R MCLAREN	9/20/1982	8.80	El Dorado	INDIAN CREEK
A011588C02	6729	003374C02	FREDERICK R MCLAREN	12/13/1985	75.70	El Dorado	INDIAN CREEK
A016368A	10290	008701A	FREDERICK R MCLAREN	9/20/1982	3.80	El Dorado	INDIAN CREEK
A016368B	10290	008701B	FREDERICK R MCLAREN	9/20/1982	3.80	El Dorado	INDIAN CREEK
A016368C02	10290	008701C02	FREDERICK R MCLAREN	12/13/1985	43.60	El Dorado	INDIAN CREEK
			FREDERICK R MCLAREN Total		144.50		
A003405	2329	2053	GAEL M BARSOTTI	5/18/1923	188.40	El Dorado	BRUSH CANYON
A020305	14796	9696	GAEL M BARSOTTI	7/18/1961	70.20	El Dorado	BRUSH CANYON
A020306	14797	9679	GAEL M BARSOTTI	7/18/1961	70.20	El Dorado	BRUSH CANYON
A020307	14798	9680	GAEL M BARSOTTI	7/18/1961	70.20	El Dorado	BRUSH CANYON
			GAEL M BARSOTTI Total		399.00		
A026060	18050	11935	GAIL IRENE WHITE	8/8/1979	0.40	Placer	UNST
			GAIL IRENE WHITE Total		0.40		
A007013	3806	1699	GALE A MCGUIRE	7/20/1931	0.30	El Dorado	BULL CREEK
			GALE A MCGUIRE Total		0.30		
A018657	12072	6495	GARY T MATSON	4/21/1959	9.00	El Dorado	UNST
			GARY T MATSON Total		9.00		
A018158	11644	8402	GEOFF H JOHNSON	5/26/1958	72.20	El Dorado	UNSP, UNST
			GEOFF H JOHNSON Total		72.20		
A015252	9538	7761	George Popescu	3/24/1953	15.00	El Dorado	KELLEY CREEK
			George Popescu Total		15.00		
A015522	10016	7542	George & Geri Grant LP	9/2/1953	36.20	Placer	OWL CREEK, UNST
			George & Geri Grant LP Total		36.20		
A002458	1632	486	GEORGE A FARIS	7/27/1921	0.40	El Dorado	UNSP (2)
			GEORGE A FARIS Total		0.40		
A016763	10509	5508	GEORGE A LAY	12/5/1955	11.00	Placer	UNDR
			GEORGE A LAY Total		11.00		

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A022996	15659	10207	GEORGE ANGELO TSAKOPOULOS	2/28/1968	15.00	Sacramento	ALDER CREEK
			GEORGE ANGELO TSAKOPOULOS Total		15.00		
A018004	11546	8163	GEORGE L COX	2/18/1958	36.70	Placer	UNST
A021211	14210	8855	GEORGE L COX	3/29/1963	8.60	Placer	UNST
			GEORGE L COX Total		45.30		
A013131	7830	3813	GEORGE W SHRIVER	6/2/1949	0.20	El Dorado	SOUTH FORK AMERICAN RIVER
			GEORGE W SHRIVER Total		0.20		
A005644A	12827		GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT	3/24/2000	74,347.90	El Dorado	PILOT CREEK
A016212	11304		GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT	3/24/2000	20,000.00	El Dorado	BACON CANYON, BRANCH OF FIRST CANYON OTTER CREEK, BRANCH OF SECOND CANYON OTTER CREEK, BRANCH OF THIRD CANYON OTTER CREEK, DEEP CANYON, PILOT CREEK, UNXX, UNXX (2)
A016688	11306		GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT	10/24/1955	20,363.90	El Dorado	ONION CREEK
			GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT Total		114,711.80		
A018487	11895	7157	GERALD E HAWKINS	1/23/1959	8.10	El Dorado	UNSP
			GERALD E HAWKINS Total		8.10		
A002944	1193	296	Gerald R Decamp	7/26/1922	0.30	El Dorado	COLD STREAM
			Gerald R Decamp Total		0.30		
A007305	3982	1701	GILBERT A ALBIANI	6/27/1932	0.20	El Dorado	UNSP
			GILBERT A ALBIANI Total		0.20		
A018566	11912	6634	GLEN EASTMAN	3/4/1959	0.90	El Dorado	UNSP, UNST
			GLEN EASTMAN Total		0.90		
A015804	9984	8171	GORDON J VICINI	3/30/1954	98.80	El Dorado	BURNT SHANTY CREEK, UNST
			GORDON J VICINI Total		98.80		
A011588C01	6729	003374C01	GREENSTONE COUNTRY OWNER'S ASSOC	12/13/1985	101.80	El Dorado	INDIAN CREEK
A016368C01	10290	008701C01	GREENSTONE COUNTRY OWNER'S ASSOC	12/13/1985	210.90	El Dorado	INDIAN CREEK
A026722	18583	12463	GREENSTONE COUNTRY OWNER'S ASSOC	2/20/1981	30.00	El Dorado	UNST
A026815	18584	12461	GREENSTONE COUNTRY OWNER'S ASSOC	5/1/1981	1.70	El Dorado	UNST
A026816	18585	12599	GREENSTONE COUNTRY OWNER'S ASSOC	5/1/1981	3.80	El Dorado	UNST
A026817	18586	12600	GREENSTONE COUNTRY OWNER'S ASSOC	5/1/1981	39.00	El Dorado	UNST
A026818	18587	12462	GREENSTONE COUNTRY OWNER'S ASSOC	5/1/1981	4.10	El Dorado	UNST
			GREENSTONE COUNTRY OWNER'S ASSOC Total		391.30		
A003793	1743	590	GREGORY D HAWES	1/10/1924	0.60	El Dorado	COLD STREAM
			GREGORY D HAWES Total		0.60		
A015043	9282	6572	GREGORY M WATSON	10/7/1952	5.00	Placer	UNST
			GREGORY M WATSON Total		5.00		
A016508	10555	5837	GREGORY W PAINTER	10/22/1959	0.10	El Dorado	UNSP (2)
			GREGORY W PAINTER Total		0.10		
A027615	18865	12406	HARLEY DELANO	12/20/1982	0.90	El Dorado	UNST
			HARLEY DELANO Total		0.90		
A026099	18080	11266	HENRIETTA DENNIS	9/27/1979	1.30	El Dorado	UNSP
			HENRIETTA DENNIS Total		1.30		
A006797	3653	1400	HENRIK KAM	9/17/1930	0.20	El Dorado	FORNI CREEK
			HENRIK KAM Total		0.20		
A014439	8850	4857	HENRY TEICHERT	8/23/1951	3.00	Placer	UNXX

No comments

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A015338	9553	5071	HENRY TEICHERT	5/12/1953	20.00	Placer	GRAPEVINE RAVINE
			HENRY TEICHERT Total		23.00		
A013839	8361	5452	HENRY WALTHER	7/6/1950	38.00	Placer	UNST
A015077	9273	5687	HENRY WALTHER	11/5/1952	16.00	Placer	UNST
			HENRY WALTHER Total		54.00		
A013419	7692	5430	HIDDEN VALLEY COMMUNITY ASSOC	10/26/1949	165.50	Placer	MINERS RAVINE
A014525	8892	5431	HIDDEN VALLEY COMMUNITY ASSOC	10/16/1951	57.30	Placer	MINERS RAVINE, UNST
			HIDDEN VALLEY COMMUNITY ASSOC Total		222.80		
A012364	8127	4118	JACALYN GAY WINJE	2/27/1948	12.30	El Dorado	UNST
			JACALYN GAY WINJE Total		12.30		
A024351A	017135A	12736	JACK E DEL CONTE	4/27/1990	1.40	Sacramento	LINDA CREEK
			JACK E DEL CONTE Total		1.40		
A008756	4822	2431	JACK R WEAVER	8/8/1936	0.20	El Dorado	UNSP
			JACK R WEAVER Total		0.20		
A025930	17740	11751	JAMES HART	2/28/1979	15.00	El Dorado	UNST
			JAMES HART Total		15.00		
A014370	8994	5229	JAMES PETRIKIN	6/27/1951	50.70	Placer	DIRTY FACE RAVINE
			JAMES PETRIKIN Total		50.70		
A025854	17735	12594	JAMES A CROFF	10/13/1978	6.80	El Dorado	UNST
			JAMES A CROFF Total		6.80		
A007294	3973	1684	JAMES A WATT	6/16/1932	0.20	Alpine	UNSP
			JAMES A WATT Total		0.20		
A009643	5394	2489	JAMES D & JANIS L ALDEA REVOKABLE TRUST	6/26/1939	0.10	El Dorado	UNST
A010477	6004	2967	JAMES D & JANIS L ALDEA REVOKABLE TRUST	6/12/1942	0.30	El Dorado	UNST
			JAMES D & JANIS L ALDEA REVOKABLE TRUST Total		0.40		
A028184	19584	12693	JAMES D MCLAIN	7/6/1984	0.30	El Dorado	UNST
			JAMES D MCLAIN Total		0.30		
A028474	19727	13389	JAMES G CLARK	6/12/1985	0.50	El Dorado	UNST
			JAMES G CLARK Total		0.50		
A012124	7129	6648	JAMES W ARNOLD	10/8/1947	14.00	El Dorado	NORTON RAVINE
			JAMES W ARNOLD Total		14.00		
A019052A	12310	10056	JAMI MANDEL	10/29/1959	7.10	Placer	UNST
			JAMI MANDEL Total		7.10		
A023041	15939	11075	JANICE M SUTHERLAND	5/10/1968	45.00	El Dorado, Placer	CLIPPER CREEK, UNST
			JANICE M SUTHERLAND Total		45.00		
A004597B		000948B	JASON CARDINET	8/20/2004	16.30	Placer	AUBURN RAVINE
			JASON CARDINET Total		16.30		
A004781	2403	943	JEFF LITTLE	9/24/1925	0.40	El Dorado	SOUTH FORK AMERICAN RIVER
			JEFF LITTLE Total		0.40		
A020490	13614	8160	JEFF WEAVER	11/10/1961	1.40	El Dorado	MOSQUITO CREEK
			JEFF WEAVER Total		1.40		
A010751	6237	3966	JEFFREY TILFORD	1/18/1944	149.30	Placer	UNST
A014545	9004	5160	JEFFREY TILFORD	11/1/1951	21.20	Placer	UNXX
			JEFFREY TILFORD Total		170.50		
A022817	15561	11707	JEFFREY C OLSON	6/14/1967	23.00	El Dorado	MARTEL CREEK, UNST
			JEFFREY C OLSON Total		23.00		
A013542	8041	4134	JEFFREY R LEONG	1/18/1950	85.30	Placer	UNCR
			JEFFREY R LEONG Total		85.30		
A014884	9127	8123	JEFFREY S HUBER	7/1/1952	12.00	Placer	CAPS RAVINE

No comments

- n/a -

No comments

- n/a -

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			JEFFREY S HUBER Total		12.00		
A005601	2905	1003	JEREMIAH FLYNN	7/11/1927	0.30	El Dorado	UNSP
			JEREMIAH FLYNN Total		0.30		
A013502	8031	4853	Jerome Vickrey	12/7/1949	0.80	El Dorado	UNST
			Jerome Vickrey Total		0.80		
A024109	16523	10713	JERRY DUNCAN	7/6/1972	9.00	Placer	UNST
			JERRY DUNCAN Total		9.00		
A019185	12425	7817	JERRY JOHNSON	1/18/1960	35.00	Placer	UNST
			JERRY JOHNSON Total		35.00		
A019392	13781	8664	JERRY W BALLEW	4/26/1960	2.80	El Dorado	UNSP
			JERRY W BALLEW Total		2.80		
A025855	17736	11800	JOANNE K BATEMAN	10/13/1978	15.00	El Dorado	UNST
			JOANNE K BATEMAN Total		15.00		
A012156	7142	3777	JOHN BRIGGS	11/17/1947	10.00	El Dorado	UNST
			JOHN BRIGGS Total		10.00		
A015662	9733	6523	JOHN METROPULOS III	12/28/1953	5.30	El Dorado	SOUTH FORK AMERICAN RIVER
			JOHN METROPULOS III Total		5.30		
A009199	5174	2571	John A. Cunningham	12/3/1937	0.10	El Dorado	COLD STREAM
			John A. Cunningham Total		0.10		
A011813	6852	4317	JOHN C SUNDIN	4/4/1947	1.10	El Dorado	CHUNK CREEK
			JOHN C SUNDIN Total		1.10		
A020259	13374	8114	JOHN E MARLOW	6/12/1961	16.20	El Dorado	UNST
A020514	13836	10791	JOHN E MARLOW	12/5/1961	15.60	El Dorado	UNST
			JOHN E MARLOW Total		31.80		
A007662	4251	1980	JOHN H PETERSON	9/6/1933	0.20	El Dorado	UNSP
			JOHN H PETERSON Total		0.20		
A021802	14569	9251	JOHN P HENDERSON	5/29/1964	28.00	El Dorado	IRISH CREEK
			JOHN P HENDERSON Total		28.00		
A018157	11643	8687	John Ryan Neil	5/26/1958	185.30	El Dorado	UNST
			John Ryan Neil Total		185.30		
A017223	11314	6248	JOHN T LUKKONEN	8/9/1956	266.50	Placer	SAILORS RAVINE
			JOHN T LUKKONEN Total		266.50		
A002190	1003	510	JON KNUDSEN	11/16/1948	87.00	Placer	CAPS RAVINE
			JON KNUDSEN Total		87.00		
A023302	15955	11159	JOSEPH MALONEY	7/2/1969	14.70	El Dorado	UNST
			JOSEPH MALONEY Total		14.70		
A030402	20968	13804	JOSEPH M KEATING	4/6/2010	14.00	El Dorado	UNST
			JOSEPH M KEATING Total		14.00		
A012999	7757	4363	JOSEPH S LANZA	3/24/1949	173.80	El Dorado	FISH CREEK
			JOSEPH S LANZA Total		173.80		
A018684	12034	7387	JOSH L WILSON JR	4/30/1959	3.40	Placer	UNSP
			JOSH L WILSON JR Total		3.40		
A025560	17345	12476	KARL HEMPFLING	11/10/1977	4.00	El Dorado	UNST
A025567	17346	11420	KARL HEMPFLING	11/15/1977	2.40	El Dorado	UNST
			KARL HEMPFLING Total		6.40		
A012240	7239	6374	KATHERINE A TUTTLE	1/13/1948	70.00	El Dorado	WHITE ROCK CANYON
			KATHERINE A TUTTLE Total		70.00		
A025728	17560	12394	KEN JOSEPH	3/17/1989	1.10	El Dorado	UNST
			KEN JOSEPH Total		1.10		
A024875	16908	13688	KENNETH PIMENTEL	12/13/2006	2.50	El Dorado	BRUSHY CANYON

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			KENNETH PIMENTEL Total		2.50		
A013616	8147	3839	KENNETH SAYLOR	3/6/1950	0.20	El Dorado	UNST
			KENNETH SAYLOR Total		0.20		
A027651	19312		KENNETH WILSON	2/10/1983	8,398.10	El Dorado	CANYON CREEK
			KENNETH WILSON Total		8,398.10		
A006685	3565	1290	KENNETH J MAGRI	5/21/1930	0.30	El Dorado	UNCR
			KENNETH J MAGRI Total		0.30		
A018579	11931	7229	KENNETH J TURTON	3/30/1965	15.00	Placer	MORMON RAVINE
			KENNETH J TURTON Total		15.00		
A012885	7656	4479	KENNETH S HILL	12/29/1948	36.00	El Dorado	UNST
			KENNETH S HILL Total		36.00		
A013146	7822	3824	KEVIN CAIRNS	6/9/1949	0.20	El Dorado	EVANS CREEK
			KEVIN CAIRNS Total		0.20		
A010212	5851	3524	KIRKWOOD MOUNTAIN RESORT LLC	5/28/1941	0.20	Alpine	UNSP
A030062	20851		KIRKWOOD MOUNTAIN RESORT LLC	2/7/1992	250.00	Alpine	CAPLES LAKE
A030453	20852		KIRKWOOD MOUNTAIN RESORT LLC	6/6/1995	250.00	Alpine	CAPLES LAKE
			KIRKWOOD MOUNTAIN RESORT LLC Total		500.20		
A010484	6044	3289	KRISTAN OTTO	6/26/1942	0.10	El Dorado	SOUTH FORK AMERICAN RIVER
			KRISTAN OTTO Total		0.10		
A008623	4765	3541	KYBURZ MUTUAL WATER COMPANY	3/30/1936	1.10	El Dorado	SOUTH FORK AMERICAN RIVER
A026486	18511		KYBURZ MUTUAL WATER COMPANY	8/7/1980	146.00	El Dorado	UNST, UNST (2)
			KYBURZ MUTUAL WATER COMPANY Total		147.10		
A013718	8159	4471	LAGUNA HOMEOWNERS ASSOCIATION	5/3/1950	10.00	Placer	UNST
			LAGUNA HOMEOWNERS ASSOCIATION Total		10.00		
A016650	10445	7204	LAKEVIEW HILLS COMMUNITY ASSOCIATION	3/10/1965	113.60	Placer	CARROLL CREEK, MINERS RAVINE
			LAKEVIEW HILLS COMMUNITY ASSOCIATION Total		113.60		
A012040	7093	4445	LARANE INVESTMENTS	8/13/1947	18.00	Placer	GRAPEVINE RAVINE
			LARANE INVESTMENTS Total		18.00		
A025667	17805	11717	LARISA LYSAK	2/2/1978	0.90	Placer	UNST
			LARISA LYSAK Total		0.90		
A021888	15625	10773	Larry Bowser	8/31/1964	2.10	Placer	UNST
			Larry Bowser Total		2.10		
A018617	12314	7997	LARRY JONES	3/31/1959	7.80	Placer	UNST
			LARRY JONES Total		7.80		
A024514A	16976	11409	LARRY R GOULDEN	1/25/1984	12.00	El Dorado	UNST
			LARRY R GOULDEN Total		12.00		
A007316	4014	1942	LAWRENCE E SWENSON	7/6/1932	0.10	El Dorado	UNST
			LAWRENCE E SWENSON Total		0.10		
A021225	14566	10002	LAWRENCE L CABODI	4/6/1963	2.20	El Dorado	UNSP
			LAWRENCE L CABODI Total		2.20		
A008356	4626	1933	LAWRENCE T WELDEN	6/11/1935	0.10	El Dorado	UNSP
			LAWRENCE T WELDEN Total		0.10		
A028467	19739		LEE A CHIUSANO	6/4/1985	2.80	El Dorado	UNST
			LEE A CHIUSANO Total		2.80		
A025315	17212	11457	LEE F SMITH	3/31/1977	7.00	El Dorado	TENNESSEE CREEK
			LEE F SMITH Total		7.00		
A020640	13791	8411	LEO E FINNERAN	7/3/1962	4.00	El Dorado	UNCR
			LEO E FINNERAN Total		4.00		
A013519	8104	5414	LEON M GASTALDI	12/27/1949	83.00	El Dorado	UNST

No comments

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			LEON M GASTALDI Total		83.00		
A013292	7867	3787	LEV V RIKOFF	8/11/1949	0.30	El Dorado	UNSP
			LEV V RIKOFF Total		0.30		
A002011	937	152	LEZLIE ELAINE DORSETT	9/18/1920	0.20	El Dorado	UNSP
			LEZLIE ELAINE DORSETT Total		0.20		
A026523	18777	12447	LINDA D WALDECK	9/11/1980	0.30	Placer	UNST
			LINDA D WALDECK Total		0.30		
A019325	12555	8113	LINDA R MURRAY	3/24/1960	9.00	Placer	UNST
			LINDA R MURRAY Total		9.00		
A021407	14357	8866	LINZY L COTHAM JR	7/24/1963	26.60	El Dorado	UNST
			LINZY L COTHAM JR Total		26.60		
A019825	12971	8225	Lionell Williams Trust	10/24/1960	4.50	El Dorado	UNSP
			Lionell Williams Trust Total		4.50		
A013318	7868	3788	LOIS PENMAN	8/29/1949	0.30	El Dorado	UNSP
			LOIS PENMAN Total		0.30		
A018512	12002	7506	LORI JANOWSKI	1/29/1959	25.00	El Dorado	UNCR
A030239	20915		LORI JANOWSKI	3/23/1993	6.00	El Dorado	UNST
			LORI JANOWSKI Total		31.00		
A029223	20717	13677	LOUIS W HEBERT	11/27/2006	1.20	Placer	UNST
			LOUIS W HEBERT Total		1.20		
A013612	8402	3842	LUCILLE HONIG	3/1/1950	10.00	El Dorado	DUTCH MARY RAVINE
			LUCILLE HONIG Total		10.00		
A003910	1970	586	LYDIA BACA	3/18/1924	0.10	El Dorado	UNSP
			LYDIA BACA Total		0.10		
A026406	18219	12068	MARC ALLISON	6/6/1980	0.20	Placer	UNST
			MARC ALLISON Total		0.20		
A019764	12790	7667	MARCIA C TAFFY WARNER	9/30/1960	19.00	El Dorado	MOSQUITO CREEK
			MARCIA C TAFFY WARNER Total		19.00		
A014410	9394	5598	MARK FOSTER	7/30/1951	29.20	Placer	SECRET RAVINE
			MARK FOSTER Total		29.20		
A011258B	6528	9363	MARK HANNUM	1/10/1946	11.80	Placer	UNST
			MARK HANNUM Total		11.80		
A026934	18880	12449	MARTHA J CROWL	7/30/1981	0.60	Placer	UNST
			MARTHA J CROWL Total		0.60		
A010344	5940	3071	Mary Hillabrand	12/12/1941	0.10	El Dorado	UNSP
			Mary Hillabrand Total		0.10		
A008163	4500	3553	MARY WOOD	11/20/1934	3.40	El Dorado	UNSP
			MARY WOOD Total		3.40		
A007070	3919	1555	Mary Leslie Rev. Trust	9/1/1931	0.10	El Dorado	UNST
			Mary Leslie Rev. Trust Total		0.10		
A020796	13838	8489	MELINDA S LAU	5/29/1962	149.50	El Dorado	SHENOGLE CREEK
			MELINDA S LAU Total		149.50		
A019680	13228	10465	MHC TT, INC.	12/16/1960	152.00	Placer	KELLY CREEK
A021480	14567	10466	MHC TT, INC.	10/1/1963	44.00	Placer	KELLY CREEK
			MHC TT, INC. Total		196.00		
A009026	5162	2557	MICHAEL HICKOX	6/28/1937	0.20	El Dorado	UNST
			MICHAEL HICKOX Total		0.20		
A027979	19335	12741	Michael K Baughman	2/17/1984	6.00	Placer	UNST
			Michael K Baughman Total		6.00		
A014244	9003	4648	Michael K Baughman	4/10/1951	161.30	Placer	UNXX

No comments

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			Michael K Baughman Total		161.30		
A026057	17953	12833	MICHAEL KIM	7/30/1979	30.00	El Dorado	UNST
			MICHAEL KIM Total		30.00		
A018653	12245	7914	MICHAEL MCCARTY	4/20/1959	3.80	Placer	UNST
			MICHAEL MCCARTY Total		3.80		
A009463	5323	2485	MICHAEL CARL VISMAN	8/4/1942	543.00	El Dorado	COON GULCH
			MICHAEL CARL VISMAN Total		543.00		
A014620	9007	5860	MICHAEL R POSEHN	1/15/1952	1.00	Placer	UNST
			MICHAEL R POSEHN Total		1.00		
A030430	20999		Michael W Dennis	11/22/1994	10.00	Placer	UNST
			Michael W Dennis Total		10.00		
A017382	10898	7668	Michelle D. Menard	12/7/1956	19.00	El Dorado	UNST
			Michelle D. Menard Total		19.00		
A020086	13353	9954	MICHIGAN BLUFF MUTUAL WATER COMPANY	4/13/1961	2.50	Placer	UNXX
A020653	13784	9955	MICHIGAN BLUFF MUTUAL WATER COMPANY	3/14/1962	8.10	Placer	UNSP
A024997	17213	11598	MICHIGAN BLUFF MUTUAL WATER COMPANY	2/18/1976	8.10	Placer	UNSP
A027642	19719	13254	MICHIGAN BLUFF MUTUAL WATER COMPANY	1/31/1983	3.40	Placer	UNSP (AKA BOHEA MINE TUNNEL)
			MICHIGAN BLUFF MUTUAL WATER COMPANY Total		22.10		
A024514B	16976	11410	MIKE LEMIRE	1/25/1984	10.00	El Dorado	SWEETWATER CREEK
A027602	18877	12443	MIKE LEMIRE	4/25/1989	7.00	El Dorado	SWEETWATER CREEK
			MIKE LEMIRE Total		17.00		
A026427	18499	13619	MINERS COVE HOMEOWNERS ASSOCIATION	11/21/2005	15.00	Placer	MINERS RAVINE
			MINERS COVE HOMEOWNERS ASSOCIATION Total		15.00		
A021616	14965	9252	MINERS RAVINE ESTATES HOMEOWNERS ASSOCIATION	1/24/1964	21.00	Placer	MINERS RAVINE
			MINERS RAVINE ESTATES HOMEOWNERS ASSOCIATION Total		21.00		
A017414	12359	7015	MITCHELL D HOPE	3/20/1964	25.50	Placer	MINERS RAVINE
			MITCHELL D HOPE Total		25.50		
A011264	6934	10829	MT RALSTON PROPERTIES ASSN INC	8/2/2005	13.20	El Dorado	TAMARACK CREEK
A015623	10214	10830	MT RALSTON PROPERTIES ASSN INC	8/2/2005	6.00	El Dorado	TAMARACK CREEK
A026577	18519	12457	MT RALSTON PROPERTIES ASSN INC	8/2/2005	23.60	El Dorado	UNSP
			MT RALSTON PROPERTIES ASSN INC Total		42.80		
A018485	12089	9025	N JON NELSON	1/21/1959	3.10	El Dorado	CHINA CREEK
			N JON NELSON Total		3.10		
A009358	5288	2246	NANCY BAUER	7/29/1938	0.10	El Dorado	UNST
			NANCY BAUER Total		0.10		
A011097	6445	3024	NANCY BALCH-PRICE FISCHER	7/5/1945	0.10	Alpine	UNSP
			NANCY BALCH-PRICE FISCHER Total		0.10		
A004027	1878	893	NANCY E DOLCINI	6/14/1924	0.70	El Dorado	UNSP
			NANCY E DOLCINI Total		0.70		
A006529	5805	4403	NEVADA IRRIGATION DISTRICT	1/9/1930	3,411.60	Placer	AUBURN RAVINE
A008177	5812	12801	NEVADA IRRIGATION DISTRICT	11/27/1934	1,580.00	Placer	UNST (AKA WILSON CRK)
			NEVADA IRRIGATION DISTRICT Total		4,991.60		
A019872	13025	8108	New Forestry, LLC	12/9/1960	3.70	Placer	UNSP
			New Forestry, LLC Total		3.70		
A017207	10885	8289	NIKOLAI BARADIN	8/3/1956	35.00	El Dorado	UNST
			NIKOLAI BARADIN Total		35.00		

No comments

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A025424	17385	12027	NORMA JEAN SCHNEIDER	7/11/1977	2.10	El Dorado	UNST
A025425	17386	11497	NORMA JEAN SCHNEIDER	7/11/1977	2.00	El Dorado	UNST
			NORMA JEAN SCHNEIDER Total		4.10		
A025144	19837	13175	NORTH CANYON LAKE ASSOCIATION	9/10/1976	35.00	El Dorado	NORTH CANYON CREEK
			NORTH CANYON LAKE ASSOCIATION Total		35.00		
A014794	9291	9738	NORTH FORK ASSOCIATION	5/5/1952	22.00	Placer	FREEMAN CREEK
			NORTH FORK ASSOCIATION Total		22.00		
A011836	6927	4243	NORTHERN CALIFORNIA CONFERENCE ASSOC OF 7TH DAY ADVENTISTS	4/22/1947	13.00	El Dorado	MOUND SPRINGS CREEK
A013592	8214	4244	NORTHERN CALIFORNIA CONFERENCE ASSOC OF 7TH DAY ADVENTISTS	2/20/1950	20.00	El Dorado	MOUND SPRINGS CREEK
			NORTHERN CALIFORNIA CONFERENCE ASSOC OF 7TH DAY ADVENTISTS Total		33.00		
A004219	2598	941	ORENO J TONARELLI	9/17/1924	0.20	El Dorado	COLD STREAM
			ORENO J TONARELLI Total		0.20		
A026078	17930	11863	ORVILLE F SLINGSBY	8/28/1979	0.30	Placer	UNST
			ORVILLE F SLINGSBY Total		0.30		
A026633	18492	12411	OSCAR R CAMPBELL JR	11/25/1980	0.20	El Dorado	UNST
			OSCAR R CAMPBELL JR Total		0.20		
A014229	8620	6653	OUR LADY OF THE OAKS, A CALIF CORP	4/5/1951	63.00	Placer	UNST
			OUR LADY OF THE OAKS, A CALIF CORP Total		63.00		
A004597A		000948A	PATRIC JAMES HILLENBRAND LIVING TRUST	8/20/2004	21.00	Placer	AUBURN RAVINE
			PATRIC JAMES HILLENBRAND LIVING TRUST Total		21.00		
A021423	14598	8781	PATRICIA MCCORMICK	8/6/1963	0.20	El Dorado	STATION CREEK
			PATRICIA MCCORMICK Total		0.20		
A016326	11492	7303	Patty A Hooper	6/9/1965	318.60	Placer	UNST (2)
			Patty A Hooper Total		318.60		
A013994	8520	5323	PATTY BERRY	10/13/1950	2.50	El Dorado	UNSP
A022051	15106	9620	PATTY BERRY	2/24/1965	0.60	El Dorado	UNSP (2)
A022053	15108	9625	PATTY BERRY	2/24/1965	0.10	El Dorado	UNSP (2)
			PATTY BERRY Total		3.20		
A020326	13199	9365	Paul Perron	7/26/1961	23.00	Placer	UNST
			Paul Perron Total		23.00		
A006842	3735	1467	PAUL HEWES	12/6/1930	0.90	El Dorado	FORNI CREEK
			PAUL HEWES Total		0.90		
A017571C	11120	9733	PAUL NIPPERT	4/25/1957	4.10	Placer	ANTELOPE CREEK
			PAUL NIPPERT Total		4.10		
A024146	16670	10954	PAUL THOMASSON	8/17/1972	2.00	El Dorado	OTTER CREEK
			PAUL THOMASSON Total		2.00		
A004344	2305	1423	Paul A Zanetta	4/10/1934	18.10	El Dorado	MILL CREEK
			Paul A Zanetta Total		18.10		
A025973	17940	11867	PAUL S BURNS	4/16/1979	0.10	Placer	UNST
			PAUL S BURNS Total		0.10		
A013160	8316	4332	PAULA S DWELLY	6/17/1949	11.60	Placer	LIVE OAK RAVINE (AKA LIVE OAK CREEK)
			PAULA S DWELLY Total		11.60		
A007018	3808	1837	PAULINE RODGERS	7/25/1931	0.30	El Dorado	UNSP
			PAULINE RODGERS Total		0.30		
A016327	11493	7912	PETE JENSON	4/7/1967	32.00	Placer	UNST

No comments

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			PETE JENSON Total		32.00		
A018858	12718	7828	PETER M LA TONA	7/15/1959	2.30	Placer	MINERS RAVINE
			PETER M LA TONA Total		2.30		
A001923	843	352	PETER N BERBOHM	5/12/1924	30.30	Placer	SAILORS RAVINE
			PETER N BERBOHM Total		30.30		
A003982	1791	1111	PETER R BOHLEY	5/8/1924	2.70	El Dorado	EVANS CREEK
A022299	15076	10250	PETER R BOHLEY	10/1/1965	0.20	El Dorado	EVANS CREEK
			PETER R BOHLEY Total		2.90		
A013576	8457	4797	PILOT HILL ESTATES HOMEOWNERS ASSOC	2/9/1950	57.00	El Dorado	UNST
			PILOT HILL ESTATES HOMEOWNERS ASSOC Total		57.00		
A018085	13856		PLACER COUNTY WATER AGENCY	4/7/1958	839,438.40	Placer, Sacramento	DUNCAN CANYON, MIDDLE FORK AMERICAN RIVER, NORTH FORK AMERICAN RIVER, RUBICON RIVER
A018087	13858		PLACER COUNTY WATER AGENCY	4/8/1958	451,592.40	Placer, Sacramento	MIDDLE FORK AMERICAN RIVER, NORTH FORK AMERICAN RIVER, NORTH FORK LONG CANYON, RUBICON RIVER, SOUTH FORK LONG CANYON
			PLACER COUNTY WATER AGENCY Total		1,291,030.80		
A003887A		001093A	PLASSE HOMESTEAD WATER ASSOCIATION	1/29/2003	1.10	Amador	UNSP, UNST
			PLASSE HOMESTEAD WATER ASSOCIATION Total		1.10		
A003887B		001093B	PLASSE'S MEADOW GROUP LLC	1/29/2003	1.90	Amador	UNSP, UNST
			PLASSE'S MEADOW GROUP LLC Total		1.90		
A018095	11572	10371	QUINTETTE SERVICE	4/17/1958	9.30	El Dorado	CRYSTAL SPRING
			QUINTETTE SERVICE Total		9.30		
A019052B	12310	10057	R W VELON	7/20/2004	7.10		
			R W VELON Total		7.10		
A013520	8423	3833	RALPH MILLER	12/27/1949	40.00	El Dorado	UNST
			RALPH MILLER Total		40.00		
A026940	18496	12409	Randolph G Wilson	8/4/1981	1.00	El Dorado	UNST
			Randolph G Wilson Total		1.00		
A006801	3746	1802	RAYMOND BENDER	9/20/1930	0.30	El Dorado	UNSP
			RAYMOND BENDER Total		0.30		
A018189	11652	6769	RAYMOND KRINGEL	6/10/1963	1.70	El Dorado	UNST
			RAYMOND KRINGEL Total		1.70		
A006414	3366	1803	RAYMOND A YOUNG	8/19/1929	0.10	El Dorado	UNSP
			RAYMOND A YOUNG Total		0.10		
A013644	8219	5979	RAYMOND BEST PATCHEN	3/22/1950	110.00	El Dorado	MANHATTAN CREEK
			RAYMOND BEST PATCHEN Total		110.00		
A006410	3669	1904	RAYMOND W LARSEN	8/16/1929	362.00	El Dorado	SOUTH FORK BRUSH CANYON
			RAYMOND W LARSEN Total		362.00		
A019633	12835	7725	RICHARD E. FREY	8/1/1960	42.50	Placer	UNST
			RICHARD E. FREY Total		42.50		
A007647	4207	1652	RICHARD FIELLEN	8/14/1933	1.10	El Dorado	ROCKY CANYON
			RICHARD FIELLEN Total		1.10		
A013629	8347	4092	RICHARD C PAYNE & RUTH L PAYNE FAMILY TRUST	7/5/1950	0.10	El Dorado	UNSP

No comments

- n/a -

No comments

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Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			RICHARD C PAYNE & RUTH L PAYNE FAMILY TRUST Total		0.10		
A012184	7096	3602	RICHARD E AKIN	12/3/1947	29.20	El Dorado	UNST
			RICHARD E AKIN Total		29.20		
A008698	4803	2471	RICHARD K JONES	6/8/1936	0.10	El Dorado	UNST
			RICHARD K JONES Total		0.10		
A002262	938	491	RICHARD L GALLAGHER	3/15/1921	1.20	El Dorado	COLD STREAM
			RICHARD L GALLAGHER Total		1.20		
A028122	19361	12714	RICHARD SCOTT HEER	4/26/1984	3.00	El Dorado	UNST
			RICHARD SCOTT HEER Total		3.00		
A019328	12673	7810	RICK MANICA	3/28/1960	21.00	El Dorado	OTTER CREEK
			RICK MANICA Total		21.00		
A001778	819	789	RICK MASSIE	4/17/1975	27.00	Placer	CLOVER VALLEY CREEK
			RICK MASSIE Total		27.00		
A014377	8812	4865	Robert Aichele	6/28/1951	0.10	El Dorado	ROCKY CANYON
			Robert Aichele Total		0.10		
A009728	5617	2573	ROBERT BRUCIA	9/18/1939	0.10	El Dorado	STATION CREEK
			ROBERT BRUCIA Total		0.10		
A020627A	13629	008487A	ROBERT DEITZ II	8/13/1992	4.50	El Dorado	UNST
			ROBERT DEITZ II Total		4.50		
A024672	16897	11435	ROBERT B JORDAN	8/16/1974	14.90	El Dorado	JOHNTOWN CREEK
			ROBERT B JORDAN Total		14.90		
A024888	17819	12469	ROBERT D BERGTHOLD	9/29/1975	1.00	Placer	MINERS RAVINE
			ROBERT D BERGTHOLD Total		1.00		
A011142	6453	3354	ROBERT E JONES	5/24/1963	0.10	El Dorado	SOUTH FORK AMERICAN RIVER
			ROBERT E JONES Total		0.10		
A013740	8740	5312	Robert E Woodward, Jr	5/15/1950	33.00	Placer	UNST
			Robert E Woodward, Jr Total		33.00		
A024948	16889	11244	ROBERT H AND ERIKA L ANDERSON REVOCABLE TRUST	12/3/1975	4.30	El Dorado	UNST
			ROBERT H AND ERIKA L ANDERSON REVOCABLE TRUST Total		4.30		
A012181	7152	4478	ROBERT H POWELL	12/1/1947	7.00	El Dorado	UNST
			ROBERT H POWELL Total		7.00		
A025495	17339	13232	ROBERT I RIDGWAY	9/2/1977	1.40	El Dorado	UNST
			ROBERT I RIDGWAY Total		1.40		
A025453	17375	12048	ROBERT N DUPRIEST	8/10/1977	0.40	Placer	UNST
			ROBERT N DUPRIEST Total		0.40		
A006263	3318	1122	ROBERT P STANLEY	4/20/1929	0.10	El Dorado	UNSP
			ROBERT P STANLEY Total		0.10		
A020018	13096	7970	Roberta Kanter	3/6/1961	1.00	Placer	UNST
			Roberta Kanter Total		1.00		
A020827	13966	9648	RODNEY PIMENTAL	6/22/1962	5.00	El Dorado	UNST
			RODNEY PIMENTAL Total		5.00		
A028821	19942	13743	ROGER E TURNER	10/31/2007	1.30	Placer	DRY CREEK
			ROGER E TURNER Total		1.30		
A008951	4960	2152	ROLF W MORROW	4/22/1937	0.10	El Dorado	UNSP
			ROLF W MORROW Total		0.10		
A003934	1848	2369	RONALD JAVOR	3/31/1924	0.40	El Dorado	UNSP
			RONALD JAVOR Total		0.40		

No comments

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A007387	4140	1820	RONALD E MINER	9/23/1932	0.20	El Dorado	UNSP
			RONALD E MINER Total		0.20		
A003496	1509	488	RONALD J BELL	7/2/1923	0.30	El Dorado	UNSP
			RONALD J BELL Total		0.30		
A017173	11536	6987	RONALD J COLEMAN	7/12/1956	25.50	Placer	UNST
			RONALD J COLEMAN Total		25.50		
A012463	7383	3771	RONALD N HUSTON	4/7/1948	24.00	El Dorado	INDIAN CREEK, UNST
			RONALD N HUSTON Total		24.00		
A021171	14326	9258	RONALD ROSS CLOVER	2/27/1963	1.70	Placer	SECRET RAVINE
			RONALD ROSS CLOVER Total		1.70		
A013233	7831	10052	ROSE ANN GUTIERREZ	7/13/1949	121.00	El Dorado	PILOT CREEK
A023937	16494	11030	ROSE ANN GUTIERREZ	12/6/1971	19.00	El Dorado	PILOT CREEK
A023938	16493	11031	ROSE ANN GUTIERREZ	12/6/1971	16.00	El Dorado	UNST
			ROSE ANN GUTIERREZ Total		156.00		
A021876	14859	9227	RSC DEVELOPMENT CORPORATION	8/24/1964	57.10	Placer	DUTCH RAVINE
			RSC DEVELOPMENT CORPORATION Total		57.10		
A023903	16642	10803	RYAN ENNIS	10/22/1971	0.90	El Dorado	UNSP
			RYAN ENNIS Total		0.90		
A025122	16986	11267	S360 Granite Lakes LLC	8/2/1976	10.00	Placer	UNST
			S360 Granite Lakes LLC Total		10.00		
A008011	4474	2509	SACRAMENTO MOUNTAINEERS	7/5/1934	1.00	El Dorado	UNSP
			SACRAMENTO MOUNTAINEERS Total		1.00		
A025316	17145	11453	SACRAMENTO VALLEY TEEN CHALLENGE INC	3/31/1976	6.00	Placer	UNST
			SACRAMENTO VALLEY TEEN CHALLENGE INC Total		6.00		
A026969	18764	13757	Saeed Zarakani	3/20/2008	3.00	Placer	UNST
			Saeed Zarakani Total		3.00		
A026137	18210	12245	SALLY MARKSTEIN	11/19/1979	1.40	Placer	UNST
			SALLY MARKSTEIN Total		1.40		
A005830	4009	6324	San Juan Water District	2/11/1928	4,581.90	Placer	NORTH FORK AMERICAN RIVER
			San Juan Water District Total		4,581.90		
A022515	15318	9950	SCHOENNAUER FAMILY PARTNERSHIP	6/30/1966	12.00	El Dorado	RINGOLD CREEK
			SCHOENNAUER FAMILY PARTNERSHIP Total		12.00		
A011917	7176	10135	SCHUBIN RANCH LP	6/5/1947	83.00	El Dorado	UNST
A013663	8222	10134	SCHUBIN RANCH LP	3/30/1950	150.00	El Dorado	UNST
A014778	9141	10136	SCHUBIN RANCH LP	4/25/1952	90.00	El Dorado	UNST
			SCHUBIN RANCH LP Total		323.00		
A003321	1554	5488	SCIOTS TRACT CABIN OWNERS ASSN	3/23/1923	15.60	El Dorado	CODY CREEK
			SCIOTS TRACT CABIN OWNERS ASSN Total		15.60		
A005683	3035	1201	SCOTT E ADAMS	9/7/1927	0.10	El Dorado	UNSP
			SCOTT E ADAMS Total		0.10		
A018320	11778	6978	SCOTT KRIGER	9/16/1958	1.30	El Dorado	CHINA CREEK
			SCOTT KRIGER Total		1.30		
A007340	4026	2295	Sharon Warden	8/6/1932	0.10	El Dorado	UNSP
A007341	4027	1584	Sharon Warden	8/6/1932	0.10	El Dorado	UNSP
			Sharon Warden Total		0.20		
A010325	5939	3291	SHARON L CAMERON	11/21/1941	0.10	El Dorado	UNSP
A020256A	13189	9779	SHARON L CAMERON	5/5/1971	2.60	El Dorado	WHITE ROCK CREEK
			SHARON L CAMERON Total		2.70		

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A028993	20394	13325	SHIRLAND LAKEVIEW ESTATES HOMEOWNERS ASSOC	3/24/1987	6.60	Placer	UNST
			SHIRLAND LAKEVIEW ESTATES HOMEOWNERS ASSOC Total		6.60		
A018955	12217	8621	SHIRLIE ROBERTS	9/1/1959	9.70	El Dorado	JOHNTOWN CREEK
			SHIRLIE ROBERTS Total		9.70		
A020601	14248		SIERRA LAKES COUNTY WATER DISTRICT	1/3/1964	1,177.00	Placer	ICE LAKES
			SIERRA LAKES COUNTY WATER DISTRICT Total		1,177.00		
A019114	12541	9031	SIERRA PACIFIC INDUSTRIES	12/2/1959	1.10	El Dorado	ONION CREEK
			SIERRA PACIFIC INDUSTRIES Total		1.10		
A028208B	019433B	13036	SILVER SPRINGS LLC	3/6/1991	0.50	El Dorado	UNST
			SILVER SPRINGS LLC Total		0.50		
A019119	12388	9032	SLEEPY HOLLOW OWNERS ASSOCIATION	12/3/1959	47.50	El Dorado	UNST
			SLEEPY HOLLOW OWNERS ASSOCIATION Total		47.50		
A010012	5671	7195	SOUTHFORK PARTNERSHIP	9/24/1940	23.00	Placer	BADGER RAVINE, UNST
			SOUTHFORK PARTNERSHIP Total		23.00		
A012180	7151	4477	STAR-CREST LUMBER, INC	12/1/1947	49.00	El Dorado	UNST
A013257	8373	4480	STAR-CREST LUMBER, INC	7/25/1949	7.70	El Dorado	UNST
			STAR-CREST LUMBER, INC Total		56.70		
A025310	17844	11713	STEPHEN HOFFMAN	3/29/1977	4.50	El Dorado	UNST
			STEPHEN HOFFMAN Total		4.50		
A006080	3181	2038	STEPHEN RULAND	10/3/1928	0.10	El Dorado	UNSP
			STEPHEN RULAND Total		0.10		
A021185	14483	10075	STEPHEN C MARIANOS	3/8/1963	6.00	El Dorado	WEBER CREEK
			STEPHEN C MARIANOS Total		6.00		
A025380	17876	12386	STEPHEN W BEAM	6/2/1977	0.60	El Dorado	UNST
			STEPHEN W BEAM Total		0.60		
A006549	3477	1888	STEVEN BENNETTS	2/4/1930	20.40	El Dorado	EMIGRANT RAVINE CREEK
			STEVEN BENNETTS Total		20.40		
A019922	13052	9923	STEVEN FORD	1/17/1961	3.20	El Dorado	UNST
			STEVEN FORD Total		3.20		
A015298	9533	5660	STONEWORTH INC	4/17/1953	73.30	Placer	SOUTH FORK DRY CREEK
A018752	12366	7519	STONEWORTH INC	5/29/1959	152.00	Placer	SOUTH FORK DRY CREEK
			STONEWORTH INC Total		225.30		
A020144	13369	8089	Susan McElhone	5/23/1961	0.10	Placer	UNST
			Susan McElhone Total		0.10		
A016885	10910	7612	SUSAN A FREDERICKS	2/8/1956	15.00	El Dorado	UNST
A021232	14404	10098	SUSAN A FREDERICKS	4/10/1963	7.20	El Dorado	UNST
			SUSAN A FREDERICKS Total		22.20		
A025340	17257	11601	Susan D Hobbs	4/22/1977	8.00	El Dorado	UNST
			Susan D Hobbs Total		8.00		
A026023	18081	11847	SWANSBORO COUNTRY PROPERTY OWNERS ASSOCIATION INC	6/13/1979	23.00	El Dorado	UNST
A026024	18082	11928	SWANSBORO COUNTRY PROPERTY OWNERS ASSOCIATION INC	6/13/1979	40.50	El Dorado	UNST
A026025	18083	11848	SWANSBORO COUNTRY PROPERTY OWNERS ASSOCIATION INC	6/13/1979	17.00	El Dorado	REDBIRD CREEK

No comments

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No comments

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A026026	18084	11984	SWANSBORO COUNTRY PROPERTY OWNERS ASSOCIATION INC	6/13/1979	7.10	El Dorado	UNST
A026027	18085	11849	SWANSBORO COUNTRY PROPERTY OWNERS ASSOCIATION INC	6/13/1979	40.00	El Dorado	UNST
A028792	20056	13240	SWANSBORO COUNTRY PROPERTY OWNERS ASSOCIATION INC	2/3/1986	9.00	El Dorado	UNST
			SWANSBORO COUNTRY PROPERTY OWNERS ASSOCIATION INC Total		136.60		
A009269	5187	2694	SWORD & SANDALS INC	4/13/1938	0.60	El Dorado	UNCR
			SWORD & SANDALS INC Total		0.60		
A024351B	017135B	13157	TANYA M BOYD	4/27/1990	0.80	Sacramento	LINDA CREEK
			TANYA M BOYD Total		0.80		
A008791	4877	3191	TAYLOR T WHEELER	9/14/1936	0.10	El Dorado	UNSP
			TAYLOR T WHEELER Total		0.10		
A022478	15551	10769	TERENCE A HALL	5/27/1966	15.00	El Dorado	EMPIRE CREEK
			TERENCE A HALL Total		15.00		
A029233	20340		TERRIL R LUKENS EXEMPTION TRUST & LUKEN SURVIVOR'S TRUST UDT	4/19/1988	181.00	Placer	UNSP
			TERRIL R LUKENS EXEMPTION TRUST & LUKEN SURVIVOR'S TRUST UDT Total		181.00		
A007036	3799	1416	Terry D. Herringshaw	8/10/1931	0.20	El Dorado	UNSP
			Terry D. Herringshaw Total		0.20		
A011055	6442	3324	THE BRUCE & PAT BLAIKIE FAMILY TRUST DATED 5/20/1993	5/22/1945	0.20	El Dorado	SOUTH FORK AMERICAN RIVER
			THE BRUCE & PAT BLAIKIE FAMILY TRUST DATED 5/20/1993 Total		0.20		
A022465	15447	9913	The Pepper Family Trust	5/13/1966	1.50	El Dorado	BURNT SHANTY CREEK
			The Pepper Family Trust Total		1.50		
A006440	3396	1549	THE RITO S CASTANON FAMILY TRUST	9/18/1929	0.10	El Dorado	UNST
			THE RITO S CASTANON FAMILY TRUST Total		0.10		
A020627D	13629	008487D	THOMAS WALTERS	8/13/1992	25.20	El Dorado	UNST
			THOMAS WALTERS Total		25.20		
A020627B	13629	008487B	THOMAS E WALTERS	8/13/1992	1.30	El Dorado	UNST
			THOMAS E WALTERS Total		1.30		
A026981	19271	12888	THOMAS L PIATANESI	9/2/1981	7.00	El Dorado	UNST
			THOMAS L PIATANESI Total		7.00		
A017411	11024	6810	THOMAS S VAN HORNE	12/27/1956	17.00	Placer	UNST
			THOMAS S VAN HORNE Total		17.00		
A004510	2315	776	TIFFANY HOLBROOK	3/19/1925	6.50	El Dorado	UNSP
			TIFFANY HOLBROOK Total		6.50		
A017108	11013	7716	TIMBERLAKE ESTATES HOMEOWNERS ASSOC	5/29/1956	12.00	Placer	UNST
			TIMBERLAKE ESTATES HOMEOWNERS ASSOC Total		12.00		
A007788	4294	1674	TIMOTHY B COLLINS	12/26/1933	0.20	El Dorado	UNSP
			TIMOTHY B COLLINS Total		0.20		
A022062	15099	9129	TIMOTHY J MANDELLA	3/1/1965	0.40	El Dorado	UNSP (2)
			TIMOTHY J MANDELLA Total		0.40		
A006817	3718	1906	TONY PLANCHON	10/8/1930	0.20	El Dorado	UNST
			TONY PLANCHON Total		0.20		
A006988	3836	1343	TRACY ANN BRENNAN-MULLIGAN	6/29/1931	0.10	El Dorado	ROCK CREEK

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A018807	12161	6790	TRACY ANN BRENNAN-MULLIGAN	6/17/1959	0.10	El Dorado	SOUTH FORK AMERICAN RIVER
			TRACY ANN BRENNAN-MULLIGAN Total		0.20		
A016402	10552	6008	TROOP #1 B S A	6/2/1955	0.50	El Dorado	CODY LAKE, UNSP
			TROOP #1 B S A Total		0.50		
A004597C		000948C	Trudy Reed, et al	8/20/2004	8.20	Placer	AUBURN RAVINE
			Trudy Reed, et al Total		8.20		
A022914	15682	13080	TRUST OF WILLIAM & MARY ROTHAUS	9/29/1967	3.00	El Dorado	JOHNTOWN CREEK
A025406	17863	13081	TRUST OF WILLIAM & MARY ROTHAUS	6/24/1977	15.00	El Dorado	JOHNTOWN CREEK
			TRUST OF WILLIAM & MARY ROTHAUS Total		18.00		
A018106	11630	6767	TRUSTEN B WADSWORTH	4/28/1958	2.00	El Dorado	UNST
			TRUSTEN B WADSWORTH Total		2.00		
A021880	14767	9277	TWILIGHT RIDE LLC	8/26/1964	0.80	Placer	UNST
			TWILIGHT RIDE LLC Total		0.80		
A012046	7203	6975	Tyson Muncher	1/28/1964	31.10	El Dorado	EAST FORK SAWMILL CREEK, SAWMILL CREEK
			Tyson Muncher Total		31.10		
A002141	936	245	U S ELDORADO NATL FOREST	12/17/1920	1.20	El Dorado	COLD STREAM
A003879	1719	534	U S ELDORADO NATL FOREST	2/28/1924	0.10	El Dorado	ATWOOD SPRING
A004722	2382	1420	U S ELDORADO NATL FOREST	8/6/1925	0.30	El Dorado	UNSP
A004740	2383	2102	U S ELDORADO NATL FOREST	8/19/1925	2.30	El Dorado	UNST
A005142	2644	1001	U S ELDORADO NATL FOREST	8/4/1926	0.50	El Dorado	UNST
A006730	3585	2405	U S ELDORADO NATL FOREST	4/14/1930	0.50	El Dorado	UNSP
A007196	3959	1679	U S ELDORADO NATL FOREST	2/27/1932	3.00	Amador	UNST
A007304	4010	2441	U S ELDORADO NATL FOREST	6/27/1932	0.10	El Dorado	UNSP
A007498	4170	4543	U S ELDORADO NATL FOREST	2/7/1933	0.80	El Dorado	UNST
A007522	4163	4099	U S ELDORADO NATL FOREST	3/24/1933	0.60	Alpine	UNST
A008271	4576	1856	U S ELDORADO NATL FOREST	3/4/1935	0.40	El Dorado	UNSP
A008582	4761	3767	U S ELDORADO NATL FOREST	3/11/1936	0.50	El Dorado	ASPEN CREEK
A008929	4944	2159	U S ELDORADO NATL FOREST	3/30/1937	3.30	El Dorado	COX CREEK
A008936	4984	3972	U S ELDORADO NATL FOREST	4/3/1937	3.40	Amador	UNSP
A009058	5052	2161	U S ELDORADO NATL FOREST	7/29/1937	0.40	El Dorado	UNSP
A009086	5020	2164	U S ELDORADO NATL FOREST	8/21/1937	2.60	El Dorado	FRY CREEK
A009087	5021	2165	U S ELDORADO NATL FOREST	8/21/1937	1.30	El Dorado	UNST
A009120	5050	3254	U S ELDORADO NATL FOREST	9/18/1937	1.00	El Dorado	ROCKY CANYON
A009122	5051	2336	U S ELDORADO NATL FOREST	9/21/1937	0.60	El Dorado	ROCKY CANYON
A009128	5100	2166	U S ELDORADO NATL FOREST	9/27/1937	0.20	El Dorado	PYRAMID CREEK
A009129	5101	2167	U S ELDORADO NATL FOREST	9/27/1937	0.20	El Dorado	PYRAMID CREEK
A009189	5104	2168	U S ELDORADO NATL FOREST	11/27/1937	0.70	El Dorado	UNSP
A009251	5195	3922	U S ELDORADO NATL FOREST	3/4/1938	5.20	Amador	BLACK ROCK SPRING
A009289	5177	4059	U S ELDORADO NATL FOREST	5/6/1938	1.10	El Dorado	OATES SPRING
A009298	5178	3129	U S ELDORADO NATL FOREST	5/19/1938	0.70	El Dorado	OLANIE SPRING
A009310	5191	3256	U S ELDORADO NATL FOREST	6/6/1938	0.50	El Dorado	SNOW SLIDE CREEK
A009399	5261	3388	U S ELDORADO NATL FOREST	8/26/1938	0.90	El Dorado	UNSP
A009408	5251	4016	U S ELDORADO NATL FOREST	9/10/1938	0.30	El Dorado	UNST
A009425	5273	2337	U S ELDORADO NATL FOREST	9/24/1938	0.30	El Dorado	UNSP
A009655	5407	2864	U S ELDORADO NATL FOREST	7/5/1939	1.80	Placer	BUCKEYE SPRING
A009843	5566	3273	U S ELDORADO NATL FOREST	2/28/1940	1.00	El Dorado	UNSP
A009869	5580	2865	U S ELDORADO NATL FOREST	4/9/1940	0.50	El Dorado	UNST
A009884	5581	2866	U S ELDORADO NATL FOREST	4/26/1940	1.30	El Dorado	UNCR
A009890	5588	2867	U S ELDORADO NATL FOREST	5/6/1940	1.10	El Dorado	ASPEN CREEK

No comments

- n/a -

American River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A009955	5646	3502	U S ELDORADO NATL FOREST	7/20/1940	1.90	El Dorado	BRYANT FORK CREEK
A010110	5844	5870	U S ELDORADO NATL FOREST	2/5/1941	5.30	Amador	SHEEP CORRAL CREEK
A010192	5858	3161	U S ELDORADO NATL FOREST	4/29/1941	0.20	Alpine	ROSS SPRING
A010289	5907	2921	U S ELDORADO NATL FOREST	9/24/1941	0.20	El Dorado	UNST
A010360	5977	4095	U S ELDORADO NATL FOREST	1/13/1942	0.20	El Dorado	UNST
A010385	5979	2948	U S ELDORADO NATL FOREST	2/6/1942	0.30	El Dorado	STATION CREEK
A010405	5980	3288	U S ELDORADO NATL FOREST	3/16/1942	2.00	El Dorado	UNSP
A010463	5975	2933	U S ELDORADO NATL FOREST	5/16/1942	2.00	El Dorado	UNST
A010593	6143	4548	U S ELDORADO NATL FOREST	1/25/1943	1.80	El Dorado	CHAMPAGNE CANYON, UNST
A010604	6178	3643	U S ELDORADO NATL FOREST	2/24/1943	0.20	El Dorado	ASPEN CREEK
A010608	6179	4044	U S ELDORADO NATL FOREST	3/4/1943	0.70	El Dorado	UNSP
A010614	6144	3297	U S ELDORADO NATL FOREST	3/16/1943	6.90	El Dorado	ALDER CREEK
A010773	6281	2940	U S ELDORADO NATL FOREST	2/23/1944	0.10	El Dorado	UNST
A010821	6282	4870	U S ELDORADO NATL FOREST	5/19/1944	12.70	El Dorado	CODY CREEK
A010823	6283	3084	U S ELDORADO NATL FOREST	5/26/1944	1.00	El Dorado	UNSP, UNST
A010827	6284	5654	U S ELDORADO NATL FOREST	6/5/1944	5.20	El Dorado	UNSP
A011256	6733	7767	U S ELDORADO NATL FOREST	1/10/1946	44.90	El Dorado	TAMARACK FLAT CREEK
A011370	6734	3497	U S ELDORADO NATL FOREST	4/12/1946	0.20	El Dorado	UNST
A011464	6682	3573	U S ELDORADO NATL FOREST	7/10/1946	0.10	El Dorado	FORNI CREEK
A011608	6759	3330	U S ELDORADO NATL FOREST	11/6/1946	0.20	El Dorado	FRY CREEK
A011742	6881	3419	U S ELDORADO NATL FOREST	2/25/1947	0.20	El Dorado	ROCKY CANYON
A011867	7003	3395	U S ELDORADO NATL FOREST	5/9/1947	0.10	El Dorado	UNSP
A011893	6976	4861	U S ELDORADO NATL FOREST	5/26/1947	0.70	El Dorado	ASPEN CREEK
A011971	7009	4744	U S ELDORADO NATL FOREST	7/3/1947	0.50	El Dorado	SAYLES CANYON
A012000	7051	3346	U S ELDORADO NATL FOREST	7/21/1947	0.70	El Dorado	UNST
A012057	7081	3399	U S ELDORADO NATL FOREST	8/26/1947	0.20	El Dorado	UNSP
A012397	7324	3721	U S ELDORADO NATL FOREST	3/12/1948	0.20	El Dorado	PYRAMID CREEK
A012552	7449	5535	U S ELDORADO NATL FOREST	6/22/1948	1.20	El Dorado	BULL CREEK
A013383	7911	3834	U S ELDORADO NATL FOREST	10/5/1949	0.50	El Dorado	UNSP
A013410	8004	3797	U S ELDORADO NATL FOREST	10/24/1949	0.10	Alpine	JONES SPRING
A013653	8136	6630	U S ELDORADO NATL FOREST	3/27/1950	1.70	El Dorado	BRYAN CREEK
A014409	9031	4382	U S ELDORADO NATL FOREST	7/27/1951	0.10	El Dorado	UNSP
A014452	9026	4713	U S ELDORADO NATL FOREST	8/29/1951	0.40	El Dorado	UNSP
A014902	9262	4533	U S ELDORADO NATL FOREST	7/10/1952	483.70	El Dorado	ASPEN CREEK
A015490	10028	4996	U S ELDORADO NATL FOREST	8/31/1953	55.00	El Dorado	SMITH LAKE
A015492	10029	4997	U S ELDORADO NATL FOREST	8/31/1953	54.00	El Dorado	CLYDE LAKE
A015493	10030	4998	U S ELDORADO NATL FOREST	8/31/1953	30.00	El Dorado	TOEM LAKE
A015494	10031	4999	U S ELDORADO NATL FOREST	8/31/1953	160.00	El Dorado	WRIGHTS LAKE
A015495	10032	5000	U S ELDORADO NATL FOREST	8/31/1953	80.00	El Dorado	ROPI LAKE
A015496	10033	5001	U S ELDORADO NATL FOREST	8/31/1953	85.40	El Dorado	LOIS LAKE
A015497	10034	5002	U S ELDORADO NATL FOREST	8/31/1953	203.60	El Dorado	LAKE SCHMIDELL
A015498	10035	5003	U S ELDORADO NATL FOREST	8/31/1953	40.00	El Dorado	LYONS LAKE
A015499	10036	6199	U S ELDORADO NATL FOREST	8/31/1953	110.00	El Dorado	BUCK ISLAND LAKE
A015500	10037	5004	U S ELDORADO NATL FOREST	8/31/1953	38.00	El Dorado	LAWRENCE LAKE
A015501	10038	6058	U S ELDORADO NATL FOREST	8/31/1953	190.00	El Dorado	SPIDER LAKE
A015503	10040	5005	U S ELDORADO NATL FOREST	8/31/1953	30.00	El Dorado	BARRETT LAKE
A015506	10043	5006	U S ELDORADO NATL FOREST	8/31/1953	148.40	El Dorado	MIDDLE VELMA LAKE
A015509	10046	6025	U S ELDORADO NATL FOREST	8/31/1953	160.00	Alpine	WINNEMUCCA LAKE
A015512	10049	5011	U S ELDORADO NATL FOREST	8/31/1953	60.00	El Dorado	ISLAND LAKE
A015513	10050	4985	U S ELDORADO NATL FOREST	8/31/1953	21.00	El Dorado	UPPER TWIN LAKE

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A015514	10051	5164	U S ELDORADO NATL FOREST	8/31/1953	26.00	El Dorado	LOWER TWIN LAKE
A015616	10052	6200	U S ELDORADO NATL FOREST	11/23/1953	440.00	El Dorado	ROCKBOUND LAKE
A016564	10564	5531	U S ELDORADO NATL FOREST	8/31/1955	0.20	El Dorado	UNST
A017521	11280	8645	U S ELDORADO NATL FOREST	3/22/1957	2.80	El Dorado	GERLE CREEK
A017846	11577	6935	U S ELDORADO NATL FOREST	10/11/1957	0.20	El Dorado	ROCKY CANYON
A018022	11627	7172	U S ELDORADO NATL FOREST	3/3/1958	2.90	Amador	UNSP
A019541	12806	7807	U S ELDORADO NATL FOREST	7/13/1960	3.50	El Dorado	PILLIKEN SPRING
A019544	12808	7971	U S ELDORADO NATL FOREST	7/13/1960	0.40	Placer	JERRYS CANYON SPRING
A019546	12810	7972	U S ELDORADO NATL FOREST	7/13/1960	0.40	Placer	CHIPMUNK RIDGE SPRING
A019547	12811	7973	U S ELDORADO NATL FOREST	7/13/1960	0.40	Placer	LYNCHBURG SPRING
A019548	12812	7974	U S ELDORADO NATL FOREST	7/13/1960	0.40	Placer	BEAR SPRINGS
A019549	12813	7975	U S ELDORADO NATL FOREST	7/13/1960	0.40	Placer	DESERT COLD SPRING
A020659	13789	8325	U S ELDORADO NATL FOREST	3/19/1962	0.40	El Dorado	UNST
A020675	13795	8324	U S ELDORADO NATL FOREST	3/26/1962	0.20	El Dorado	OWENS CAMP SPRING
A023420	16189	10597	U S ELDORADO NATL FOREST	12/23/1969	4.50	Placer	SOUTH FORK LONG CANYON
A028204	19518	12944	U S ELDORADO NATL FOREST	8/3/1984	2.20	El Dorado	UNSP
			U S ELDORADO NATL FOREST Total		2,565.40		
A007629	4209	1702	U S FOREST SERVICE	7/26/1933	0.10	El Dorado	UNST
A007848	4350	2138	U S FOREST SERVICE	2/14/1934	0.40	Placer	GREEK STORE SPRING
A009114	5095	2611	U S FOREST SERVICE	9/14/1937	13.40	Placer	BLUE CANYON RANGER STATION SP
A009816	5536	2599	U S FOREST SERVICE	1/29/1940	4.30	Placer	UNSP
A010126	5779	2886	U S FOREST SERVICE	2/20/1941	4.70	Placer	TEXAS HILL SPRING
A010129	5782	2655	U S FOREST SERVICE	2/20/1941	0.60	Placer	DAWSON SPRING
A010442	6014	4181	U S FOREST SERVICE	5/6/1942	0.10	Placer	NORTH FORK SPRING
A010443	6015	3037	U S FOREST SERVICE	5/6/1942	5.50	Placer	ONION VALLEY SPRING NO 3
A010445	6017	2690	U S FOREST SERVICE	5/6/1942	0.60	Placer	LONG VALLEY SPRING
A011157	6589	3207	U S FOREST SERVICE	9/19/1945	1.00	Placer	TADPOLE SPRING
A011787	6897	4862	U S FOREST SERVICE	3/19/1947	0.30	Placer	UNSP
A012036	7055	3250	U S FOREST SERVICE	8/12/1947	1.10	Placer	PAGGE CREEK
A014193	8704	4112	U S FOREST SERVICE	3/14/1951	11.00	Placer	ELLIOTT MEADOW SPRING
A014194	8705	4113	U S FOREST SERVICE	6/28/1955	34.10	Placer	ELLIOTT RANCH SPRING
A014195	9308	4964	U S FOREST SERVICE	3/14/1951	1.40	Placer	BEAR SPRING
A014196	8706	4126	U S FOREST SERVICE	3/14/1951	0.40	Placer	CHICKEN HAWK SPRING
A014197	8707	4127	U S FOREST SERVICE	3/14/1951	0.30	Placer	ORCHARD SPRING
A014198	8708	4876	U S FOREST SERVICE	3/14/1951	0.20	Placer	SECRET HOUSE SPRING
A016517	10278	7335	U S FOREST SERVICE	8/11/1955	96.80	Placer	CODY CREEK
A016691	10621	7367	U S FOREST SERVICE	10/26/1955	6.10	Placer	FULDA SPRING
A017304	11837	7098	U S FOREST SERVICE	1/14/1965	84.90	Placer	POWDERHORN CREEK
A021489	14495	8892	U S FOREST SERVICE	10/7/1963	5.20	Placer	BEARTRAP SPRING
A023221	16016	10309	U S FOREST SERVICE	1/30/1969	0.40	Placer	DELLER SPRING
A023222	16177	10620	U S FOREST SERVICE	1/30/1969	1.10	Placer	MT MILDRED CREEK
A023223	16178	10611	U S FOREST SERVICE	1/30/1969	4.20	Placer	DOLLY CREEK
A023224	16179	10618	U S FOREST SERVICE	1/30/1969	3.90	Placer	FRENCH MEADOW CREEK
A023227	16013	10543	U S FOREST SERVICE	1/30/1969	0.80	Placer	WILLMONT SPRING
A023228	16012	10310	U S FOREST SERVICE	1/30/1969	0.50	Placer	GIANT GAP SPRING #1
A023229	16011	10311	U S FOREST SERVICE	1/30/1969	0.50	Placer	GIANT GAP SPRING #2
			U S FOREST SERVICE Total		283.90		
A013103	7803	4220	U.S. BUREAU OF RECLAMATION	3/21/1956	4.00	El Dorado	KNICKERBOCKER CREEK
A013370	11315		U.S. BUREAU OF RECLAMATION	4/22/1958	5,347,832.00	Contra Costa, Sacramento	AMERICAN RIVER, OLD RIVER, SACRAMENTO RIVER

No comments

- n/a -

American River - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A013371	11316		U.S. BUREAU OF RECLAMATION	7/29/2002	680,435.30	Contra Costa, Sacramento	AMERICAN RIVER, Sacramento River
A013629	8151	6654	U.S. BUREAU OF RECLAMATION	3/1/1963	30.00	El Dorado	UNST
A014165	8572	4221	U.S. BUREAU OF RECLAMATION	3/21/1956	22.00	El Dorado	KNICKERBOCKER CREEK
A014515	8887	4798	U.S. BUREAU OF RECLAMATION	10/24/1957	14.30	El Dorado	UNST
A015028	9246	5878	U.S. BUREAU OF RECLAMATION	11/17/1959	15.00	El Dorado	UNST
A017371	10923	5824	U.S. BUREAU OF RECLAMATION	10/22/1959	19.60	El Dorado	MIDDLE FORK AMERICAN RIVER
A018196	12706	7596	U.S. BUREAU OF RECLAMATION	3/9/1966	0.10	Placer	UNSP (2)
A019977	13093	8229	U.S. BUREAU OF RECLAMATION	2/8/1961	21.70	Placer	CARLTON SPRING, NORTH FORK AMERICAN RIVER
A020011	13161		U.S. BUREAU OF RECLAMATION	2/28/1961	22.00	El Dorado	KNICKERBOCKER CREEK
A020478	13934	8588	U.S. BUREAU OF RECLAMATION	11/7/1961	0.10	Placer	NORTH FORK AMERICAN RIVER
A021189	14220	8871	U.S. BUREAU OF RECLAMATION	3/13/1963	18.00	El Dorado	UNST
			U.S. BUREAU OF RECLAMATION Total		6,028,434.10		
A005214	2776	1075	ULF ASPENLIND	9/17/1926	231.70	Placer	CANYON CREEK
			ULF ASPENLIND Total		231.70		
A023318	15937	11043	UNION PACIFIC RAILROAD COMPANY	6/4/1980	4.00	Placer	UNXX
			UNION PACIFIC RAILROAD COMPANY Total		4.00		
A027266	18612		US BUREAU OF LAND MANAGEMENT	11/4/1982	2,533.90	Placer	DARDANELLES CREEK, POND CREEK
			US BUREAU OF LAND MANAGEMENT Total		2,533.90		
A005981	3152	5560	USDA-FOREST SERVICE, LAKE TAHOE BASIN MANAGEMENT UNIT	7/16/1928	4.30	El Dorado	HAWLEY SPRING
A010290	5988	6099	USDA-FOREST SERVICE, LAKE TAHOE BASIN MANAGEMENT UNIT	9/24/1941	0.70	El Dorado	BENWOOD CREEK
A015510	10047	5009	USDA-FOREST SERVICE, LAKE TAHOE BASIN MANAGEMENT UNIT	8/31/1953	141.80	El Dorado	HEATHER LAKE
A027518	19091	12562	USDA-FOREST SERVICE, LAKE TAHOE BASIN MANAGEMENT UNIT	9/15/1982	0.30	El Dorado	HAWLEY SPRING
			USDA-FOREST SERVICE, LAKE TAHOE BASIN MANAGEMENT UNIT Total		147.10		
A004026	1899	736	VERYL T KUCHAR	10/5/1928	113.10	Placer	BIG CHIEF CREEK, BOULDER CREEK
A011258A	6528	9362	VERYL T KUCHAR	1/10/1946	61.00	Placer	UNST
			VERYL T KUCHAR Total		174.10		
A015953	9902	5786	VICKIE L LONGO	7/26/1954	3.80	El Dorado	SOUTH FORK AMERICAN RIVER
			VICKIE L LONGO Total		3.80		
A005535	3114	1098	VICTOR HERRERO	6/17/1927	0.10	El Dorado	UNSP
			VICTOR HERRERO Total		0.10		
A017916	11348	7619	VINCENT J GRAVES	12/16/1957	2.20	Placer	BABIE CREEK
			VINCENT J GRAVES Total		2.20		
A028603	20086	13242	WAYNE BRUMMOND	10/28/1985	2.50	Placer	UNXX
			WAYNE BRUMMOND Total		2.50		
A011162	6477	3032	WAYNE HILLARD	9/27/1945	0.20	El Dorado	SOUTH FORK AMERICAN RIVER
			WAYNE HILLARD Total		0.20		
A024241	16911	12453	WILLIAM FAWX	11/8/1972	0.10	Placer	DUTCH RAVINE
			WILLIAM FAWX Total		0.10		
A027705	19112	12678	WILLIAM OZAWA	4/5/1983	1.30	El Dorado	UNST
			WILLIAM OZAWA Total		1.30		
A027173	18747	13544	WILLIAM SMITH	7/11/2003	19.00	El Dorado	ACORN CREEK

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			WILLIAM SMITH Total		19.00		
A016891	10691	7265	WILLIAM WHITAKER	2/14/1956	0.40	El Dorado	UNST
			WILLIAM WHITAKER Total		0.40		
A019850	13243		WILLIAM B ASHTON	11/21/1960	37.00	El Dorado	SILVER FORK OF SOUTH FORK AMERICAN RIVER, SUGAR LOAF CREEK
			WILLIAM B ASHTON Total		37.00		
A001963	935	428	WILLIAM B TIMBERLAKE	8/11/1920	2.90	El Dorado	NILSSON SPRING
			WILLIAM B TIMBERLAKE Total		2.90		
A005989	3394	1436	WILLIAM C SAWTELL	7/19/1928	0.20	El Dorado	UNST
			WILLIAM C SAWTELL Total		0.20		
A027491	19229	13413	WILLIAM P KLEIN JR	8/31/1982	0.80	Placer	UNST
A028034	20068	13411	WILLIAM P KLEIN JR	3/15/1984	12.00	Placer	UNST
A028035	20069	13412	WILLIAM P KLEIN JR	3/15/1984	11.00	Placer	UNST
			WILLIAM P KLEIN JR Total		23.80		
A027520	19118	13269	WILLIAM V DALLAS	9/16/1982	0.20	Placer	UNST
			WILLIAM V DALLAS Total		0.20		
A010121	5976	3045	WILLIS H LAMBERT	2/20/1941	0.70	El Dorado	UNST
			WILLIS H LAMBERT Total		0.70		
A014086	8441	4369	WILLOMAE DOBBS	12/1/1950	0.40	El Dorado	UNSP
A015918	9886	5630	WILLOMAE DOBBS	6/18/1954	0.70	El Dorado	UNSP
			WILLOMAE DOBBS Total		1.10		
A022029	15275	10683	WILSON GRANAT	1/15/1965	3.30	Placer	UNST
			WILSON GRANAT Total		3.30		
A013893	8603	4079	WOODBRIDGE RANCH HOMEOWNERS ASSOCIATION	8/14/1950	33.00	Sacramento	UNCR
			WOODBRIDGE RANCH HOMEOWNERS ASSOCIATION Total		33.00		
A008015	4390	2604	YANKEE HILL ESTATES OWNERS ASSOCIATION	7/9/1934	287.90	Placer	ANTELOPE CREEK
A013394	8207	4761	YANKEE HILL ESTATES OWNERS ASSOCIATION	10/11/1949	25.00	Placer	ANTELOPE CREEK
A016437	10551	5511	YANKEE HILL ESTATES OWNERS ASSOCIATION	6/23/1955	142.70	Placer	ANTELOPE CREEK
			YANKEE HILL ESTATES OWNERS ASSOCIATION Total		455.60		
			Grand Total		9,560,977.90		

East Creeks of Sacramento River Basin - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A009802	5719	2809	BIRD HAVEN RANCH LLC	1/11/1940	852.90	Glenn	BUTTE CREEK
			BIRD HAVEN RANCH LLC Total		852.90		
A002234	1114	5236	BUTTE VALLEY IRRIGATION DISTRICT	2/28/1921	17,163.80	Siskiyou	BUTTE CREEK
A023025	16330	10776	BUTTE VALLEY IRRIGATION DISTRICT	4/10/1968	10,000.00	Siskiyou	BUTTE CREEK
			BUTTE VALLEY IRRIGATION DISTRICT Total		27,163.80		
A013794	8624	8176	CAMERON PARK COMMUNITY SERVICES DISTRICT	6/14/1950	240.00	El Dorado	DEER CREEK
			CAMERON PARK COMMUNITY SERVICES DISTRICT Total		240.00		
A009216	5153	6113	CITY OF CHICO	12/30/1937	258.90	Butte	BIG CHICO CREEK
			CITY OF CHICO Total		258.90		
A013675	8194	7075	COLUSA SHOOTING CLUB	4/7/1950	853.90	Colusa	BUTTE CREEK
A013728	8195	7076	COLUSA SHOOTING CLUB	5/10/1950	1,386.90	Colusa	BUTTE CREEK
			COLUSA SHOOTING CLUB Total		2,240.80		
A009625	5717	2984	Dept of Fish and Game	6/19/1939	5,474.50	Butte, Glenn	BUTTE CREEK
A013008	7747	8712	Dept of Fish and Game	7/24/1968	5,182.50	Butte, Glenn	BUTTE CREEK
A013323	7885	4793	Dept of Fish and Game	10/24/1957	2,554.80	Glenn	BUTTE CREEK DRAINAGE DISTRICT DITCH
A014354	9663	4794	Dept of Fish and Game	10/24/1957	2,700.70	Butte	BUTTE CREEK
A015467	14438	9973	Dept of Fish and Game	12/21/1972	5,463.00	Glenn	BUTTE CREEK DRAINAGE DISTRICT DITCH
A015468	14439	9974	Dept of Fish and Game	12/21/1972	5,463.00	Butte	BUTTE CREEK
A024590	17233		Dept of Fish and Game	4/10/1974	7,428.00	Butte	BUTTE CREEK
			Dept of Fish and Game Total		34,266.50		
A022564	16029	10433	GAIL BROWN	8/29/1966	493.00	Butte	BUTTE CREEK
			GAIL BROWN Total		493.00		
A002777	1779	2389	GORRILL LAND COMPANY	3/6/1922	4,581.90	Butte	BUTTE CREEK, HAMLIN SLOUGH
A004664	2448	2390	GORRILL LAND COMPANY	6/30/1925	4,523.50	Butte	HAMLIN SLOUGH
A004665	2449	2391	GORRILL LAND COMPANY	3/13/1942	3,930.10	Butte	BUTTE CREEK
A022321	16018	11044	GORRILL LAND COMPANY	10/25/1965	2,500.00	Butte	BUTTE CREEK
A025717	17845	11996	GORRILL LAND COMPANY	4/12/1978	4,400.00	Butte	HAMLIN SLOUGH
			GORRILL LAND COMPANY Total		19,935.50		
A022799	15502	9911	LOUIS A PAYEN	5/31/1967	45.00	Sacramento	LITTLE DEER CREEK
			LOUIS A PAYEN Total		45.00		
A023298	15950	10194	LUCIAN B VANDEGRIFT TRUST	6/17/1969	45.00	Butte	LITTLE BUTTE CREEK
			LUCIAN B VANDEGRIFT TRUST Total		45.00		
A005109	3210	2614	M & T INCORPORATED	7/17/1926	5,060.00	Butte	BUTTE CREEK
A008188	4700	2617	M & T INCORPORATED	12/1/1934	5,060.00	Butte	BUTTE CREEK
A008565	4744		M & T INCORPORATED	2/27/1936	3,074.40	Butte	BIG BUTTE CREEK

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A009735	5847		M & T INCORPORATED	9/22/1939	13,587.00	Butte	BIG BUTTE CREEK
A015866	10390	9267	M & T INCORPORATED	5/10/1954	500.00	Butte	BUTTE CREEK
			M & T INCORPORATED Total		27,281.40		
A014546	9664	5394	MCPHERRIN LAND CO	11/2/1951	6,396.80	Butte	BUTTE CREEK
A015710	14021	8676	MCPHERRIN LAND CO	6/25/1968	2,122.40	Butte	BUTTE CREEK
			MCPHERRIN LAND CO Total		8,519.20		
A019743	13039	10035	MELVIN D MYERS	9/19/1960	142.00	Lassen	BUTTE CREEK
			MELVIN D MYERS Total		142.00		
A023084	15727	10197	MICHAEL HARRIS	7/15/1968	32	Butte	LITTLE CHICO CREEK
			MICHAEL HARRIS Total		32		
A000476	271		Paradise Irrigation District	5/3/1917	9,500.00	Butte	LITTLE BUTTE CREEK
A022061	16040		Paradise Irrigation District	6/17/1970	8,800.00	Butte	LITTLE BUTTE CREEK
			Paradise Irrigation District Total		18,300.00		
A005110	3211	2615	PARROTT INVESTMENT COMPANY	7/17/1926	5,060.00	Butte	BUTTE CREEK
A008187	4699	2616	PARROTT INVESTMENT COMPANY	12/1/1934	5,060.00	Butte	BUTTE CREEK
A008559	4743		PARROTT INVESTMENT COMPANY	2/19/1936	3,074.40	Butte	BIG BUTTE CREEK
A009736	5848		PARROTT INVESTMENT COMPANY	9/22/1939	13,587.00	Butte	BIG BUTTE CREEK
A015867	10391	9268	PARROTT INVESTMENT COMPANY	5/10/1954	500.00	Butte	BUTTE CREEK
			PARROTT INVESTMENT COMPANY Total		27,281.40		
A001656	794	880	RANCHO ESQUON INC	2/5/1920	3,665.45	Butte	HAMLIN SLOUGH
A002576	1722	1027	RANCHO ESQUON INC	10/6/1921	1,832.80	Butte	BUTTE CREEK
A002805	1872	1028	RANCHO ESQUON INC	3/24/1922	3,832.10	Butte	BUTTE CREEK
A002909	2027	1029	RANCHO ESQUON INC	6/27/1922	3,014.90	Butte	BUTTE CREEK
A004663	2447	1030	RANCHO ESQUON INC	6/30/1925	4,598.48	Butte	HAMLIN SLOUGH
A022039	16039	11046	RANCHO ESQUON INC	2/5/1965	5,540.00	Butte	BUTTE CREEK
			RANCHO ESQUON INC Total		22,483.73		
A023201	16771		RECLAMATION DISTRICT #1004	12/1/1978	36,000.00	Colusa, Sutter	BUTTE CREEK, BUTTE SLOUGH
			RECLAMATION DISTRICT #1004 Total		36,000.00		
A007925	4365	1797	RECLAMATION DISTRICT #833	5/1/1934	2,217.20	Colusa	BUTTE CREEK
			RECLAMATION DISTRICT #833 Total		2,217.20		
A004989	2706	837	SIERRA PACIFIC INDUSTRIES	1/8/1965	1,831.70	Butte	WEST BRANCH BUTTE CREEK
			SIERRA PACIFIC INDUSTRIES Total		1,831.70		
A001041	542	485	STANFORD VINA RANCH IRRIGATION CO	8/5/1918	4,581.90	Tehama	DEER CREEK
			STANFORD VINA RANCH IRRIGATION CO Total		4,581.90		
A020531			STATE WATER RESOURCES CONTROL BOARD	12/19/1961	0.00	Lassen, Modoc	ASH CREEK, BUTTE CREEK, UNST, WILLOW CREEK
			STATE WATER RESOURCES CONTROL BOARD Total		0.00		
A022534	16022	10432	Stephen Meline IV	7/27/1966	1,695.00	Butte	BUTTE CREEK

No comments

- n/a -

East Creeks of Sacramento River Basin - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			Stephen Meline IV Total		1,695.00		
A012437	7368	3458	U S FISH & WILDLIFE SERVICE	3/25/1948	1,097.00	Colusa	BUTTE CREEK
A013540	8838	4472	U S FISH & WILDLIFE SERVICE	1/12/1950	44,162.60	Shasta, Tehama	BATTLE CREEK
A014316	9662	7053	U S FISH & WILDLIFE SERVICE	5/21/1951	590.30	Colusa	BUTTE CREEK
A017862	11615	6591	U S FISH & WILDLIFE SERVICE	10/25/1957	7,963.80	Shasta	BATTLE CREEK
A020288	13384	7993	U S FISH & WILDLIFE SERVICE	7/3/1961	21,719.30	Shasta	BATTLE CREEK, Battle Creek
A022227	15046	9561	U S FISH & WILDLIFE SERVICE	7/19/1965	14,479.60	Shasta	BATTLE CREEK, Battle Creek
			U S FISH & WILDLIFE SERVICE Total		90,012.60		
A031071	21277		U S KLAMATH NATIONAL FOREST - GOOSENEST RECLAMATION DISTRICT	6/6/2011	185.00	Siskiyou	BUTTE CREEK
			U S KLAMATH NATIONAL FOREST - GOOSENEST RECLAMATION DISTRICT Total		185.00		
			Grand Total		326,104.54		

No comments

- n/a -

West Creeks of Sacramento River Basin - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A017927	11586	9898	ANTHONY D CRUYSEN	12/26/1957	23.00	Shasta	CLEAR CREEK
			ANTHONY D CRUYSEN Total		23.00		
A023232	16007	10906	BENNETT FAMILY TRUST	2/6/1969	74.00	Shasta	SOUTH FORK CLEAR CREEK
			BENNETT FAMILY TRUST Total		74.00		
A016145	10125	9563	BILL GIBSON	11/18/1954	627.00	Shasta, Tehama	COTTONWOOD CREEK
			BILL GIBSON Total		627.00		
A013972	8537	4100	CALIF DEPT OF TRANSPORTATION	9/29/1950	5.80	Shasta	MIDDLE FORK COTTONWOOD CREEK
			CALIF DEPT OF TRANSPORTATION Total		5.80		
A016373D		006033D	CARPENTER FAMILY REVOCABLE TRUST	6/3/1991	167.20	Tehama	COTTONWOOD CREEK
			CARPENTER FAMILY REVOCABLE TRUST Total		167.20		
A016373C		006033C	CEVASCO ROBT CEVASCO REVOC TRUST 2/18/9	6/3/1991	45.70	Tehama	COTTONWOOD CREEK
			CEVASCO ROBT CEVASCO REVOC TRUST 2/18/9 Total		45.70		
A012074	7559	6320	CONAWAY PRESERVATION GROUP LLC	9/8/1947	3,728.93	Yolo	WILLOW SLOUGH
A026695	19372		CONAWAY PRESERVATION GROUP LLC	1/27/1981	10,000.00	Yolo	CACHE CREEK, YOLO BYPASS
			CONAWAY PRESERVATION GROUP LLC Total		13,728.93		
A027382	20208		COUNTY OF COLUSA	7/8/1982	10.00	Colusa	STONY CREEK UNDERFLOW
			COUNTY OF COLUSA Total		10.00		
A016373A		006033A	DENNIS C DIERKSEN	6/3/1991	64.10	Shasta	COTTONWOOD CREEK
			DENNIS C DIERKSEN Total		64.10		
A013764	8578	4460	DONALD KRENN	5/29/1950	18.30	Tehama	SOUTH FORK COTTONWOOD CREEK
			DONALD KRENN Total		18.30		
A024723	16873	11283	FRENCH GULCH-WHISKEYTOWN SCHOOL DISTRICT	12/11/1974	10.20	Shasta	CLEAR CREEK
			FRENCH GULCH-WHISKEYTOWN SCHOOL DISTRICT Total		10.20		
A007284	4198	2006	HAMMER FAMILY TRUST	6/8/1932	1,463.80	Tehama	SOUTH FORK COTTONWOOD CREEK
			HAMMER FAMILY TRUST Total		1,463.80		
A021223	14272	8831	HARRY A BAKER REVOCABLE TRUST	4/8/1963	2.70	Tehama	SOUTH FORK COTTONWOOD CREEK
			HARRY A BAKER REVOCABLE TRUST Total		2.70		
A030232	20993		Heart Consciousness Church, Inc.	3/8/1993	245.00	Lake	CRAZY CREEK, PUTAH CREEK, UNST
			Heart Consciousness Church, Inc. Total		245.00		
A013976	8588	6976	IGO ONO COMMUNITY SERVICE DISTRICT	10/3/1950	341.20	Shasta	COTTONWOOD CREEK
			IGO ONO COMMUNITY SERVICE DISTRICT Total		341.20		
A000334	157	153	JOSHUA L SOSKE JR	5/11/1916	24.60	Glenn, Sonoma	NORTH FORK STONY CREEK
			JOSHUA L SOSKE JR Total		24.60		
A013701	8225	4312	KENT W PFRIMMER	4/24/1950	122.20	Tehama	COTTONWOOD CREEK
			KENT W PFRIMMER Total		122.20		
A016373B		006033B	KEVIN J DEVINE	6/3/1991	41.30	Tehama	COTTONWOOD CREEK
			KEVIN J DEVINE Total		41.30		
A013110	7843	4736	LEMA 1992 TRUST	5/24/1949	219.90	Tehama	COTTONWOOD CREEK
			LEMA 1992 TRUST Total		219.90		
A023234	16005	10921	MARY ANN SMITH	2/6/1969	1.20	Shasta	SOUTH FORK CLEAR CREEK
			MARY ANN SMITH Total		1.20		
A031558			MIDDLETOWN FARM & CATTLE COMPANY	3/30/2007	434.00	Lake	HARDIN CREEK, PUTAH CREEK, UNST
			MIDDLETOWN FARM & CATTLE COMPANY Total		434.00		
A023233	16000	10540	ROBERT W ANDERSON	2/6/1969	69.00	Shasta	SOUTH FORK CLEAR CREEK

No comments

- n/a -

West Creeks of Sacramento River Basin - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A024785	16939	11368	ROBERT W ANDERSON	3/24/1975	2.20	Shasta	SOUTH FORK CLEAR CREEK, UNST
			ROBERT W ANDERSON Total		71.20		
A025261	17823		STONY CREEK WATER DISTRICT	2/14/1977	3,000.00	Colusa, Glenn	LITTLE STONY CREEK, STONY CREEK
			STONY CREEK WATER DISTRICT Total		3,000.00		
A020104	13490	8028	THE REVOCABLE TRUST OF ROBERT F RETZLOFF	4/27/1961	271.70	Glenn	STONY CREEK UNDERFLOW
			THE REVOCABLE TRUST OF ROBERT F RETZLOFF Total		271.70		
A019104	12653	7454	U S NATIONAL PARK SERVICE	11/24/1959	3.20	Shasta	CLEAR CREEK
			U S NATIONAL PARK SERVICE Total		3.20		
A002212	2339	2652	U.S. BUREAU OF RECLAMATION	2/17/1921	50,200.00	Glenn	STONY CREEK
A018115	13776		U.S. BUREAU OF RECLAMATION	4/30/1958	160,000.00	Contra Costa, Tehama	STONY CREEK
A017376	12364		U.S. BUREAU OF RECLAMATION	7/28/1960	1,335,371.20	Contra Costa, Shasta	CLEAR CREEK
A015424	12363	9957	U.S. BUREAU OF RECLAMATION	4/15/2002	1,230,761.80	Shasta	CLEAR CREEK
			U.S. BUREAU OF RECLAMATION Total		2,776,333.00		
A016373E		006033E	WAYNE ROCHLITZ	6/3/1991	85.00	Tehama	COTTONWOOD CREEK
			WAYNE ROCHLITZ Total		85.00		
A012994	7469	3822	WILLIAM T GRAY	3/23/1949	114.60	Shasta	COTTONWOOD CREEK
			WILLIAM T GRAY Total		114.60		
A011389	12848		YOLO COUNTY F C & W C DISTRICT	5/3/1946	431,000.00	Lake, Yolo	CACHE CREEK, NORTH FORK CACH
			YOLO COUNTY F C & W C DISTRICT Total		431,000.00		
			Grand Total		3,228,548.83		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A011384	6629	3641	A & L AG RENTAL & LEASING INC	4/25/1946	1,094.90	Colusa	SACRAMENTO RIVER
			A & L AG RENTAL & LEASING INC Total		1,094.90		
A000657	338	237	ALICE K MARKS	4/27/1917	136.50	Sutter	SACRAMENTO RIVER
			ALICE K MARKS Total		136.50		
A001976	1243	1206	ALLEN A EHRKE	5/31/1932	158.80	Colusa	SACRAMENTO RIVER
			ALLEN A EHRKE Total		158.80		
A012469A	7267	003722A	Anna C. Byrd 1997 Trust	4/13/1948	1,598.50	Sutter	SACRAMENTO RIVER
			Anna C. Byrd 1997 Trust Total		1,598.50		
A008931	4985	3169	ARNOLD ANDREOTTI	4/1/1937	1,094.90	Colusa	SACRAMENTO RIVER
A011618	6793	3170	ARNOLD ANDREOTTI	11/14/1946	2,007.30	Colusa	SACRAMENTO RIVER
			ARNOLD ANDREOTTI Total		3,102.20		
A013454	8010	7251	ARTHUR ANDREOTTI	11/9/1949	4,927.00	Colusa	SACRAMENTO RIVER
			ARTHUR ANDREOTTI Total		4,927.00		
A012482	7399	3655	BARRY A MCCLAIN	4/23/1948	182.50	Sacramento	SACRAMENTO RIVER
			BARRY A MCCLAIN Total		182.50		
A005100	2609	989	BURTIS RANCH	7/13/1926	140.50	Sutter	SACRAMENTO RIVER
			BURTIS RANCH Total		140.50		
A010900	6375	3569	BURTON H LAUPPE	10/9/1944	1,069.10	Sutter	SACRAMENTO RIVER
			BURTON H LAUPPE Total		1,069.10		
A000186	72	1753	CACHIL DEHE BAND OF WINTUN INDIANS OF	11/22/1915	3,198.40	Colusa	SACRAMENTO RIVER
			CACHIL DEHE BAND OF WINTUN INDIANS OF Total		3,198.40		
A014445A	16481		CALIF DEPT OF WATER RESOURCES	8/25/1951	1,575,212.40	Contra Costa, Sacramento	ITALIAN SLOUGH, SACRAMENTO RIVER DELTA CHANNELS
A017512	16482		CALIF DEPT OF WATER RESOURCES	3/15/1957	1,100,000.00	Madera, Merced, Sacramento	ITALIAN SLOUGH, SACRAMENTO RIVER DELTA CHANNELS, SAN LUIS CREEK
			CALIF DEPT OF WATER RESOURCES Total		2,675,212.40		
A014682	9061	6380	CARTER FAMILY TRUST & CARTER FAMILY MARTIAL TRUST	2/15/1952	2,498.20	Colusa	SACRAMENTO RIVER
			CARTER FAMILY TRUST & CARTER FAMILY MARTIAL TRUST Total		2,498.20		
A000230B	204	001788B	CHARLES W SEAVER	1/10/1916	1,568.10	Colusa	SACRAMENTO RIVER
			CHARLES W SEAVER Total		1,568.10		
A001179	609	1478	CHARLES W TUTTLE JR	2/15/1919	4,169.50	Colusa	SACRAMENTO RIVER
			CHARLES W TUTTLE JR Total		4,169.50		
A006716	3630	1849	CITY OF REDDING	6/30/1930	53.70	Shasta	SACRAMENTO RIVER
A008884	5163	2640	CITY OF REDDING	1/26/1937	3,619.90	Shasta	SACRAMENTO RIVER
A010320	5921	2736	CITY OF REDDING	11/18/1941	325.80	Shasta	SACRAMENTO RIVER

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A015197	9821	5677	CITY OF REDDING	2/16/1953	211.70	Shasta	SACRAMENTO RIVER
			CITY OF REDDING Total		4,211.10		
A001743	992		CITY OF SACRAMENTO	10/30/2000	81,800.00	Sacramento	SACRAMENTO RIVER
			CITY OF SACRAMENTO Total		81,800.00		
A025616	18150		CITY OF WEST SACRAMENTO	12/22/1977	18,350.00	Yolo	SACRAMENTO RIVER
			CITY OF WEST SACRAMENTO Total		18,350.00		
A010363	5952	3585	COLUSA DRAIN MUTUAL WATER COMPANY	1/16/1942	5,668.10	Glenn	SACRAMENTO RIVER
A016305	14595	12087	COLUSA DRAIN MUTUAL WATER COMPANY	4/7/1955	3,660.00	Yolo	SACRAMENTO RIVER
			COLUSA DRAIN MUTUAL WATER COMPANY Total		9,328.10		
A015452	9647	7332	COLUSA PROPERTIES INC	8/6/1953	2,032.70	Colusa	SACRAMENTO RIVER
			COLUSA PROPERTIES INC Total		2,032.70		
A001199	614	904	CONAWAY PRESERVATION GROUP LLC	3/1/1919	43,557.70	Yolo	SACRAMENTO RIVER
A001588	792	905	CONAWAY PRESERVATION GROUP LLC	4/18/1930	5,354.00	Yolo	SACRAMENTO RIVER
A012073	7234	5487	CONAWAY PRESERVATION GROUP LLC	9/8/1947	70,143.50	Yolo	SACRAMENTO RIVER
			CONAWAY PRESERVATION GROUP LLC Total		119,055.20		
A001061	513	1062	COUNTY OF SACRAMENTO	6/6/1931	2,715.30	Sacramento	SACRAMENTO RIVER
A014494	8921	4060	COUNTY OF SACRAMENTO	8/19/1982	479.60	Sacramento	SACRAMENTO RIVER
			COUNTY OF SACRAMENTO Total		3,194.90		
A017210	13872	9926	Cranmore Farms LLC	8/6/1956	100.00	Sutter	SACRAMENTO RIVER
			Cranmore Farms LLC Total		100.00		
A004376	2021	1241	DANIEL A SERPA REV TRUST	12/15/1932	116.10	Sacramento	SACRAMENTO RIVER
			DANIEL A SERPA REV TRUST Total		116.10		
A017134	10734	6192	DIAMOND LANDS CORPORATION	6/14/1956	650.00	Tehama	SACRAMENTO RIVER
			DIAMOND LANDS CORPORATION Total		650.00		
A016199	13860	8205	DIANNE E BUTLER	9/7/1967	721.60	Colusa, Sutter	SACRAMENTO RIVER
			DIANNE E BUTLER Total		721.60		
A012469B	7267	003722B	DOLORES AZEVEDO	4/13/1948	91.20	Sutter	SACRAMENTO RIVER
			DOLORES AZEVEDO Total		91.20		
A005993	3112	2393	DONNA L REED	3/19/1942	857.70	Yolo	SACRAMENTO RIVER
			DONNA L REED Total		857.70		
A014314	8782	5080	DRISCOLL STRAWBERRY ASSOCIATES	5/21/1951	240.90	Tehama	SACRAMENTO RIVER
			DRISCOLL STRAWBERRY ASSOCIATES Total		240.90		
A007641A	4215	006389A	E D WILLEY & SON INC	8/4/1933	9,582.70	Sutter	SACRAMENTO RIVER

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			E D WILLEY & SON INC Total		9,582.70		
A011274	6725	3527	EASTSIDE MUTUAL WATER COMPANY	2/4/1946	5,474.50	Colusa	SACRAMENTO RIVER
			EASTSIDE MUTUAL WATER COMPANY Total		5,474.50		
A013796	8337	4758	ELLIS FAMILY TRUST	6/16/1950	580.40	Sutter	SACRAMENTO RIVER
			ELLIS FAMILY TRUST Total		580.40		
A005916	3066	1994	EMERY BURKE POUNDSTONE	5/16/1928	2,717.70	Colusa	SACRAMENTO RIVER
A009987	5664	2763	EMERY BURKE POUNDSTONE	8/22/1940	2,788.40	Colusa	SACRAMENTO RIVER
			EMERY BURKE POUNDSTONE Total		5,506.10		
A006672	3588	10019	Erdman Family Trust	5/8/1930	1,400.00	Colusa	SACRAMENTO RIVER
			Erdman Family Trust Total		1,400.00		
A017150	13871	10221	Faraz A Saeed	6/25/1956	997.00	Yolo	SACRAMENTO RIVER
			Faraz A Saeed Total		997.00		
A009032	5004	3674	FEDORA FARMS INC	7/8/1937	547.50	Colusa, Sutter	SACRAMENTO RIVER
A013511	8061	3675	FEDORA FARMS INC	12/15/1949	328.50	Colusa, Sutter	SACRAMENTO RIVER
A013512	8062	3676	FEDORA FARMS INC	12/15/1949	587.60	Colusa, Sutter	SACRAMENTO RIVER
			FEDORA FARMS INC Total		1,463.60		
A006670	3654	1516	Frank J. O'Brien Family Trust	5/6/1930	1,681.40	Sutter	SACRAMENTO RIVER
			Frank J. O'Brien Family Trust Total		1,681.40		
A014584	9188	5432	FRANK LAMB TRUST	11/20/1951	1,527.30	Sutter	SACRAMENTO RIVER
			FRANK LAMB TRUST Total		1,527.30		
A013487	7835	7216	GARY J RUMIANO	11/29/1949	726.00	Tehama	SACRAMENTO RIVER
			GARY J RUMIANO Total		726.00		
A000018	29	2871	GLENN-COLUSA IRRIGATION DISTRICT	5/3/2006	53,673.00	Yuba	SACRAMENTO RIVER
A001554	796	7208	GLENN-COLUSA IRRIGATION DISTRICT	12/3/1919	28,078.20	Glenn	SACRAMENTO RIVER
A001624	797	7209	GLENN-COLUSA IRRIGATION DISTRICT	1/14/1920	10,793.60	Glenn	SACRAMENTO RIVER
A008688	4795	5387	GLENN-COLUSA IRRIGATION DISTRICT	5/28/1936	674.38	Colusa	HUNTERS CREEK
A012125	8272	4340	GLENN-COLUSA IRRIGATION DISTRICT	10/8/1947	3,360.00	Colusa	STONE CORRAL CREEK
A023005	15687	10635	GLENN-COLUSA IRRIGATION DISTRICT	3/12/1968	415.00	Colusa	UNST
A030838	21101		GLENN-COLUSA IRRIGATION DISTRICT	2/18/1999	182,900.00	Glenn	SACRAMENTO RIVER
			GLENN-COLUSA IRRIGATION DISTRICT Total		279,894.18		
A001653	1248	439	GREEN VALLEY CORPORATION A CA CORP	2/5/1920	2,106.70	Colusa	SACRAMENTO RIVER
			GREEN VALLEY CORPORATION A CA CORP Total		2,106.70		
A011281	7288	5261	HAMMOND RESERVOIR IRRIGATION ASSN	2/11/1946	5,742.20	Siskiyou	NORTH FORK SACRAMENTO RIVER
A016219	10679	6531	HAMMOND RESERVOIR IRRIGATION ASSN	1/26/1955	348.00	Siskiyou	NORTH FORK SACRAMENTO RIVER
			HAMMOND RESERVOIR IRRIGATION ASSN Total		6,090.20		
A006696	3589	3566	HAROLD ARMSTRONG	6/12/1930	1,885.10	Colusa	SACRAMENTO RIVER
			HAROLD ARMSTRONG Total		1,885.10		
A003466	1552	646	Heidrick & Holdrick Properties LP	6/5/1923	345.20	Sutter	SACRAMENTO RIVER
			Heidrick & Holdrick Properties LP Total		345.20		

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A018154	14510	8798	HEIDRICK & MCGINNIS PROP LP	1/2/1969	484.00	Sutter	SACRAMENTO RIVER
			HEIDRICK & MCGINNIS PROP LP Total		484.00		
A006146	3234	1484	HENLE FAMILY LIMITED PARTNERSHIP	12/27/1928	3,503.70	Sutter	SACRAMENTO RIVER
			HENLE FAMILY LIMITED PARTNERSHIP Total		3,503.70		
A006418A		001799A	HENRY D RICHTER JR	6/20/1991	3,178.80	Sutter	SACRAMENTO RIVER
A013646	8156	7218	HENRY D RICHTER JR	3/22/1950	239.80	Yolo	SACRAMENTO RIVER
			HENRY D RICHTER JR Total		3,418.60		
A016361A	013861A		HERSHEY LAND COMPANY ROW CROP LLC	6/10/2002	4,195.00	Sutter, Yolo	COLUSA BASIN DRAINAGE CANAL, SACRAMENTO RIVER
			HERSHEY LAND COMPANY ROW CROP LLC Total		4,195.00		
A001765B	1111	000613B	HIATT DOWNER RANCH LLC	4/9/1920	1,697.90	Sutter	SACRAMENTO RIVER
A003290B		002627B	HIATT DOWNER RANCH LLC	7/27/1990	1,184.30	Sutter	SACRAMENTO RIVER
			HIATT DOWNER RANCH LLC Total		2,882.20		
A001617	1888	1407	JACK W BABER	3/20/1934	1,959.90	Colusa	SACRAMENTO RIVER
			JACK W BABER Total		1,959.90		
A002317A	1259	001130A	JAMES T MUNSON	2/4/1980	82.50	Sutter	SACRAMENTO RIVER
			JAMES T MUNSON Total		82.50		
A012899	7681	3766	JOHN ZUPPAN	1/13/1949	275.20	Butte, Tehama	SACRAMENTO RIVER
A014447	8840	8011	JOHN ZUPPAN	8/27/1951	575.70	Tehama	SACRAMENTO RIVER
			JOHN ZUPPAN Total		850.90		
A017537	11071	5955	JOHN AND JANE FITZGERALD FAMILY REVOCABLE TRUST	4/2/1957	109.50	Sutter	OLD CHANNEL SACRAMENTO RIVER
			JOHN AND JANE FITZGERALD FAMILY REVOCABLE TRUST Total		109.50		
A003994	1850	651	Johnathan Tucker	1/13/1928	76.40	Glenn	SACRAMENTO RIVER
			Johnathan Tucker Total		76.40		
A007308	3980	1949	Joseph Alamo	6/29/1932	2,622.70	Colusa	SACRAMENTO RIVER
			Joseph Alamo Total		2,622.70		
A006418B		001799B	KENNETH L WALLACE	6/20/1991	1,127.70	Sutter	SACRAMENTO RIVER
A014728	9002	4951	KENNETH L WALLACE	3/24/1952	160.60	Sutter	SACRAMENTO RIVER
			KENNETH L WALLACE Total		1,288.30		
A014520	8928	5112	KENNETH R PYLMAN	10/15/1951	146.00	Yolo	SACRAMENTO RIVER
			KENNETH R PYLMAN Total		146.00		
A004364	2227	981	Knights Landing Investors LLC	12/13/1924	3,537.60	Sutter, Yolo	SACRAMENTO RIVER
			Knights Landing Investors LLC Total		3,537.60		
A006454	3388	1469	KRAMER RANCH	10/8/1929	474.50	Yolo	SACRAMENTO RIVER
			KRAMER RANCH Total		474.50		
A013667B	8303	11188	LAKE CALIFORNIA PROPERTY OWNERS ASSN INC	3/26/1982	1,220.00	Tehama	SACRAMENTO RIVER
A023140	16056	11186	LAKE CALIFORNIA PROPERTY OWNERS ASSN INC	9/23/1968	985.00	Tehama	SACRAMENTO RIVER
			LAKE CALIFORNIA PROPERTY OWNERS ASSN INC Total		2,205.00		
A004501	2285	1728	LAWRENCE SCHNEIDER AND RUTH SCHNEIDER FAMILY REV TRUST	4/19/1937	73.40	Yolo	SACRAMENTO RIVER
A012803	7563	4098	LAWRENCE SCHNEIDER AND RUTH SCHNEIDER FAMILY REV TRUST	11/17/1948	110.90	Yolo	SACRAMENTO RIVER
			LAWRENCE SCHNEIDER AND RUTH SCHNEIDER FAMILY REV TRUST Total		184.30		

No comments

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Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A000882A	429	001205A	LEE W RICHTER	12/30/1982	336.90	Sutter	SACRAMENTO RIVER
			LEE W RICHTER Total		336.90		
A001074A	591	004676A	LOMO COLD STORAGE A CAL GEN PARTNERSHIP	9/10/1918	1,951.80	Sutter	SACRAMENTO RIVER
A004613	2347	940	LOMO COLD STORAGE A CAL GEN PARTNERSHIP	11/28/1955	212.20	Sutter	SACRAMENTO RIVER
A004699	2364	1154	LOMO COLD STORAGE A CAL GEN PARTNERSHIP	3/21/1932	670.40	Sutter	SACRAMENTO RIVER
A006486	3615	4168	LOMO COLD STORAGE A CAL GEN PARTNERSHIP	11/14/1929	20,255.50	Sutter	SACRAMENTO RIVER
			LOMO COLD STORAGE A CAL GEN PARTNERSHIP Total		23,089.90		
A007232	3903	1651	LORNA KELSO	4/7/1932	64.10	Yolo	SACRAMENTO RIVER
			LORNA KELSO Total		64.10		
A003700	1633	1458	LOUISE A MARTIN-KOBELLAS	10/31/1923	558.70	Sutter	SACRAMENTO RIVER
			LOUISE A MARTIN-KOBELLAS Total		558.70		
A002707	1162	1729	M & H REALTY PARTNERS VI L P	12/29/1921	305.50	Sacramento	SACRAMENTO RIVER
			M & H REALTY PARTNERS VI L P Total		305.50		
A008213	4516	2618	M & T INCORPORATED	1/15/1935	1,450.00	Butte	SACRAMENTO RIVER
			M & T INCORPORATED Total		1,450.00		
A007641D2		006389D2	MARIA JOHN NICHOLAS KELLY RANCH LLC	1/5/2001	761.00	Sutter	SACRAMENTO RIVER
			MARIA JOHN NICHOLAS KELLY RANCH LLC Total		761.00		
A012120	7127	4666	MARIETTE B HOLLINS	10/7/1947	387.80	Colusa	SACRAMENTO RIVER
			MARIETTE B HOLLINS Total		387.80		
A008631	5128	7210	MAXWELL IRRIGATION DISTRICT	4/8/1936	28,990.80	Colusa	SACRAMENTO RIVER
A030445	21004		MAXWELL IRRIGATION DISTRICT	2/17/1995	13,630.00	Colusa	COLUSA BASIN DRAIN, LURLINE CREEK, SACRAMENTO RIVER, STONE CORRAL CREEK
A011956	8266	4586	MAXWELL IRRIGATION DISTRICT	6/24/1947	2,596.36	Colusa	RECLAMATION DISTRICT 2047 MAIN DRAIN
A014378	8808	4523	MAXWELL IRRIGATION DISTRICT	6/28/1951	1,636.36	Colusa	LATERAL DRAIN OF RECLAMATIN DISTRICT 2047
A011955	8265	4643	MAXWELL IRRIGATION DISTRICT	6/24/1957	4,720.66	Colusa	RECLAMATION DISTRICT 2047 MAIN DRAIN
A011597	8267	4644	MAXWELL IRRIGATION DISTRICT	6/24/1957	22,085.95	Colusa	LOGAN AND HUNTER CREEK, AND RECLAMATION DISTRICT 2047 MAIN DRAIN CANAL
A011958	8268	4694	MAXWELL IRRIGATION DISTRICT	6/24/1957	5,226.45	Colusa	STONE CORRAL CREEK
A013919	9042	5692	MAXWELL IRRIGATION DISTRICT	8/25/1950	4,946.78	Colusa	LURLINE CREEK
A030445	21004		MAXWELL IRRIGATION DISTRICT	5/30/1995	13,630.00	Colusa	SACRAMENTO RIVER, COLUSA BASIN DRAIN, STONE CORRAL CREEK, LURLINE CREEK
			MAXWELL IRRIGATION DISTRICT Total		97,463.36		
A015150	9391	4775	MCM PROPERTIES, A CALIF CORP	1/12/1953	1,094.90	Sutter	SACRAMENTO RIVER
A015152	9393	4776	MCM PROPERTIES, A CALIF CORP	1/12/1953	474.50	Sutter	SACRAMENTO RIVER
			MCM PROPERTIES, A CALIF CORP Total		1,569.40		

No comments

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A001074B	591	004676B	MERIDIAN FARMS WATER CO	9/10/1918	67,335.90	Sutter	SACRAMENTO RIVER
			MERIDIAN FARMS WATER CO Total		67,335.90		
A007641B	4215	006389B	MERILYN C SCHEIDEL	8/4/1933	3,484.60	Sutter	SACRAMENTO RIVER
			MERILYN C SCHEIDEL Total		3,484.60		
A004355A		002881A	MICHAEL E LONON	6/9/2000	822.00	Sutter	SACRAMENTO RIVER
			MICHAEL E LONON Total		822.00		
A007598	4220	1693	MILDRED HEIDRICK	6/23/1933	447.70	Yolo	SACRAMENTO RIVER
			MILDRED HEIDRICK Total		447.70		
A015811	9814	5407	Moore Bros.	3/31/1954	794.20	Colusa	SACRAMENTO RIVER
			Moore Bros. Total		794.20		
A004367	2012	1394	Narusuke Monguchi	12/15/1924	161.50	Yolo	SACRAMENTO RIVER UNDERFLOW
			Narusuke Monguchi Total		161.50		
A000534	247	1050	NATOMAS CENTRAL MUTUAL WATER CO	5/28/1931	15,394.20	Sacramento, Sutter	NATOMAS CROSS CANAL, SACRAMENTO RIVER
A001056	511	2814	NATOMAS CENTRAL MUTUAL WATER CO	8/22/1918	16,205.20	Sacramento, Sutter	NATOMAS CROSS CANAL, SACRAMENTO RIVER
A001203	580	3109	NATOMAS CENTRAL MUTUAL WATER CO	3/5/1919	58,394.20	Sacramento, Sutter	NATOMAS CROSS CANAL, SACRAMENTO RIVER
A001413	1129	3110	NATOMAS CENTRAL MUTUAL WATER CO	8/27/1919	36,655.10	Sacramento, Sutter	NATOMAS CROSS CANAL, SACRAMENTO RIVER
A015572	15150	9794	NATOMAS CENTRAL MUTUAL WATER CO	10/8/1953	11,846.00	Sacramento, Sutter	NATOMAS CROSS CANAL, SACRAMENTO RIVER
A022309	15314	9989	NATOMAS CENTRAL MUTUAL WATER CO	10/8/1965	2,627.00	Sacramento, Sutter	RECLAMATION DISTRICT 1000 EAST DRAIN, RECLAMATIN DISTRICT 1000 WEST DRAIN, RECLAMATION DISTRICT 1000 MAIN DRAIN
A025727	19400		NATOMAS CENTRAL MUTUAL WATER CO	2/7/1985	10,000.00	Sacramento, Sutter	NATOMAS CROSS CANAL, RD 1000 EAST DRAIN, RD 1000 MAIN DRAIN, RD 1000 WEST DRAIN, SACRAMENTO RIVER
			NATOMAS CENTRAL MUTUAL WATER CO Total		151,121.70		
A007641D1		006389D 1	NICOLI G NICHOLAS	1/5/2001	761.00	Sutter	SACRAMENTO RIVER
			NICOLI G NICHOLAS Total		761.00		
A000880B	418	002820B	OJI BROTHERS, A CO-PARTNERSHIP	3/6/1946	636.60	Sutter	SACRAMENTO RIVER
A000880C	418	002820C	OJI BROTHERS, A CO-PARTNERSHIP	1/3/1918	1,880.70	Sutter	SACRAMENTO RIVER
A003290A		002627A	OJI BROTHERS, A CO-PARTNERSHIP	7/27/1990	3,985.80	Sutter	SACRAMENTO RIVER
A010951	6377	3242	OJI BROTHERS, A CO-PARTNERSHIP	1/11/1945	2,854.00	Sutter	SACRAMENTO RIVER
A013590	8137	3835	OJI BROTHERS, A CO-PARTNERSHIP	2/20/1950	1,047.50	Sutter	SACRAMENTO RIVER
			OJI BROTHERS, A CO-PARTNERSHIP Total		10,404.60		
A001765A	1111	000613A	PELGER MUTUAL WATER COMPANY	3/13/1972	1,697.90	Sutter	SACRAMENTO RIVER
A012470B	007268B	008547B	PELGER MUTUAL WATER COMPANY	4/13/1948	22,815.20	Sutter	SACRAMENTO RIVER

No comments

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A030410	20933		PELGER MUTUAL WATER COMPANY	9/16/1994	5,000.00	Sutter	SACRAMENTO RIVER
			PELGER MUTUAL WATER COMPANY Total		29,513.10		
A000882B		429 001205B	PHIL KNOX LEISER TRUST	12/30/1982	307.10	Sutter	SACRAMENTO RIVER
			PHIL KNOX LEISER TRUST Total		307.10		
A000244	463	2646	PRINCETON-CODORA-GLENN IRRIGATION DISTRICT	12/17/2001	50,936.30	Glenn	SACRAMENTO RIVER
A000770	464	4161	PRINCETON-CODORA-GLENN IRRIGATION DISTRICT	12/17/2001	20,936.30	Glenn	SACRAMENTO RIVER
A017066	13869	8989	PRINCETON-CODORA-GLENN IRRIGATION DISTRICT	5/2/1956	15,074.38	Colusa, Glenn	COLUSA BASIN DRAIN
A030812	21132		PRINCETON-CODORA-GLENN IRRIGATION DISTRICT	11/19/1998	24,370.00	Colusa, Glenn	COLUSA BASIN DRAIN, SACRAMENTO RIVER
			PRINCETON-CODORA-GLENN IRRIGATION DISTRICT Total		111,316.98		
A000462	303	7205	PROVIDENT IRRIGATION DISTRICT	2/27/2001	88,000.00	Glenn	COLUSA DRAIN, DRAIN NO 13, DRAIN NO 55, SACRAMENTO RIVER, UNDR, WILLOW CREEK
A000640	304	7206	PROVIDENT IRRIGATION DISTRICT	2/27/2001	36,496.00	Glenn	COLUSA DRAIN, DRAIN NO 13, DRAIN NO 55, SACRAMENTO RIVER, UNDR, WILLOW CREEK
A000892	416	7207	PROVIDENT IRRIGATION DISTRICT	1/18/1918	40,146.00	Glenn	COLUSA DRAIN, DRAIN 13, DRAIN NO 55, SACRAMENTO RIVER, UNDR, WILLOW CREEK
A001422	847	1109	PROVIDENT IRRIGATION DISTRICT	9/2/1919	3,371.90	Glenn	COLUSA DRAIN
A030813	21133		PROVIDENT IRRIGATION DISTRICT	11/19/1998	26,747.00	Glenn	COLUSA BASIN DRAIN, DRAIN NO 13, DRAIN NO 55, SACRAMENTO RIVER, UNDR, WILLOWS CREEK
			PROVIDENT IRRIGATION DISTRICT Total		194,760.90		
A004226	2024	2790	PURHIRAN FARMS LLC	6/28/1945	525.40	Yolo	SACRAMENTO RIVER
			PURHIRAN FARMS LLC Total		525.40		
A018062	14507	8795	QUAD H RANCHES, INC	1/2/1969	307.70	Sutter	SACRAMENTO RIVER
			QUAD H RANCHES, INC Total		307.70		
A004372	2017	1393	R W ROSE	12/15/1924	80.70	Yolo	SACRAMENTO RIVER
			R W ROSE Total		80.70		
A010408	6118	2966	RALPH BECKLEY	3/18/1942	549.30	Colusa	SACRAMENTO RIVER
			RALPH BECKLEY Total		549.30		
A004355B		002881B	RAY E AND JANICE R ANDERSON FAMILY TRUST	6/9/2000	286.40	Sutter	SACRAMENTO RIVER
			RAY E AND JANICE R ANDERSON FAMILY TRUST Total		286.40		
A015151	9392	5596	Rebekah Leiser	1/12/1953	36.70	Sutter	SACRAMENTO RIVER
			Rebekah Leiser Total		36.70		
A000027	31	3165	RECLAMATION DISTRICT #1004	4/2/1915	56,000.00	Colusa, Glenn	SACRAMENTO RIVER
A023201	16771		RECLAMATION DISTRICT #1004	12/26/1968	21,000.00	Colusa	

No comments

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Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			RECLAMATION DISTRICT #1004 Total		77,000.00		
A000576	315	3065	RECLAMATION DISTRICT #108	1/25/1917	97,469.20	Colusa, Yolo	SACRAMENTO RIVER
A000763	388	3066	RECLAMATION DISTRICT #108	8/27/1917	270,747.80	Colusa, Yolo	SACRAMENTO RIVER
A001589	1885	3067	RECLAMATION DISTRICT #108	2/24/1950	77,968.40	Colusa, Yolo	SACRAMENTO RIVER
A011899	8251	7060	RECLAMATION DISTRICT #108	5/26/1947	27,371.90	Colusa	BACK LEVEE BORROW PIT OF RECLAMATION DISTRICTC NO. 108 (COLUSA BASIN DRAIN)
A031436	21274		RECLAMATION DISTRICT #108	10/18/2010	36,000.00	Colusa	SACRAMENTO RIVER
			RECLAMATION DISTRICT #108 Total		509,557.30		
A001666	884	1301	RECLAMATION DISTRICT #999	2/11/1920	58,394.20	Solano, Yolo	ELK SLOUGH, MINER SLOUGH, SACRAMENTO RIVER, SACRAMENTO RIVER DEEP WATER SHIP CHANNEL, SUTTER SLOUGH
A004099	1890	1302	RECLAMATION DISTRICT #999	4/1/1966	1,472.30	Yolo	SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
A004100	1891	1303	RECLAMATION DISTRICT #999	4/1/1966	34,174.80	Solano, Yolo	ELK SLOUGH, MINER SLOUGH, SACRAMENTO RIVER, SACRAMENTO RIVER DEEP WATER SHIP CHANNEL, SUTTER SLOUGH
A004101	1892	1304	RECLAMATION DISTRICT #999	7/18/1924	3,909.90	Yolo	SACRAMENTO RIVER, SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
			RECLAMATION DISTRICT #999 Total		97,951.20		
A020087	13942	9643	RICHARD SWIERSTRA	4/17/1961	45.10	Tehama	SACRAMENTO RIVER
			RICHARD SWIERSTRA Total		45.10		
A018061	14506	8794	RICHARD & SANDRA GIUSTI FAMILY TRUST DATED 8/13/90	1/2/1969	307.70	Sutter	SACRAMENTO RIVER
			RICHARD & SANDRA GIUSTI FAMILY TRUST DATED 8/13/90 Total		307.70		
A000575	314	1718	RIVER GARDEN FARMS COMPANY	1/25/1917	15,550.60	Yolo	SACRAMENTO RIVER
A000577	316	3123	RIVER GARDEN FARMS COMPANY	1/25/1917	13,745.70	Yolo	SACRAMENTO RIVER
A011910	8258	4636	RIVER GARDEN FARMS COMPANY	5/29/1947	6,331.24	Yolo	KNIGHTS LANDING RIDGE CUT, SACRAMENTO RIVER
			RIVER GARDEN FARMS COMPANY Total		35,627.54		
A013239	7849	5140	RIVER MAID LAND LTD	7/19/1949	63.40	Sacramento	SACRAMENTO RIVER
			RIVER MAID LAND LTD Total		63.40		
A007641C	4215	006389C	RIVER RANCH PARTNERSHIP	8/4/1933	2,795.00	Sutter	SACRAMENTO RIVER
			RIVER RANCH PARTNERSHIP Total		2,795.00		
A002317C	1259	001130C	ROBERTA SCHREINER	2/4/1980	36.70	Sutter	SACRAMENTO RIVER
			ROBERTA SCHREINER Total		36.70		
A003201	2172	1060	ROGER L MATTEOLI	12/27/1922	131.40	Yolo	SACRAMENTO RIVER

No comments

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No comments

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			ROGER L MATTEOLI Total		131.40		
A014836	9153	5437	SACRAMENTO & SAN JOAQUIN DRAINAGE DISTRICT	6/2/1952	277.70	Sutter	SACRAMENTO RIVER
			SACRAMENTO & SAN JOAQUIN DRAINAGE DISTRICT Total		277.70		
A030454	21209		SACRAMENTO COUNTY WATER AGENCY	2/15/2008	71,000.00	Sacramento	SACRAMENTO RIVER
			SACRAMENTO COUNTY WATER AGENCY Total		71,000.00		
A003423	1646	9994	SACRAMENTO RIVER RANCH II LLC	5/17/1923	2,646.00	Yolo	KNIGHTS LANDING RIDGE CUT, SACRAMENTO RIVER
A004901	2514	9995	SACRAMENTO RIVER RANCH II LLC	3/1/1973	9,338.30	Yolo	KNIGHTS LANDING RIDGE CUT, SACRAMENTO RIVER
A004902	2515	9996	SACRAMENTO RIVER RANCH II LLC	3/1/1973	3,446.70	Yolo	KNIGHTS LANDING RIDGE CUT, SACRAMENTO RIVER
A005359	2811	9997	SACRAMENTO RIVER RANCH II LLC	2/17/1927	1,808.20	Yolo	KNIGHTS LANDING RIDGE CUT, SACRAMENTO RIVER
			SACRAMENTO RIVER RANCH II LLC Total		17,239.20		
A004351	2098	1200	SACRAMENTO RIVER RANCH LLC	12/4/1924	113.00	Sutter, Yolo	SACRAMENTO RIVER
			SACRAMENTO RIVER RANCH LLC Total		113.00		
A001060	512	1187	SIDDIQUI FAMILY PARTNERSHIP	8/28/1918	98.50	Sacramento	SACRAMENTO RIVER
A001094	518	570	SIDDIQUI FAMILY PARTNERSHIP	9/26/1918	1,198.70	Sacramento	SACRAMENTO RIVER
			SIDDIQUI FAMILY PARTNERSHIP Total		1,297.20		
A003200	2171	1653	SIOUX CREEK PROPERTY LLC	12/27/1922	351.30	Sutter	SACRAMENTO RIVER
A005696	2931	1157	SIOUX CREEK PROPERTY LLC	9/16/1927	311.60	Sutter	SACRAMENTO RIVER
			SIOUX CREEK PROPERTY LLC Total		662.90		
A022503	15151	9726	SISKIYOU COUNTY F C & W C D	6/22/1966	26,000.00	Siskiyou	SACRAMENTO RIVER
A023016	15992		SISKIYOU COUNTY F C & W C D	4/3/1968	14.00	Siskiyou	SCOTT CAMP CREEK
A024354	18371	12062	SISKIYOU COUNTY F C & W C D	6/20/1986	25.00	Siskiyou	LITTLE CASTLE CREEK
			SISKIYOU COUNTY F C & W C D Total		26,039.00		
A013658	8302	6169	SMITH RANCHES AND WOOD ORCHARD	3/29/1950	478.10	Tehama	SACRAMENTO RIVER
			SMITH RANCHES AND WOOD ORCHARD Total		478.10		
A006726	3621	4541	STEVE TARKE	7/10/1930	1,824.80	Sutter	SACRAMENTO RIVER
A011450	6726	4542	STEVE TARKE	6/27/1946	2,919.70	Sutter	SACRAMENTO RIVER
			STEVE TARKE Total		4,744.50		
A000230A	204	001788A	STEVEN J RUDEK	1/10/1916	484.00	Colusa	SACRAMENTO RIVER
A014205	8767	4390	STEVEN J RUDEK	3/20/1951	1,277.40	Colusa	SACRAMENTO RIVER
			STEVEN J RUDEK Total		1,761.40		
A005160B	002649B	001183B	SUTTER BASIN GROWERS COOPERATIVE	8/18/1926	182.50	Sutter	SACRAMENTO RIVER
			SUTTER BASIN GROWERS COOPERATIVE Total		182.50		
A000581	287	2817	SUTTER MUTUAL WATER COMPANY	2/1/1917	21,868.10	Sutter	SACRAMENTO RIVER
A000878	419	2818	SUTTER MUTUAL WATER COMPANY	1/3/1918	56,721.00	Sutter	SACRAMENTO RIVER
A000879	420	2819	SUTTER MUTUAL WATER COMPANY	1/3/1918	12,270.40	Sutter	SACRAMENTO RIVER
A000880A	418	002820A	SUTTER MUTUAL WATER COMPANY	1/3/1918	196,725.30	Sutter	SACRAMENTO RIVER
A001160	569	2822	SUTTER MUTUAL WATER COMPANY	1/24/1919	19,681.30	Sutter	SACRAMENTO RIVER
A001758	1103	552	SUTTER MUTUAL WATER COMPANY	4/9/1920	636.70	Sutter	SACRAMENTO RIVER

No comments

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A001763	1108	1110	SUTTER MUTUAL WATER COMPANY	4/9/1920	916.40	Sutter	SACRAMENTO RIVER
A001769	1117	547	SUTTER MUTUAL WATER COMPANY	6/22/1926	3,255.10	Sutter	SACRAMENTO RIVER
A001772	1120	657	SUTTER MUTUAL WATER COMPANY	1/31/1928	94.70	Sutter	SACRAMENTO RIVER
A003195	2169	882	SUTTER MUTUAL WATER COMPANY	11/30/1929	585.80	Sutter	SACRAMENTO RIVER
A007886	4354	2240	SUTTER MUTUAL WATER COMPANY	3/29/1934	3,121.60	Sutter	SACRAMENTO RIVER
A009760	5510	2821	SUTTER MUTUAL WATER COMPANY	11/3/1939	180,994.40	Sutter	SACRAMENTO RIVER
A010658	6189	2823	SUTTER MUTUAL WATER COMPANY	6/16/1943	3,654.40	Sutter	SACRAMENTO RIVER
A011953	7194	4562	SUTTER MUTUAL WATER COMPANY	6/23/1947	2,737.20	Sutter	SACRAMENTO RIVER, WEST BORROW PIT SUTTER BYPASS
A012470A	007268A	008547A	SUTTER MUTUAL WATER COMPANY	4/13/1948	15,309.70	Sutter	SACRAMENTO RIVER
A016677	13867	8220	SUTTER MUTUAL WATER COMPANY	9/7/1967	2,038.10	Sutter	SACRAMENTO RIVER
			SUTTER MUTUAL WATER COMPANY Total		520,610.20		
A013667A	8303	11187	SUZANNE GOELET	3/26/1982	410.00	Tehama	SACRAMENTO RIVER
			SUZANNE GOELET Total		410.00		
A001659	1981	8129	Sycamore Mutual Water Company	2/9/1920	42,521.20	Colusa	SACRAMENTO RIVER
A012412	8277	4056	Sycamore Mutual Water Company	3/17/1948	2,189.75	Colusa	R D 2047 MAIN CANAL
A013000	8285	5796	Sycamore Mutual Water Company	3/25/1949	1,824.79	Colusa	R D 2047 MAIN CANAL
A013001	8285	7062	Sycamore Mutual Water Company	3/25/1949	98.54	Colusa	R D 2047 MAIN CANAL
A013002	8285	4057	Sycamore Mutual Water Company	3/25/1949	364.96	Colusa	R D 2047 MAIN CANAL
A018372	14514	9977	Sycamore Mutual Water Company	12/22/1972	1,013.00	Colusa	SACRAMENTO RIVER
			Sycamore Mutual Water Company Total		48,012.24		
A014789	9069	7219	THOMAS L NELSON & HAZEL M NELSON TRUST	5/1/1952	656.70	Sutter	SACRAMENTO RIVER
			THOMAS L NELSON & HAZEL M NELSON TRUST Total		656.70		
A007641D3		0063890 3	THOMAS S ATKINSON II	1/5/2001	761.00	Sutter	SACRAMENTO RIVER
			THOMAS S ATKINSON II Total		761.00		
A000742	382	1211	TISDALE IRRIGATION & DRAINAGE CO	7/26/1917	12,473.70	Sutter	SACRAMENTO RIVER
A016985	13868	9335	TISDALE IRRIGATION & DRAINAGE CO	4/3/1956	1,350.00	Sutter	SACRAMENTO RIVER
			TISDALE IRRIGATION & DRAINAGE CO Total		13,823.70		
A009169	5099	2695	TOWNE ENTERPRISES	11/3/1937	386.90	Sacramento	SACRAMENTO RIVER
			TOWNE ENTERPRISES Total		386.90		
A016168	14505	10001	TRILOGY HOMES INC	12/6/1954	1,450.00	Sacramento	SACRAMENTO RIVER
			TRILOGY HOMES INC Total		1,450.00		
A005625	12720		U.S. BUREAU OF RECLAMATION	7/30/1927	11,153,752.50	Shasta	SACRAMENTO RIVER
A005626	12721		U.S. BUREAU OF RECLAMATION	4/12/1961	7,998,004.00	Contra Costa, Glenn, Sacramento, Shasta, Tehama	OLD RIVER, SACRAMENTO RIVER

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A009363	12722		U.S. BUREAU OF RECLAMATION	4/12/1961	1,033,977.50	Contra Costa, Sacramento, San Joaquin, Shasta, Tehama	OLD RIVER, SACRAMENTO RIVER, Victoria Canal
A009364	12723		U.S. BUREAU OF RECLAMATION	8/2/1938	7,818,797.50	Contra Costa, Sacramento, San Joaquin, Shasta, Tehama	OLD RIVER, SACRAMENTO RIVER, Victoria Canal
			U.S. BUREAU OF RECLAMATION Total		28,004,531.50		
A006527	3597	2145	VAN RUITEN BROS	1/8/1930	1,094.90	Sutter, Yolo	SACRAMENTO RIVER
			VAN RUITEN BROS Total		1,094.90		
A000771	389	4160	W.A. YERXA	9/5/1917	9,084.40	Colusa	SACRAMENTO RIVER
			W.A. YERXA Total		9,084.40		
A015711	9751	5593	WALLACE L EDSON	2/2/1954	142.70	Sutter	OLD RIVER, SACRAMENTO RIVER
			WALLACE L EDSON Total		142.70		
A002317B	1259	001130B	WAYMON LYNCH	2/4/1980	30.60	Sutter	SACRAMENTO RIVER
			WAYMON LYNCH Total		30.60		
A004369	2014	1331	WILLIAM J CORREA	12/15/1924	44.00	Sacramento	SACRAMENTO RIVER
			WILLIAM J CORREA Total		44.00		
A002884	1347	968	WILLIAM P LOCKETT	6/17/1922	116.10	Sutter	SACRAMENTO RIVER
A005160A	2649	001183A	WILLIAM P LOCKETT	8/18/1926	365.00	Sutter	SACRAMENTO RIVER
			WILLIAM P LOCKETT Total		481.10		
A028238	20073	13351	WILLOW CREEK MUTUAL WATER CO	9/7/1984	5,000.00	Glenn	SACRAMENTO RIVER
			WILLOW CREEK MUTUAL WATER CO Total		5,000.00		
A008141	4459	2631	WILSON RANCH PARTNERSHIP	10/24/1934	2,717.40	Yolo	SACRAMENTO RIVER
			WILSON RANCH PARTNERSHIP Total		2,717.40		
A003247	1695	4255	WINDSWEPT LAND AND CATTLE COMPANY	3/21/1956	3,209.00	Sutter, Yolo	SACRAMENTO RIVER
			WINDSWEPT LAND AND CATTLE COMPANY Total		3,209.00		
A004257	2066	1939	Woodland Development Company, LLC	4/6/1939	666.50	Yolo	SACRAMENTO RIVER
			Woodland Development Company, LLC Total		666.50		
A030358	20281		Woodland-Davis Clean Water Agency	4/14/2011	45,000.00	Yolo	SACRAMENTO RIVER
			Woodland-Davis Clean Water Agency Total		45,000.00		
A013031	7461	4721	Yolo Land Trust	4/18/1949	1,011.60	Yolo	SACRAMENTO RIVER
			Yolo Land Trust Total		1,011.60		
A014619	8957	11038	ZUMWALT MUTUAL WATER COMPANY	1/14/1952	63.00	Colusa	SACRAMENTO RIVER
			ZUMWALT MUTUAL WATER COMPANY Total		63.00		
			Grand Total		33,492,590.01		

No comments

- n/a -

Stanislaus River Watershed - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	Season	Purpose of Use	County	Source
A020406	13915	8274	ALEX NACCARATO	11/15/61	13.00			Tuolumne	OWL CREEK
A029917	20928		ALEX NACCARATO	3/14/91	20.00			Tuolumne	OWL CREEK
			ALEX NACCARATO Total		33.00				
A018809	12223	6502	ALMA A RYALS	6/18/59	1.10			Tuolumne	UNSP
			ALMA A RYALS Total		1.10				
A016295	10192	10158	BEAR VALLEY HOMEOWNERS ASSOCIATION	4/1/55	2.50			Alpine	UNSP
A022290	15190	10159	BEAR VALLEY HOMEOWNERS ASSOCIATION	9/17/65	1.30			Alpine	UNSP
A022291	15449	10160	BEAR VALLEY HOMEOWNERS ASSOCIATION	9/17/65	3.20			Alpine	UNSP
A029813	20542	13866	BEAR VALLEY HOMEOWNERS ASSOCIATION	8/20/12	7.80			Alpine	UNSP
			BEAR VALLEY HOMEOWNERS ASSOCIATION Total		14.80				
A018366	12170	7514	BERNICE JANE BOTTOMLEY	10/9/58	47.00			Calaveras	CARSON CREEK
			BERNICE JANE BOTTOMLEY Total		47.00				
A012550	7440	4929	BLUE LAKE SPRINGS HOMEOWNERS ASSOCIATION	6/16/48	45.00			Calaveras	MORAN CREEK
A014576	9049	4698	BLUE LAKE SPRINGS HOMEOWNERS ASSOCIATION	11/13/51	51.20			Calaveras	MORAN CREEK
			BLUE LAKE SPRINGS HOMEOWNERS ASSOCIATION Total		96.20				
A027131	18603	12280	BRETT D THOMSON	12/2/81	1.00			Calaveras	UNST
			BRETT D THOMSON Total		1.00				
A011792B	15013		CALAVERAS COUNTY WATER DISTRICT	3/24/47	78,500.00			Calaveras, Tuolumne	HIGHLAND CREEK, NORTH FORK STANISLAUS RIVER
A012911	15016		CALAVERAS COUNTY WATER DISTRICT	1/25/49	368,091.00			Calaveras, Tuolumne	HIGHLAND CREEK, NORTH FORK STANISLAUS RIVER
A012912	15017		CALAVERAS COUNTY WATER DISTRICT	1/25/49	3,373.90			Tuolumne	NORTH FORK STANISLAUS RIVER
A012912A	14769		CALAVERAS COUNTY WATER DISTRICT	1/25/49	1,446.00			Tuolumne	NORTH FORK STANISLAUS RIVER
A013091	15018		CALAVERAS COUNTY WATER DISTRICT	5/13/49	63,000.00			Tuolumne	HIGHLAND CREEK
A013092	15019		CALAVERAS COUNTY WATER DISTRICT	5/13/49	63,000.00			Tuolumne	HIGHLAND CREEK
A013093	15020		CALAVERAS COUNTY WATER DISTRICT	5/13/49	50,050.00			Alpine, Tuolumne	HIGHLAND CREEK, NORTH FORK STANISLAUS RIVER
A018727	15021		CALAVERAS COUNTY WATER DISTRICT	5/20/59	506,809.30			Tuolumne	BEAVER CREEK, NORTH FORK STANISLAUS RIVER
A019148	15023		CALAVERAS COUNTY WATER DISTRICT	12/23/59	732,538.90			Alpine, Tuolumne	BEAVER CREEK, HIGHLAND CREEK, NORTH FORK STANISLAUS RIVER
A019149	15024		CALAVERAS COUNTY WATER DISTRICT	12/23/59	50,050.00			Alpine, Tuolumne	HIGHLAND CREEK, NORTH FORK STANISLAUS RIVER
			CALAVERAS COUNTY WATER DISTRICT Total		1,916,859.10				
A018148	11642	6479	CASTLE & COOKE CALAVERAS INC	5/22/58	50.00			Calaveras	SAWMILL CREEK
			CASTLE & COOKE CALAVERAS INC Total		50.00				
A030100	20788		CASTLE & COOKE CALIFORNIA INC	4/8/92	98.00			Calaveras	SAW MILL CREEK
			CASTLE & COOKE CALIFORNIA INC Total		98.00				
A014898	9610	4993	CEDAR RIDGE IMPROVEMENT ASSOCIATION	7/9/52	27.50			Tuolumne	FIVEMILE CREEK
A018514	12003	9773	CEDAR RIDGE IMPROVEMENT ASSOCIATION	1/30/59	15.00			Tuolumne	UNSP (3)
			CEDAR RIDGE IMPROVEMENT ASSOCIATION Total		42.50				
A004895	2599	1308	CLIFFORD D CHENEY	1/26/26	3.40			Tuolumne	UNSP
			CLIFFORD D CHENEY Total		3.40				
A021647	14633	9120	COLD SPRINGS WATER COMPANY INC	2/20/64	106.00			Tuolumne	UNST
			COLD SPRINGS WATER COMPANY INC Total		106.00				
A019732	13038	8088	DANA KAUFFMANN	9/8/60	29.00			Tuolumne	KNIGHT CREEK
			DANA KAUFFMANN Total		29.00				
A018808	12222	6501	DAVE D FICKEL	6/18/59	0.80			Tuolumne	UNSP
			DAVE D FICKEL Total		0.80				
A020819	13802	10299	DAVIES PROPERTIES	6/14/62	6.40			Calaveras	LOVE CREEK
			DAVIES PROPERTIES Total		6.40				
A016082	10614	5887	Donald Paul Deshon	4/2/56	6.00			Tuolumne	UNST
			Donald Paul Deshon Total		6.00				
A019168	12437	7468	EARL D GARRISON	1/4/60	6.00			Calaveras	UNST
			EARL D GARRISON Total		6.00				
A012659	7486	4989	ESTATE OF E ALFORD	8/19/48	24.00			Calaveras	LOVE CREEK
			ESTATE OF E ALFORD Total		24.00				
A021338	14498	10248	Eureka Valley LLC	5/9/74	15.00			Tuolumne	UNST
			Eureka Valley LLC Total		15.00				
A025335	17026	11288	GEORGE A ATHERTON	4/21/77	32.00			Tuolumne	SOUTH FORK WILDCAT CREEK

No comments

- n/a -

Stanislaus River Watershed - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	Season	Purpose of Use	County	Source
			GEORGE A ATHERTON Total		32.00				
A017554	11689	8666	GERALD B ENGLER	4/18/57	25.00			Tuolumne	MORMON CREEK
			GERALD B ENGLER Total		25.00				
A015583	9715	6899	GREENHORN CREEK ASSOCIATES L P	10/23/53	45.00			Calaveras	UNXX
			GREENHORN CREEK ASSOCIATES L P Total		45.00				
A029013	21114		GUADALUPE RAMIREZ	4/23/87	18.00			Calaveras	LOVE CREEK
			GUADALUPE RAMIREZ Total		18.00				
A009620	5396	5298	IRVING M TERZICH	6/15/39	426.50			Tuolumne	EAGLE CREEK
			IRVING M TERZICH Total		426.50				
A022343	15266	9934	JANICE M ZUKAL	11/24/65	7.00			Tuolumne	MINE TUNNEL
			JANICE M ZUKAL Total		7.00				
A019307	12552	7663	JEFF R WILSON	3/14/60	14.10			Tuolumne	UNST
			JEFF R WILSON Total		14.10				
A021779	15162	10782	JEROME P SOLARI	5/19/64	22.50			Tuolumne	DEADMAN GULCH
			JEROME P SOLARI Total		22.50				
A018573	11984	6635	JOANNA VIDITO	3/9/59	4.00			Tuolumne	UNST
			JOANNA VIDITO Total		4.00				
A025626	17480	11277	JOHN WILLMS RANCH INC	12/30/77	11.00			Stanislaus	UNST
			JOHN WILLMS RANCH INC Total		11.00				
A020041	13786	9752	JON H JANOFSKY	3/17/61	20.00			Calaveras	PENNY CREEK
			JON H JANOFSKY Total		20.00				
A013517	8095	4279	JON V ELLIS	12/27/49	35.00			Calaveras	UNST
			JON V ELLIS Total		35.00				
A019469	16009	10448	JOSEPH W MARTIN JR	6/2/60	9.60			Tuolumne	ANDREWS CREEK
			JOSEPH W MARTIN JR Total		9.60				
A018574	11985	7360	KAREN REESE	3/9/59	48.00			Tuolumne	GREEN SPRING RUN
			KAREN REESE Total		48.00				
A021149	14736	8849	KATHARINE K STEVENS	2/4/63	2.00			Tuolumne	UNSP
			KATHARINE K STEVENS Total		2.00				
A011661	6863	4230	KATHERINE R REID	12/16/46	36.90			Tuolumne	EAGLE CREEK
			KATHERINE R REID Total		36.90				
A020312	13903	10840	LAKE ALPINE WATER COMPANY	7/21/61	42.00			Alpine	UNSP
A021485	14541	11007	LAKE ALPINE WATER COMPANY	10/7/63	261.00			Alpine	BEAR CREEK
A005648G	21237		LAKE ALPINE WATER COMPANY	6/10/09	395.00			Alpine	BEAR CREEK
			LAKE ALPINE WATER COMPANY Total		698.00				
A020450	13818	12186	LELAND MEADOW WATER DISTRICT	10/24/61	2.30			Tuolumne	UNSP
A023195	16065	11345	LELAND MEADOW WATER DISTRICT	12/17/68	68.00			Tuolumne	LELAND CREEK
A026373	18277	12187	LELAND MEADOW WATER DISTRICT	5/21/80	2.70			Tuolumne	UNSP
			LELAND MEADOW WATER DISTRICT Total		73.00				
A008919	4961	2482	LENORA HOLMES	3/13/37	0.20			Alpine	UNSP
A009217	5129	2483	LENORA HOLMES	12/30/37	0.20			Alpine	UNSP
A009851	5546	3153	LENORA HOLMES	3/14/40	0.70			Alpine	UNSP
			LENORA HOLMES Total		1.10				
A003602	1849	895	MATTHEW T BLOOM	4/17/03	0.30			Tuolumne	UNST
			MATTHEW T BLOOM Total		0.30				
A015841	10169	6882	MICHAEL P TRACY	4/23/07	18.00			Tuolumne	MORMON CREEK
			MICHAEL P TRACY Total		18.00				
A026084	18024	12790	MIKEL C WILLIAMS	9/6/79	0.50			Tuolumne	MORMON CREEK, UNST
			MIKEL C WILLIAMS Total		0.50				
A000077A	1303	9966	Northern California Power Agency	8/4/15	4,062.00			Tuolumne	HIGHLAND CREEK
			Northern California Power Agency Total		4,062.00				
A001081	2104	2012	OAKDALE IRRIGATION DISTRICT	9/20/18	96,195.00			Calaveras	STANISLAUS RIVER
A003091	2106	2013	OAKDALE IRRIGATION DISTRICT	10/19/22	10,754.00			Calaveras	STANISLAUS RIVER
A005648A	13692	12385	OAKDALE IRRIGATION DISTRICT	7/30/27	60,000.00			Tuolumne	MIDDLE FORK STANISLAUS RIVER
A010872	9360	7856	OAKDALE IRRIGATION DISTRICT	8/31/01	80,000.00			Tuolumne	STANISLAUS RIVER
A010978	6448	3986	OAKDALE IRRIGATION DISTRICT	8/31/01	25,000.00			Calaveras	STANISLAUS RIVER
A011105	9361	7857	OAKDALE IRRIGATION DISTRICT	8/31/01	98,000.00			Tuolumne	MIDDLE FORK STANISLAUS RIVER
A012490	9362	10166	OAKDALE IRRIGATION DISTRICT	8/31/01	64,500.00			Tuolumne	MIDDLE FORK STANISLAUS RIVER
A012614	9363	7858	OAKDALE IRRIGATION DISTRICT	7/23/48	496,187.60			Tuolumne	MIDDLE FORK STANISLAUS RIVER
A012873	9364	10167	OAKDALE IRRIGATION DISTRICT	12/22/48	354,091.00			Tuolumne	MIDDLE FORK STANISLAUS RIVER
A013309	9365	7859	OAKDALE IRRIGATION DISTRICT	8/22/49	144,795.50			Tuolumne	MIDDLE FORK STANISLAUS RIVER
A013310	9366	7860	OAKDALE IRRIGATION DISTRICT	8/22/49	1,165,966.30			Tuolumne	STANISLAUS RIVER
A026791	19046		OAKDALE IRRIGATION DISTRICT	4/15/81	1,303,159.50			Calaveras	STANISLAUS RIVER

No comments

- n/a -

Stanislaus River Watershed - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	Season	Purpose of Use	County	Source
A031502	21188		OAKDALE IRRIGATION DISTRICT	8/30/07	50,000.00			Tuolumne	MIDDLE FORK STANISLAUS RIVER
A031770	21299		OAKDALE IRRIGATION DISTRICT	4/25/12	506,000.00			Tuolumne	
			OAKDALE IRRIGATION DISTRICT Total		4,454,648.90				
A001339	668	1391	PACIFIC GAS AND ELECTRIC COMPANY	1/3/34	40,904.70			Tuolumne	SOUTH FORK STANISLAUS RIVER
A006129	3507	1541	PACIFIC GAS AND ELECTRIC COMPANY	12/4/28	3,919.00			Tuolumne	SOUTH FORK STANISLAUS RIVER
A006130	3508	1542	PACIFIC GAS AND ELECTRIC COMPANY	12/4/28	5,360.00			Tuolumne	SOUTH FORK STANISLAUS RIVER
A010122	6107	2862	PACIFIC GAS AND ELECTRIC COMPANY	2/19/41	115,836.40			Tuolumne	MIDDLE FORK STANISLAUS RIVER
A031405	21170		PACIFIC GAS AND ELECTRIC COMPANY	4/5/05	4,706.00			Tuolumne	SOUTH FORK STANISLAUS RIVER
			PACIFIC GAS AND ELECTRIC COMPANY Total		170,726.10				
A022245	15262	9709	PATRICIA D DAVEY	3/31/71	12.00			Tuolumne	UNST
			PATRICIA D DAVEY Total		12.00				
A023320	16216	12444	PETER G VON DER LINDE	7/29/69	11.10			Tuolumne	UNNAMED MINE TUNNEL
			PETER G VON DER LINDE Total		11.10				
A025177	17033	13451	RICHARD M GONZALES	10/20/76	10.00			Calaveras	YORK CREEK
			RICHARD M GONZALES Total		10.00				
A020416	13653	8499	RNE INVESTMENTS LLC	10/2/61	46.00			Calaveras	SAWMILL CREEK
			RNE INVESTMENTS LLC Total		46.00				
A024335	16788	11194	ROSS A CARKEET JR	4/3/73	0.20			Tuolumne	UNSP
			ROSS A CARKEET JR Total		0.20				
A013353	8073	10902	SHERMAN ACRES MUTUAL WATER ASSN	9/14/49	1.50			Calaveras	UNSP
			SHERMAN ACRES MUTUAL WATER ASSN Total		1.50				
A024930	17704	11731	Sierra Golf Management, Inc.	11/17/75	108.00			Calaveras	ANGELS CREEK
			Sierra Golf Management, Inc. Total		108.00				
A012739	7567	5256	SIERRA PACIFIC INDUSTRIES	10/8/48	8.10			Tuolumne	UNSP
			SIERRA PACIFIC INDUSTRIES Total		8.10				
A005648X01			SIX MILE LAND COMPANY	5/9/01	81.00			Calaveras	SIX MILE CREEK
A031182			SIX MILE LAND COMPANY	5/9/01	41.00			Calaveras	SIX MILE CREEK
			SIX MILE LAND COMPANY Total		122.00				
A002524	1147	604	SOUTH SAN JOAQUIN IRRIGATION DISTRICT	8/29/21	36,000.00			Calaveras	STANISLAUS RIVER
			SOUTH SAN JOAQUIN IRRIGATION DISTRICT Total		36,000.00				
A030603A			STOCKTON EAST WATER DISTRICT	9/10/04	111,900.00			Calaveras	STANISLAUS RIVER
A0306038			STOCKTON EAST WATER DISTRICT	9/10/04	407,000.00			Calaveras, Tuolumne	STANISLAUS RIVER
			STOCKTON EAST WATER DISTRICT Total		518,900.00				
A010168	5974	3560	TAMARACK CABIN OWNERS ASSN	3/25/41	7.30			Calaveras	UNSP
			TAMARACK CABIN OWNERS ASSN Total		7.30				
A016563	10518		TAMARACK SPRINGS MUTUAL WATER CO	8/31/55	4.60			Calaveras	UNSP (2), UNXX
			TAMARACK SPRINGS MUTUAL WATER CO Total		4.60				
A019990	13140	8194	The Donald A. Bottomley 1992 Trust	2/16/61	4.00			Calaveras	UNST
			The Donald A. Bottomley 1992 Trust Total		4.00				
A018815	12329	7403	THOMAS P KLEIN	6/22/59	2.20			Tuolumne	UNST
			THOMAS P KLEIN Total		2.20				
A005648X02			THOMSON FAMILY TRUST	10/26/00	28.10			Calaveras	SIXMILE CREEK, UNST
A031364			THOMSON FAMILY TRUST	10/2/02	28.10			Calaveras	SIXMILE CREEK, UNST
			THOMSON FAMILY TRUST Total		56.20				
A003912	1781	1182	U S STANISLAUS NATL FOREST	4/18/32	32.80			Tuolumne	GOOSEBERRY SPRING
A010384	5982	3941	U S STANISLAUS NATL FOREST	2/6/42	6.60			Tuolumne	COW CREEK
A010386	5983	3917	U S STANISLAUS NATL FOREST	2/6/42	4.50			Tuolumne	LELAND CREEK
A010421	5986	3561	U S STANISLAUS NATL FOREST	4/1/42	1.10			Calaveras	BIG MEADOW CREEK
A010437	5987	3931	U S STANISLAUS NATL FOREST	4/25/42	0.70			Alpine	BEE CREEK
A010490	6038	3282	U S STANISLAUS NATL FOREST	7/8/42	1.10			Tuolumne	UNSP
A010491	6039	3012	U S STANISLAUS NATL FOREST	7/8/42	1.00			Tuolumne	UNST
A010492	6040	3013	U S STANISLAUS NATL FOREST	7/9/42	0.90			Tuolumne	UNST
A010495	6041	2977	U S STANISLAUS NATL FOREST	7/15/42	3.10			Tuolumne	UNST
A010556	6104	5015	U S STANISLAUS NATL FOREST	11/12/42	3.00			Tuolumne	BUMBLEBEE CREEK
A010557	6105	2974	U S STANISLAUS NATL FOREST	11/12/42	1.60			Tuolumne	CASCADE CREEK
A010575	6159	2975	U S STANISLAUS NATL FOREST	12/28/42	0.80			Tuolumne	UNST
A010576	6160	3903	U S STANISLAUS NATL FOREST	12/28/42	0.90			Tuolumne	UNST
A010584	6161	3283	U S STANISLAUS NATL FOREST	1/2/43	2.10			Tuolumne	UNST
A013833	8360	3860	U S STANISLAUS NATL FOREST	7/5/50	3.10			Tuolumne	UNST
A014167	8618	4660	U S STANISLAUS NATL FOREST	2/20/51	1.90			Tuolumne	UNSP
A016980	10760	7337	U S STANISLAUS NATL FOREST	3/30/56	0.70			Tuolumne	UNST

No comments

- n/a -

Stanislaus River Watershed - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	Season	Purpose of Use	County	Source
A017484	11017	7115	U S STANISLAUS NATL FOREST	2/27/57	11.40			Alpine	UNST
A018680	12115	7497	U S STANISLAUS NATL FOREST	4/30/59	0.90			Alpine	INSPIRATION SPRING
A018882	12197	7863	U S STANISLAUS NATL FOREST	8/3/59	1.20			Tuolumne	CRANDALL SPRING
A018883	12198	7255	U S STANISLAUS NATL FOREST	8/3/59	1.20			Tuolumne	SCHAFER SPRING
A018893	12199	7260	U S STANISLAUS NATL FOREST	8/3/59	1.20			Tuolumne	FRASER SPRING
A019702	13033	8003	U S STANISLAUS NATL FOREST	8/22/60	2.30			Tuolumne	UNST
A019703	13034	7977	U S STANISLAUS NATL FOREST	8/22/60	0.70			Tuolumne	UNSP
A019704	13035	8232	U S STANISLAUS NATL FOREST	8/22/60	1.90			Alpine	UNST
A019706	13037	8142	U S STANISLAUS NATL FOREST	8/22/60	1.40			Tuolumne	UNST
A020426	13565	8080	U S STANISLAUS NATL FOREST	10/5/61	0.90			Calaveras	UNSP
A021918	14918	9098	U S STANISLAUS NATL FOREST	9/29/64	0.50			Tuolumne	UNSP
A022030	14969	9097	U S STANISLAUS NATL FOREST	1/18/65	0.20			Tuolumne	UNSP
			U S STANISLAUS NATL FOREST Total		89.70				
A014858A	16597		U.S. BUREAU OF RECLAMATION	4/4/73	980,000.00			Calaveras	STANISLAUS RIVER
A014858B	20245		U.S. BUREAU OF RECLAMATION	7/18/88	1,000,000.00			Calaveras, San Joaquin	STANISLAUS RIVER
A014859	16598		U.S. BUREAU OF RECLAMATION	6/16/52	5,323,865.00			Calaveras	STANISLAUS RIVER
A019303	16599		U.S. BUREAU OF RECLAMATION	7/19/73	1,420,000.00			Calaveras	STANISLAUS RIVER
A019304	16600		U.S. BUREAU OF RECLAMATION	3/11/60	1,420,000.00			Calaveras, Contra Costa	STANISLAUS RIVER
A027319	20246		U.S. BUREAU OF RECLAMATION	7/18/88	2,895,910.00			Calaveras	STANISLAUS RIVER
			U.S. BUREAU OF RECLAMATION Total		13,039,775.00				
A028182	20144		VENTURE 4 MINING, A PARTNERSHIP	7/3/84	2.50			Tuolumne	UNST (AKA GREENHORN GULCH)
			VENTURE 4 MINING, A PARTNERSHIP Total		2.50				
A025369	17409	11514	WILLIAM MICHAEL ROBISON	5/27/77	28.00			Tuolumne	OWL CREEK, UNST
A025370	17410	12006	WILLIAM MICHAEL ROBISON	5/27/77	48.00			Tuolumne	OWL CREEK
A025371	17411	12007	WILLIAM MICHAEL ROBISON	5/27/77	20.00			Tuolumne	NORTH FORK WILDCAT CREEK
A025386	17412	11515	WILLIAM MICHAEL ROBISON	6/9/77	0.70			Tuolumne	NORTH FORK WILDCAT CREEK
			WILLIAM MICHAEL ROBISON Total		96.70				
A028278	19471	12939	YOUNG BERTRAND TRUSTEE ETAL	10/2/84	0.10			Calaveras	LOVE CREEK
			YOUNG BERTRAND TRUSTEE ETAL Total		0.10				
			Grand Total		20,143,681.00				

No comments

- n/a -

Tuolumne River Watershed - Post-1914 Appropriative Water Rights

Application ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source
A014162	9583	5049	Appropriative	Licensed	Aaron Lentz	2/15/51	3.7	Tuolumne	CURTIS CREEK
					Aaron Lentz Total		3.7		
A022486	15299	9177	Appropriative	Licensed	BANK OF AMERICA NT & SA	6/8/66	15	Tuolumne	UNST
A022487	15300	9161	Appropriative	Licensed	BANK OF AMERICA NT & SA	6/8/66	20	Stanislaus	UNST
					BANK OF AMERICA NT & SA Total		35		
A018644	12028	7382	Appropriative	Licensed	BARBARA THORNTON	4/14/59	9	Tuolumne	GARROTTE CREEK
					BARBARA THORNTON Total		9		
A020279	13976	10278	Appropriative	Licensed	BERNHARD KISSINGER	6/26/61	1.5	Tuolumne	UNST
					BERNHARD KISSINGER Total		1.5		
A020324	13395	8154	Appropriative	Licensed	BIG CREEK ASSOCIATES	7/25/61	24.5	Tuolumne	BIG CREEK DRAINAGE, UNST
					BIG CREEK ASSOCIATES Total		24.5		
A018738B	12118	008164B	Appropriative	Licensed	BOBBY E MADEWELL	5/25/59	1	Tuolumne	UNST
					BOBBY E MADEWELL Total		1		
A012961	7549	4032	Appropriative	Licensed	BOY SCOUT MEMORIAL FOUNDATION	3/4/49	6	Tuolumne	UNST
A016137	10124	6866	Appropriative	Licensed	BOY SCOUT MEMORIAL FOUNDATION	11/15/54	7.9	Tuolumne	UNST
					BOY SCOUT MEMORIAL FOUNDATION Total		13.9		
A012962	7550	4033	Appropriative	Licensed	BOY SCOUT OF AMERICA MEMORIAL FOUNDATION	3/4/49	2.7	Tuolumne	NORTH FORK TUOLUMNE RIVER
					BOY SCOUT OF AMERICA MEMORIAL FOUNDATION Total		2.7		
A019217	12502	7478	Appropriative	Licensed	BRENT LOOP	2/4/60	3.6	Tuolumne	UNST
					BRENT LOOP Total		3.6		
A021372	14266	9116	Appropriative	Licensed	BRENTWOOD LAKE CLUB INC	6/28/63	100	Tuolumne	UNST
					BRENTWOOD LAKE CLUB INC Total		100		
A010902	6346	3579	Appropriative	Licensed	CAMP TAWONGA-TAWONGA JEWISH COMMUNITY CORP	10/16/44	21.7	Tuolumne	MIDDLE FORK TUOLUMNE RIVER
A011108	6525	3743	Appropriative	Licensed	CAMP TAWONGA-TAWONGA JEWISH COMMUNITY CORP	7/17/45	11	Tuolumne	UNST
A013365	7958	4251	Appropriative	Licensed	CAMP TAWONGA-TAWONGA JEWISH COMMUNITY CORP	9/27/49	21.7	Tuolumne	UNST
A015078	9901	5326	Appropriative	Licensed	CAMP TAWONGA-TAWONGA JEWISH COMMUNITY CORP	11/6/52	12.3	Tuolumne	UNST
					CAMP TAWONGA-TAWONGA JEWISH COMMUNITY CORP Total		66.7		
A020332	13421	9601	Appropriative	Licensed	CAROLE CANEPA	7/28/61	22	Tuolumne	UNST
					CAROLE CANEPA Total		22		
A020841	14114	8616	Appropriative	Licensed	CAROLYN SUE MOSLEY	7/3/62	0.3	Tuolumne	CURTIS CREEK
					CAROLYN SUE MOSLEY Total		0.3		
A018757B	12099	006636B	Appropriative	Licensed	CHARLES G YONEDA	10/28/88	0.7	Tuolumne	UNST
					CHARLES G YONEDA Total		0.7		
A013101	7796	5279	Appropriative	Licensed	CHARLES J HURST	5/19/49	4	Tuolumne	WOODS CREEK
A023560	16134	10546	Appropriative	Licensed	CHARLES J HURST	7/17/70	8	Tuolumne	UNST
					CHARLES J HURST Total		12		
A016104	10108	9181	Appropriative	Licensed	CHRISTOPHER R ROSS	2/6/03	8	Tuolumne	UNST (AKA LITTLE SUGAR PINE CREEK)
					CHRISTOPHER R ROSS Total		8		
A020574	13616	8190	Appropriative	Licensed	CLIFTON E J HODGE	1/29/62	6	Tuolumne	UNST
					CLIFTON E J HODGE Total		6		
A020617	13658	8259	Appropriative	Licensed	COUNTY OF TUOLUMNE	2/15/62	10	Tuolumne	UNST
A028689	20146	13073	Appropriative	Licensed	COUNTY OF TUOLUMNE	1/3/86	2	Tuolumne	UNST
					COUNTY OF TUOLUMNE Total		12		
A018604	12335	7329	Appropriative	Licensed	CRAIG AND PATRICIA DAMBACHER 1993 FAMILY TRUST	3/20/59	16	Tuolumne	UNST (2)
					CRAIG AND PATRICIA DAMBACHER 1993 FAMILY TRUST Total		16		
A000862	516	283	Appropriative	Licensed	CROOK REVOCABLE 1992 TRUST	12/15/17	196.4	Tuolumne	JAWBONE CREEK
A021329	14878	10317	Appropriative	Licensed	CROOK REVOCABLE 1992 TRUST	6/10/63	28	Tuolumne	UNST
					CROOK REVOCABLE 1992 TRUST Total		224.4		
A021227	14243	9178	Appropriative	Licensed	DANIEL A SCHULTZ	4/9/63	8	Tuolumne	UNST
					DANIEL A SCHULTZ Total		8		
A020883	13885	8492	Appropriative	Licensed	DAVID C HARDEN	8/1/62	8.4	Tuolumne	UNST
					DAVID C HARDEN Total		8.4		
A019299	12441	7485	Appropriative	Licensed	DAVID ERNEST HERBERT	3/9/60	1.5	Tuolumne	UNST
					DAVID ERNEST HERBERT Total		1.5		
A020381	13434	7885	Appropriative	Licensed	DENNIS S DAOUST	9/6/61	1	Tuolumne	UNST
					DENNIS S DAOUST Total		1		
A027785	19155		Appropriative	Permitted	DONALD F MC CLURE	6/30/83	8.1	Tuolumne	MOSS SPRING
					DONALD F MC CLURE Total		8.1		

No comments

- n/a -

A020497	13654	8293	Appropriative	Licensed	EDWARD J FILIBERTI	11/15/61	5.8	Tuolumne	UNST
					EDWARD J FILIBERTI Total		5.8		
A020784	13766	8593	Appropriative	Licensed	Eric J Coffill	5/21/62	17	Tuolumne	UNST
					Eric J Coffill Total		17		
A020575	13569	9158	Appropriative	Licensed	ESTATE OF LAVERNE LITTERAL	1/29/62	5.5	Tuolumne	UNST
A020587	13696	10008	Appropriative	Licensed	ESTATE OF LAVERNE LITTERAL	2/5/62	5.4	Tuolumne	BLUE GULCH
					ESTATE OF LAVERNE LITTERAL Total		10.9		
A022468	15546	10097	Appropriative	Licensed	ESTATES OF ELDON E & ANNA V AMOS	5/11/73	4	Tuolumne	UNSP
					ESTATES OF ELDON E & ANNA V AMOS Total		4		
A029977	20784		Appropriative	Permitted	G SCOTT FAHEY	3/6/02	44.8	Tuolumne	DEADWOOD SPRING, UNSP (AKA SUGAR PINE SPRING)
A031491	21289		Appropriative	Permitted	G SCOTT FAHEY	8/1/11	64.5	Tuolumne	UNSP
					G SCOTT FAHEY Total		109.3		
A018757A03	12099	006636A03	Appropriative	Licensed	GRAY A CLOSSMAN	5/9/90	1	Tuolumne	UNST
					GRAY A CLOSSMAN Total		1		
A019214	12433	7555	Appropriative	Licensed	Gregory C. Henley	2/3/60	30	Tuolumne	UNST
					Gregory C. Henley Total		30		
A018757C	12099	006636C	Appropriative	Licensed	GREGORY L CARR	10/28/88	0.7	Tuolumne	UNST
					GREGORY L CARR Total		0.7		
A019253	12662	7705	Appropriative	Licensed	HELGA ANKER TRUST	2/26/60	8.6	Tuolumne	RATTLESNAKE CREEK
					HELGA ANKER TRUST Total		8.6		
A019192	12410	7502	Appropriative	Licensed	HOLLY HAYDEN-FITZSIMMONS	1/26/60	1.1	Tuolumne	SONORA CREEK
					HOLLY HAYDEN-FITZSIMMONS Total		1.1		
A015987	10073	5215	Appropriative	Licensed	INGALLS FAMILY TRUST	8/9/54	213.2	Tuolumne	DUCKWALL CREEK
					INGALLS FAMILY TRUST Total		213.2		
A013343	7890	5344	Appropriative	Licensed	JACK G MILES	9/8/49	6.8	Tuolumne	UNST
					JACK G MILES Total		6.8		
A016932	10632	5991	Appropriative	Licensed	JACK J GARDELLA JR	3/13/56	24.1	Tuolumne	UNST
A016935	10635	5994	Appropriative	Licensed	JACK J GARDELLA JR	3/13/56	24.6	Tuolumne	UNST
A019043	12594	6946	Appropriative	Licensed	JACK J GARDELLA JR	10/21/59	60	Tuolumne	UNST
A025898	18041	11845	Appropriative	Licensed	JACK J GARDELLA JR	1/5/79	75	Tuolumne	UNST
					JACK J GARDELLA JR Total		183.7		
A020272	13381	8125	Appropriative	Licensed	JAMES CURTONI	6/20/61	30	Tuolumne	UNST
A022472	15391	9206	Appropriative	Licensed	JAMES CURTONI	5/19/66	18	Tuolumne	UNST
					JAMES CURTONI Total		48		
A020943	14166	9170	Appropriative	Licensed	JAY HALE	9/13/62	4	Tuolumne	UNSP
					JAY HALE Total		4		
A020459B	13513	008111B	Appropriative	Licensed	JELITO LIVING TRUST DATED 7/29/89	7/8/85	2.3	Tuolumne	UNST
					JELITO LIVING TRUST DATED 7/29/89 Total		2.3		
A020286	13436	8562	Appropriative	Licensed	JIM LUPO	7/3/61	11	Tuolumne	CURTIS CREEK
A020843	13986	9781	Appropriative	Licensed	JIM LUPO	7/5/62	24	Tuolumne	CURTIS CREEK
					JIM LUPO Total		35		
A020785	13767	8594	Appropriative	Licensed	JOANE SANTOS TRUST	5/21/62	3.6	Tuolumne	UNST
					JOANE SANTOS TRUST Total		3.6		
A018947	12204	6838	Appropriative	Licensed	JOHN B GROHL SR FAMILY RESIDUAL TRUST	8/27/59	49	Modoc, Tuolumne	QUIGLEY CREEK, UNST
A020598	13699	8746	Appropriative	Licensed	JOHN B GROHL SR FAMILY RESIDUAL TRUST	2/7/62	64	Tuolumne	NORTH FORK DRY CREEK, UNST
A021190	14209	9149	Appropriative	Licensed	JOHN B GROHL SR FAMILY RESIDUAL TRUST	2/27/70	26	Tuolumne	UNST
					JOHN B GROHL SR FAMILY RESIDUAL TRUST Total		139		
A018757A01A		006636A01A	Appropriative	Licensed	JOHN C BRUNK	8/17/92	1.4	Tuolumne	UNST
					JOHN C BRUNK Total		1.4		
A025191	17000	11404	Appropriative	Licensed	JOHN ROSS BAKER	10/28/76	24	Tuolumne	UNST
A027519	18792	12548	Appropriative	Licensed	JOHN ROSS BAKER	9/15/82	6	Tuolumne	UNST
A029743	20879		Appropriative	Permitted	JOHN ROSS BAKER	5/14/90	204	Tuolumne	TURNBACK CREEK, UNST
					JOHN ROSS BAKER Total		234		
A025627	17481	11284	Appropriative	Licensed	JOHN WILLMS RANCH INC	12/30/77	6.1	Stanislaus	UNST
					JOHN WILLMS RANCH INC Total		6.1		
A019662	12846	7789	Appropriative	Licensed	JOSEPH M MURRAY JR	8/16/60	19	Stanislaus	UNST
					JOSEPH M MURRAY JR Total		19		
A020407	13406	8086	Appropriative	Licensed	JUSTUS W HOUCK	9/26/61	1.2	Tuolumne	UNST
					JUSTUS W HOUCK Total		1.2		
A018575	11986	6776	Appropriative	Licensed	KAREN REESE	3/9/59	18	Tuolumne	UNST
					KAREN REESE Total		18		
A018602	13128	8018	Appropriative	Licensed	LAKEWOOD PARK ASSOCIATION	3/20/59	7	Tuolumne	SULLIVAN CREEK

No comments

- n/a -

					LAKEWOOD PARK ASSOCIATION Total		7		
A018911	12332	7420	Appropriative	Licensed	LEROY L BELT III	8/12/59	0.4	Tuolumne	UNSP (2)
					LEROY L BELT III Total		0.4		
A014262	8759	5372	Appropriative	Licensed	LOUISE ROSASCO CUNNINGHAM	4/20/51	89	Tuolumne	UNSP
					LOUISE ROSASCO CUNNINGHAM Total		89		
A017718	11083	5971	Appropriative	Licensed	LUCILLE MURPHY HATLER	7/15/57	6	Tuolumne	UNST
A017719	11084	5972	Appropriative	Licensed	LUCILLE MURPHY HATLER	7/15/57	40	Tuolumne	UNST
A017720	11085	6098	Appropriative	Licensed	LUCILLE MURPHY HATLER	7/15/57	26	Tuolumne	UNST
A017721	11086	5974	Appropriative	Licensed	LUCILLE MURPHY HATLER	7/15/57	2.3	Stanislaus	UNST
					LUCILLE MURPHY HATLER Total		74.3		
A025569	17507	11687	Appropriative	Licensed	MARILYN K RICE	11/15/77	16	Tuolumne	UNSP
					MARILYN K RICE Total		16		
A020355	13179	9207	Appropriative	Licensed	MARK R VANN	8/16/61	1.1	Tuolumne	ROUGH & READY CREEK
					MARK R VANN Total		1.1		
A021289	14265	9146	Appropriative	Licensed	MARY CURTIN	5/27/63	6.7	Tuolumne	UNST
					MARY CURTIN Total		6.7		
A020488	13752	9943	Appropriative	Licensed	MATTHEW D BEAUCHAMP	11/10/61	51	Tuolumne	CURTIS CREEK
					MATTHEW D BEAUCHAMP Total		51		
A005726	2973	1132	Appropriative	Licensed	MDL TRUST	10/18/27	10.1	Tuolumne	UNSP (2)
					MDL TRUST Total		10.1		
A022326	15125	10764	Appropriative	Licensed	MICHAEL P SARDELLA	10/29/65	9.6	Tuolumne	ROUGH & READY CREEK
					MICHAEL P SARDELLA Total		9.6		
A026084	18024	12790	Appropriative	Licensed	MIKEL C WILLIAMS	9/6/79	0.5	Tuolumne	MORMON CREEK, UNST
					MIKEL C WILLIAMS Total		0.5		
A020590	13722	9244	Appropriative	Licensed	Mountain Springs Community LP	2/5/62	133	Tuolumne	FLORAL CREEK, UNST, Unnamed Stream
					Mountain Springs Community LP Total		133		
A031384			Appropriative	Pending	MOUNTAIN SPRINGS GOLF LLC	1/21/03	99	Tuolumne	SULLIVAN CREEK, UNST, UNST (AKA FLORES CREEK)
					MOUNTAIN SPRINGS GOLF LLC Total		99		
A018554	13137	8109	Appropriative	Licensed	O J SPARROW	2/26/59	10	Tuolumne	SULLIVAN CREEK
					O J SPARROW Total		10		
A016170	10369	6249	Appropriative	Licensed	ODD FELLOWS SIERRA RECREATION ASSN	12/7/54	17.8	Tuolumne	SUGARPINE CREEK
A016172	10370	9772	Appropriative	Licensed	ODD FELLOWS SIERRA RECREATION ASSN	12/7/54	15	Tuolumne	UNSP
					ODD FELLOWS SIERRA RECREATION ASSN Total		32.8		
A018547	13125	8112	Appropriative	Licensed	Pamela Prime and David Kirkpatrick Trust	2/20/59	12	Tuolumne	UNST
					Pamela Prime and David Kirkpatrick Trust Total		12		
A019946	13110	8032	Appropriative	Licensed	PATRICIA B BROOKS	1/31/61	30.2	Tuolumne	UNST
					PATRICIA B BROOKS Total		30.2		
A020885C	14018	9963	Appropriative	Licensed	PINE MOUNTAIN LAKE ASSOCIATION	8/2/62	14	Tuolumne	UNST
A022980	15823	10634	Appropriative	Licensed	PINE MOUNTAIN LAKE ASSOCIATION	2/7/68	7,650.00	Tuolumne	BIG CREEK
					PINE MOUNTAIN LAKE ASSOCIATION Total		7,664.00		
A030367	21220		Appropriative	Permitted	PLGC Partners	8/27/08	36.8	Tuolumne	UNST
A030699	21221		Appropriative	Permitted	PLGC Partners	8/29/08	28	Tuolumne	UNST
					PLGC Partners Total		64.8		
A023262	15978	10774	Appropriative	Licensed	RACHEL M VUYOVICH	4/16/69	21	Tuolumne	UNST
A025092	17006	11369	Appropriative	Licensed	RACHEL M VUYOVICH	7/6/76	10	Tuolumne	UNST
					RACHEL M VUYOVICH Total		31		
A021028	14037	9698	Appropriative	Licensed	RICHARD J NORTON	11/23/62	8.5	Tuolumne	UNST
					RICHARD J NORTON Total		8.5		
A021183	14150	8329	Appropriative	Licensed	Robert E Thomason	3/8/63	30	Tuolumne	KANAKA CREEK
					Robert E Thomason Total		30		
A018614	12019	6496	Appropriative	Licensed	RON GROHL	3/31/59	3	Tuolumne	UNST
					RON GROHL Total		3		
A015254	9645	6368	Appropriative	Licensed	RONALD E CARTER	3/26/53	51.1	Tuolumne	WOODS CREEK
					RONALD E CARTER Total		51.1		
A019388	12687	7837	Appropriative	Licensed	ROYCE WHITNEY	8/4/66	160.6	Tuolumne	UNST
A020328	13410	7838	Appropriative	Licensed	ROYCE WHITNEY	7/26/61	31	Tuolumne	UNST
					ROYCE WHITNEY Total		191.6		
A012858	7618	4990	Appropriative	Licensed	SCOT PATTERSON	3/24/58	5	Tuolumne	UNXX
					SCOT PATTERSON Total		5		
A018738A	12118	008164A	Appropriative	Licensed	SIERRA PACIFIC HOLDING COMPANY	5/25/59	2.5	Tuolumne	UNST
					SIERRA PACIFIC HOLDING COMPANY Total		2.5		

No comments

- n/a -

A014947	9197	5270	Appropriative	Licensed	SONORA RIDGE LLC	8/1/52	47.7	Tuolumne	SULLIVAN CREEK
					SONORA RIDGE LLC Total		47.7		
A022146	15250	9454	Appropriative	Licensed	SOREN E JENSEN JR RANCH TRUST	5/10/65	5	Tuolumne	UNST
					SOREN E JENSEN JR RANCH TRUST Total		5		
A019188	12426	7472	Appropriative	Licensed	STEPHEN A FINN	1/21/60	0.4	Tuolumne	UNST
					STEPHEN A FINN Total		0.4		
A020459A	13513 008111A		Appropriative	Licensed	SUSAN A MACDONALD	7/8/85	1.5	Tuolumne	UNST
					SUSAN A MACDONALD Total		1.5		
A020092	13193	9201	Appropriative	Licensed	TUOLUMNE BAND ME-WUK INDIANS	4/19/61	1	Tuolumne	UNST
					TUOLUMNE BAND ME-WUK INDIANS Total		1		
A008758	4830	2252	Appropriative	Licensed	TUOLUMNE PARK AND RECREATION DISTRICT	8/12/36	5	Tuolumne	UNSP
					TUOLUMNE PARK AND RECREATION DISTRICT Total		5		
A016173	10371	10989	Appropriative	Licensed	TUOLUMNE UTILITIES DISTRICT	12/7/54	9.1	Tuolumne	UNSP
A018549	13127	7936	Appropriative	Licensed	TUOLUMNE UTILITIES DISTRICT	2/24/59	2	Tuolumne	UNST
A020565	13606	9740	Appropriative	Licensed	TUOLUMNE UTILITIES DISTRICT	1/19/62	28	Tuolumne	UNST
A023813	16949	11576	Appropriative	Licensed	TUOLUMNE UTILITIES DISTRICT	6/22/71	3.9	Tuolumne	UNSP
					TUOLUMNE UTILITIES DISTRICT Total		43		
A001232	1164	5420	Appropriative	Licensed	TURLOCK I D & MODESTO I D	4/8/19	325,000.00	Tuolumne	TUOLUMNE RIVER
A001233	1165	5417	Appropriative	Licensed	TURLOCK I D & MODESTO I D	4/8/19	325,000.00	Stanislaus, Tuolumne	TUOLUMNE RIVER
A001532	1166	5421	Appropriative	Licensed	TURLOCK I D & MODESTO I D	11/21/19	1,851,934.50	Tuolumne	TUOLUMNE RIVER
A003648	3026	2424	Appropriative	Licensed	TURLOCK I D & MODESTO I D	9/24/23	48,595.80	Stanislaus	TUOLUMNE RIVER
A006711	4271	2425	Appropriative	Licensed	TURLOCK I D & MODESTO I D	6/25/30	480,800.40	Stanislaus	TUOLUMNE RIVER
A009996	5909	5418	Appropriative	Licensed	TURLOCK I D & MODESTO I D	9/6/40	868,773.00	Stanislaus, Tuolumne	TUOLUMNE RIVER
A009997	5910	5419	Appropriative	Licensed	TURLOCK I D & MODESTO I D	9/6/40	721,200.60	Stanislaus, Tuolumne	TUOLUMNE RIVER
A014126	9319	11057	Appropriative	Licensed	TURLOCK I D & MODESTO I D	1/16/51	1,046,800.00	Tuolumne	TUOLUMNE RIVER
A014127	9320	11058	Appropriative	Licensed	TURLOCK I D & MODESTO I D	1/16/51	1,046,800.00	Tuolumne	TUOLUMNE RIVER
					TURLOCK I D & MODESTO I D Total		6,714,904.30		
A003139	1699	2580	Appropriative	Licensed	TURLOCK IRRIGATION DISTRICT	4/2/43	436,558.40	Stanislaus	TUOLUMNE RIVER
					TURLOCK IRRIGATION DISTRICT Total		436,558.40		
A004946	2575	1086	Appropriative	Licensed	TWAIN HARTE LAKE ASSOCIATION	6/29/31	181	Tuolumne	CALDER CREEK
					TWAIN HARTE LAKE ASSOCIATION Total		181		
A007058	3825	2727	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/24/31	25.5	Tuolumne	NORTH FORK TUOLUMNE RIVER
A009759	5475	2728	Appropriative	Licensed	U S STANISLAUS NATL FOREST	10/31/39	25.5	Tuolumne	SHEERING CREEK
A010355	5937	2962	Appropriative	Licensed	U S STANISLAUS NATL FOREST	1/5/42	1.7	Tuolumne	UNST
A010420	5985	2955	Appropriative	Licensed	U S STANISLAUS NATL FOREST	4/1/42	22.4	Tuolumne	GRANITE SPRING
A010487	6035	3189	Appropriative	Licensed	U S STANISLAUS NATL FOREST	7/3/42	1	Tuolumne	UNSP
A010489	6037	2946	Appropriative	Licensed	U S STANISLAUS NATL FOREST	7/3/42	2.2	Tuolumne	UNCR
A010587	6163	4444	Appropriative	Licensed	U S STANISLAUS NATL FOREST	1/4/43	2.6	Tuolumne	UNSP
A015405	9781	5681	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/27/53	6.7	Tuolumne	MIDDLE FORK TUOLUMNE RIVER
A015828	10132	6319	Appropriative	Licensed	U S STANISLAUS NATL FOREST	4/9/54	3.3	Tuolumne	MIDDLE FORK TUOLUMNE RIVER
A016052	10113	5923	Appropriative	Licensed	U S STANISLAUS NATL FOREST	9/16/54	3.7	Tuolumne	UNSP (2)
A016979	10759	5510	Appropriative	Licensed	U S STANISLAUS NATL FOREST	3/30/56	13.4	Tuolumne	UNSP
A017259	10962	7582	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/28/56	46.2	Tuolumne	JORDAN CREEK
A018678	12082	7385	Appropriative	Licensed	U S STANISLAUS NATL FOREST	4/30/59	0.7	Tuolumne	UNSP
A018885	12443	7256	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/3/59	1.2	Tuolumne	CLAVEY ROAD SPRING
A018886	12444	7548	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/3/59	1.2	Tuolumne	WALTON SPRING
A018887	12445	7530	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/3/59	1.2	Tuolumne	FLEMING SPRING
A018888	12446	7257	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/3/59	1.2	Tuolumne	DODGE RIDGE SPRING
A018889	12447	7258	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/3/59	1.2	Tuolumne	MT LEWIS SPRING
A018891	12449	7865	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/3/59	1.2	Tuolumne	BROKENDOWN CABIN SPRING
A018892	12450	7259	Appropriative	Licensed	U S STANISLAUS NATL FOREST	8/3/59	1.2	Tuolumne	MARBLE SPRING
					U S STANISLAUS NATL FOREST Total		163.3		
A016931	10631	5990	Appropriative	Licensed	V A RODDEN INC	3/13/56	12.8	Tuolumne	UNST
A016933	10633	5992	Appropriative	Licensed	V A RODDEN INC	3/13/56	11.9	Stanislaus	UNST
A016937	10637	5996	Appropriative	Licensed	V A RODDEN INC	3/13/56	19.6	Stanislaus	JOHNSON CREEK
A016938	10638	5997	Appropriative	Licensed	V A RODDEN INC	3/13/56	6	Stanislaus	GOODWIN CREEK
					V A RODDEN INC Total		50.3		
A020693	13917	8364	Appropriative	Licensed	VERNAN P HATLER	4/2/62	19.2	Tuolumne	UNCR
					VERNAN P HATLER Total		19.2		

No comments

- n/a -

Tuolumne River Watershed - Post-1914 Appropriative Water Rights

A017054	10961	7338 Appropriative	Licensed	VIRGINIA S SATTLER	4/27/56	4.5	Tuolumne	BIG CREEK
				VIRGINIA S SATTLER Total		4.5		
A020636	13832	9176 Appropriative	Licensed	W D FAHEY TRUST	3/2/62	0.3	Tuolumne	UNSP
				W D FAHEY TRUST Total		0.3		
A018757A01B		006636A01B Appropriative	Licensed	Wagner Family Trust	8/17/92	1.5	Tuolumne	UNST
A020885A	14018	9961 Appropriative	Licensed	Wagner Family Trust	8/2/62	15	Tuolumne	BIG HUMBUG CREEK
A020885B	14018	9962 Appropriative	Licensed	Wagner Family Trust	8/2/62	12	Tuolumne	BIG HUMBUG CREEK
A031545	21252	Appropriative	Permitted	Wagner Family Trust	4/14/10	47.6	Tuolumne	Big Humbug Creek
				Wagner Family Trust Total		76.1		
A019663	12847	7779 Appropriative	Licensed	WILLIAM C RITTS	8/16/60	51.5	Tuolumne	UNST, WEST FORK BIG CREEK
				WILLIAM C RITTS Total		51.5		
A017965	11426	7771 Appropriative	Licensed	WILLIAM L GOOKIN JR	1/29/58	9	Tuolumne	UNST
				WILLIAM L GOOKIN JR Total		9		
				Grand Total		7162449.4		

No comments

- n/a -

No comments

- n/a -

Merced River Watershed - Post-1914 Appropriative Right Holders

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A022506	15290	9699	AMANDA VANCE	6/23/66	8.40	Mariposa	UNSP
			AMANDA VANCE Total		8.40		
A017202	10895	8196	BRIAN T SCHUTT	7/27/56	22.40	Mariposa	DUTCH CREEK
A017822	12142	8197	BRIAN T SCHUTT	9/13/57	12.00	Mariposa	DUTCH CREEK
			BRIAN T SCHUTT Total		34.40		
A015747	9795	5714	CALIF DEPT OF FORESTRY & FIRE PROTECTION	5/1/59	33.30	Mariposa	UNSP
			CALIF DEPT OF FORESTRY & FIRE PROTECTION Total		33.30		
A016484	10389	6889	Carol M Menzel	7/25/55	520.00	Mariposa	MAXWELL CREEK
			Carol M Menzel Total		520.00		
A020033	13202	10081	CEDAR LODGE LLC	3/14/61	4.50	Mariposa	UNSP
			CEDAR LODGE LLC Total		4.50		
A018358	11785	7994	CHRISTINA CRAIG	10/3/58	5.40	Mariposa	UNST
			CHRISTINA CRAIG Total		5.40		
A017147	10855	6585	COASTAL DEVELOPMENT COMPANY LLC, INDIAN FLAT	6/22/56	3.60	Mariposa	MERCED RIVER UNDERFLOW
A028726	19939	13089	COASTAL DEVELOPMENT COMPANY LLC, INDIAN FLAT	1/14/86	0.50	Mariposa	UNSP
			COASTAL DEVELOPMENT COMPANY LLC, INDIAN FLAT Total		4.10		
A020935	14124	10181	CRANBERRY GULCH WATER SUPPLY LTD	9/11/62	3.00	Mariposa	CRANBERRY SPRING
			CRANBERRY GULCH WATER SUPPLY LTD Total		3.00		
A017008	10768	6549	DALE HURLEY	4/16/56	10.50	Mariposa	UNST
A018267	11688	9205	DALE HURLEY	8/14/58	14.50	Mariposa	UNST
			DALE HURLEY Total		25.00		
A028991	20429	13735	DAVID RICHARD WILKEY	8/23/07	1.80	Mariposa	UNST
			DAVID RICHARD WILKEY Total		1.80		
A026054	18134	12034	DREAM RANCH WEST LLC	7/25/79	23.00	Mariposa	UNST
A028861	20148	13046	DREAM RANCH WEST LLC	6/19/86	10.00	Mariposa	UNST
			DREAM RANCH WEST LLC Total		33.00		
A010696	6196	6528	Estate of Herbert F. Frey	4/16/62	4.30	Mariposa	BEAN CREEK
			Estate of Herbert F. Frey Total		4.30		
A006762	3650	1847	FISKE TRUST	8/8/30	4.80	Mariposa	UNSP
			FISKE TRUST Total		4.80		
A018695	12514	8655	FRANK R DOMINGUES III	5/7/59	1.50	Mariposa	CRANBERRY SPRING
			FRANK R DOMINGUES III Total		1.50		
A027985	19338		GERALD P HARRISON	3/2/84	21.00	Mariposa	SMITH CREEK
			GERALD P HARRISON Total		21.00		
A014982	9338	6134	GLEN PICKREN	8/20/52	35.00	Mariposa	PLUMBAR CREEK
			GLEN PICKREN Total		35.00		
A017647	11272	6825	HORACE MEYER ESTATE	6/11/57	1.00	Mariposa	UNXX
A017648	11457	6826	HORACE MEYER ESTATE	6/11/57	16.00	Mariposa	UNXX
			HORACE MEYER ESTATE Total		17.00		
A021014	14083	8491	JAMES DICKEY	11/13/62	16.00	Mariposa	DUTCH CREEK
			JAMES DICKEY Total		16.00		
A016639	10434	5721	JAMES D LAW	9/29/55	4.50	Mariposa	UNSP
			JAMES D LAW Total		4.50		
A022268	15006	10524	JAMES E EWERT	8/20/65	18.00	Mariposa	UNST
			JAMES E EWERT Total		18.00		
A027761	19391	12814	JERRY INMAN	5/26/83	1.20	Mariposa	UNST
			JERRY INMAN Total		1.20		
A019463	12765	8917	JOHN REYNOLDS	5/31/60	2.70	Mariposa	CRANBERRY SPRING
			JOHN REYNOLDS Total		2.70		

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A023205	15972	10272	John C. Fox Revocable Trust	1/7/69	4.30	Mariposa	UNST
			John C. Fox Revocable Trust Total		4.30		
A017496	11036	7522	JOHN H WELCH	3/5/57	25.70	Mariposa	UNSP, UNST
			JOHN H WELCH Total		25.70		
A022076	14930	9082	JOSEPH C LODGE	3/18/65	19.00	Mariposa	LONG CANYON CREEK
			JOSEPH C LODGE Total		19.00		
A017011	10888	7626	KAO CHAO	4/17/56	1.60	Mariposa	UNST
			KAO CHAO Total		1.60		
A011814	7943	3955	Kelsey Ranch LP	4/4/47	1,002.80	Mariposa, Merced	SOUTH FORK DRY CREEK, UNST
			Kelsey Ranch LP Total		1,002.80		
A016348	10503	7813	KENNETH J PULVINO	4/27/55	50.00	Mariposa	BEAN CREEK
			KENNETH J PULVINO Total		50.00		
A016969	10678	5509	LAUREL L ANDERSON	3/26/56	2.70	Mariposa	CRANBERRY SPRING
			LAUREL L ANDERSON Total		2.70		
A013954	8963	4323	LAUREL MUNSON BOYERS	9/20/50	0.20	Mariposa	CRANE CREEK
			LAUREL MUNSON BOYERS Total		0.20		
A018444	12134	7529	LEONARD SYNKOWICZ	12/24/58	1.20	Mariposa	UNST
			LEONARD SYNKOWICZ Total		1.20		
A021760	14875	9687	LLOYD MYERS	5/1/64	16.00	Mariposa	SAXON CREEK
			LLOYD MYERS Total		16.00		
A016736	11046	9275	LYLE TURPIN	11/16/55	55.60	Mariposa	UNST, WILLOW CREEK
			LYLE TURPIN Total		55.60		
A023731	16551	10498	MARGERY M DE LA MARE	3/22/71	1.00	Mariposa	UNSP
			MARGERY M DE LA MARE Total		1.00		
A020422	13988	8553	MARK HAYNES	3/18/68	16.70	Mariposa	EAST FORK PINEY CREEK
			MARK HAYNES Total		16.70		
A024212	16807	11733	MELBA WRIGHT	10/18/72	22.00	Mariposa	UNST
A027198	19304	12739	MELBA WRIGHT	2/2/82	8.20	Mariposa	UNST
			MELBA WRIGHT Total		30.20		
A020524	13735	8385	MERCED COMMUNITY COLLEGE DISTRICT	12/13/61	3.40	Mariposa	UNSP
			MERCED COMMUNITY COLLEGE DISTRICT Total		3.40		
A001221	912	990	MERCED IRRIGATION DISTRICT	3/26/19	868,773.00	Mariposa	MERCED RIVER
A001222	913	2684	MERCED IRRIGATION DISTRICT	3/26/19	491,080.20	Mariposa	MERCED RIVER
A001224	914	2685	MERCED IRRIGATION DISTRICT	6/20/03	345,440.00	Mariposa, Merced	MERCED RIVER
A016186	12825	11395	MERCED IRRIGATION DISTRICT	6/20/03	605,000.00	Mariposa	MERCED RIVER
A016187	12826	11396	MERCED IRRIGATION DISTRICT	12/23/54	1,861,824.90	Mariposa	MERCED RIVER
			MERCED IRRIGATION DISTRICT Total		4,172,118.10		
A019859	13044	8192	MIGUEL FLORES JR	11/28/60	2.50	Mariposa	UNXX
			MIGUEL FLORES JR Total		2.50		
A017204	10846	5919	MJ OAKS LLC	7/31/56	0.80	Mariposa	UNST
			MJ OAKS LLC Total		0.80		
A016463	10443	7282	OLIVER HAYCRAFT	7/13/55	18.00	Mariposa	UNST
			OLIVER HAYCRAFT Total		18.00		
A025842	17639	11876	P ORD HATTON	10/5/78	34.00	Mariposa	UNST
			P ORD HATTON Total		34.00		
A009056	5056	2555	PacificUS Real Estate Group	7/29/37	47.10	Mariposa	UNSP
A016646	10487	10522	PacificUS Real Estate Group	10/4/55	21.00	Mariposa	UNSP
			PacificUS Real Estate Group Total		68.10		

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A016994	10556	6534	PHILIP M HOULIHAN	4/9/56	48.00	Mariposa	DUTCH CREEK
A017786	11217	6535	PHILIP M HOULIHAN	8/19/57	27.00	Mariposa	DUTCH CREEK
			PHILIP M HOULIHAN Total		75.00		
A016559	10845	7366	RICHARD FERRY	8/30/55	72.40	Mariposa	PORATH GULCH
			RICHARD FERRY Total		72.40		
A020476	13787	8658	ROBERT W KINGMAN	11/6/61	16.00	Mariposa	DUTCH CREEK
			ROBERT W KINGMAN Total		16.00		
A016431	10264	6363	ROBERTA G FLANAGAN	6/21/55	2.50	Mariposa	UNXX
			ROBERTA G FLANAGAN Total		2.50		
A012986	7809	3778	ROD KENNEC	3/17/49	17.90	Mariposa	LITTLE BEAR CREEK
			ROD KENNEC Total		17.90		
A016653	10486	6321	RODNEY A BAKER	10/10/55	17.10	Mariposa	SMITH CREEK
			RODNEY A BAKER Total		17.10		
A028536	19785	13775	RONALD B LUFFY	9/5/08	4.30	Mariposa	UNST
			RONALD B LUFFY Total		4.30		
A020969	14119	8707	ROSEMARY M GAMBLIN	10/5/62	31.50	Mariposa	DUTCH CREEK, UNST
			ROSEMARY M GAMBLIN Total		31.50		
A017012	10889	7627	RUSSELL BOCKHOP	4/17/56	8.00	Mariposa	UNST
			RUSSELL BOCKHOP Total		8.00		
A017523	11236	7138	THE BARRIER	3/22/57	9.30	Mariposa	UNST
			THE BARRIER Total		9.30		
A020765	13763	8358	The Estate of William Rottenkolber	5/3/62	10.00	Mariposa	UNST
			The Estate of William Rottenkolber Total		10.00		
A019306	12551	6891	THERAN L BALMAIN	3/14/60	0.60	Mariposa	UNXX
			THERAN L BALMAIN Total		0.60		
A018430	11877	9147	Tidall Virginia	12/9/58	46.00	Mariposa	BEAN CREEK
			Tidall Virginia Total		46.00		
A014979	9336	6392	TRAIAN MICU	8/19/52	180.00	Mariposa	SMITH CREEK
A031125	21122		TRAIAN MICU	1/10/01	60.00	Mariposa	SMITH CREEK
			TRAIAN MICU Total		240.00		
A018097	11726	7117	Transition Mountain Properties	4/21/58	4.20	Mariposa	MILLER GULCH
			Transition Mountain Properties Total		4.20		
A029559	20689	13768	U S BUREAU OF LAND MANAGEMENT	6/19/08	2.40	Mariposa	UNSP
			U S BUREAU OF LAND MANAGEMENT Total		2.40		
A006729	3549	6112	U S NATIONAL PARK SERVICE	7/11/30	170.60	Madera	UNSP (2)
A010488	6036	2973	U S NATIONAL PARK SERVICE	7/3/42	7.30	Mariposa	CRANE CREEK
A019116	12387	11233	U S NATIONAL PARK SERVICE	12/2/59	76.50	Mariposa	MOSS CREEK
			U S NATIONAL PARK SERVICE Total		254.40		
A019671	12991	8390	U S SIERRA NATL FOREST	8/18/60	0.30	Madera	UNSP
A027715	19740	13206	U S SIERRA NATL FOREST	4/12/83	0.10	Mariposa	UNST
A027717	19741	13207	U S SIERRA NATL FOREST	4/12/83	0.10	Mariposa	UNST
A027718	19742	13155	U S SIERRA NATL FOREST	4/12/83	0.10	Mariposa	UNST
			U S SIERRA NATL FOREST Total		0.60		
A011772	6842	3408	U S STANISLAUS NATL FOREST	3/12/47	0.90	Mariposa	UNSP
A017904	11347	6441	U S STANISLAUS NATL FOREST	12/4/57	1.00	Mariposa	PROUTY SPRING
A022229	15102	10349	U S STANISLAUS NATL FOREST	7/19/65	3.30	Mariposa	JORDAN CREEK
			U S STANISLAUS NATL FOREST Total		5.20		
A028321	19652	13486	US BUREAU OF LAND MANAGEMENT	11/9/84	0.40	Mariposa	UNST
A028322	19653		US BUREAU OF LAND MANAGEMENT	11/9/84	0.10	Mariposa	UNSP
			US BUREAU OF LAND MANAGEMENT Total		0.50		

No comments

- n/a -

Merced River Watershed - Post-1914 Appropriative Right Holders

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A023074	15746	10295	VERE GEARY	6/26/68	22.00	Mariposa	UNST
			VERE GEARY Total		22.00		
A014721	9768	6166	W B STURTEVANT	3/20/52	80.00	Mariposa	EAST FORK PINEY CREEK
			W B STURTEVANT Total		80.00		
A029615	20574		WALTER K BUNT & DOROTHY L BUNT TRUST ETAL	11/15/89	8.00	Mariposa	UNST
			WALTER K BUNT & DOROTHY L BUNT TRUST ETAL Total		8.00		
A029012	20543	13561	Wendy L Garrish	9/10/03	0.70	Mariposa	PINEY CREEK
			Wendy L Garrish Total		0.70		
A018244	11854	7131	YOSEMITE-MARIPOSA KOA	7/30/58	4.50	Mariposa	UNST
			YOSEMITE-MARIPOSA KOA Total		4.50		
			Grand Total		4,175,203.90		

No comments

- n/a -

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A015789	9819	5684	ALLISON S FAHEY	3/22/54	597	Stanislaus	DRY CREEK
			ALLISON S FAHEY Total		597		
A028622	20118	13057	ANITA SERRANO	11/19/85	200	Merced	DUTCHMAN CREEK
			ANITA SERRANO Total		200		
A017775	11410	7344	ANTHONY VALLELUNGA	8/16/57	44	Merced	DEADMAN CREEK
			ANTHONY VALLELUNGA Total		44		
A013018	7777	6132	ANTHONY J DUTRA	4/5/49	361.1	Stanislaus	STANISLAUS RIVER
			ANTHONY J DUTRA Total		361.1		
A028539	19943	13034	ARMELIM DE SOUSA	8/19/85	293	Stanislaus	UNST (AKA VIVIAN SLOUGH)
			ARMELIM DE SOUSA Total		293		
A013679	8224	4313	ARTHUR BRIGHT	4/7/50	1,592.80	Merced	DEADMAN CREEK
			ARTHUR BRIGHT Total		1,592.80		
A023257	16003	10359	AUGUST KNITTEL	4/10/69	4.00	Fresno	UNST
A023258	16002	10358	AUGUST KNITTEL	4/10/69	18.10	Fresno	UNST
A023313	16004	10360	AUGUST KNITTEL	7/15/69	1.70	Fresno	UNST
			AUGUST KNITTEL Total		23.80		
A024900	17060	13099	BASS LAKE SCHOOL DISTRICT	10/14/75	2.70	Madera	UNSP
			BASS LAKE SCHOOL DISTRICT Total		2.70		
A003736	1887	3927	BASS LAKE WATER COMPANY	5/20/54	217.20	Madera	North Fork Willow Creek
A011270	6514	3928	BASS LAKE WATER COMPANY	1/30/46	36.20	Madera	North Fork Willow Creek
A015566	11072	9993	BASS LAKE WATER COMPANY	10/5/53	355.00	Madera	North Fork Willow Creek
			BASS LAKE WATER COMPANY Total		608.40		
A020649	13814	8403	BIG CREEK COMMUNITY SERVICE DISTRICT	3/9/62	57.90	Fresno	BIG CREEK
			BIG CREEK COMMUNITY SERVICE DISTRICT Total		57.90		
A009573	5463	2847	BILL J LYONS JR	5/1/39	4,781.80	Stanislaus	TUOLUMNE RIVER
			BILL J LYONS JR Total		4,781.80		
A012634	8701	5875	BILLY D GRISSOM	8/6/48	1,467.80	Merced	DUCK SLOUGH
			BILLY D GRISSOM Total		1,467.80		
A001730	863	1661	BORBA FAMILY HOME & STEVINSON RANCH LP	3/22/20	955.1	Merced	MERCED RIVER
			BORBA FAMILY HOME & STEVINSON RANCH LP Total		955.1		
A015835	9925	7298	BRENDA KNUTSON	4/14/54	11.8	Stanislaus	DRY CREEK
			BRENDA KNUTSON Total		11.8		
A013697	8179	4470	BRICHETTO TRUST	4/19/50	1,463.80	Stanislaus	UNCR
			BRICHETTO TRUST Total		1,463.80		
A021823	14922	9360	BRIGHT'S NURSERY INCORPORATED	5/8/70	685	Merced	DEADMAN CREEK
			BRIGHT'S NURSERY INCORPORATED Total		685		
A006963	3885	5495	BROCCHINI FARMS INC	5/19/31	4,096.90	Stanislaus	STANISLAUS RIVER
			BROCCHINI FARMS INC Total		4,096.90		
A018526	14677	8400	BRUCE AVERY	2/10/59	333.8	San Joaquin	STANISLAUS RIVER
			BRUCE AVERY Total		333.8		
A011741	6924	4420	CALIF DEPARTMENT OF TRANSPORTATION	2/21/47	204.7	Stanislaus	STANISLAUS RIVER
			CALIF DEPARTMENT OF TRANSPORTATION Total		204.7		
A001935	848	349	Camp Sierra Improvement Association	3/31/24	29.40	Fresno	ALDER CREEK
			Camp Sierra Improvement Association Total		29.40		
A011047	7583	8706	CHOWCHILLA WATER DISTRICT	5/9/45	6,195.70	Madera	ASH CREEK, BERENDA SLOUGH
A013175	9136	8577	CHOWCHILLA WATER DISTRICT	6/27/49	77,312.80	Madera	CHOWCHILLA RIVER
			CHOWCHILLA WATER DISTRICT Total		83,508.50		
A018718	12939	8257	CHRISTOPHER H GALFO	11/30/67	47.00	Fresno	LITTLE SANDY CREEK
A019193	12940	7818	CHRISTOPHER H GALFO	1/26/60	28.00	Fresno	UNST
			CHRISTOPHER H GALFO Total		75.00		

No comments

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A004102	1816	2883	City of Modesto WQC Primary	10/22/47	1,219.90	Stanislaus	SAN JOAQUIN RIVER
			City of Modesto WQC Primary Total		1,219.90		
A013541	9076	4689	COSTA VIEW FARMS #2, A CA GEN PARTNERSHIP	9/20/57	21,689.60	Madera	FRESNO RIVER
A013541	9076	4689	COSTA VIEW FARMS #2, A CA GEN PARTNERSHIP	9/20/57	21,689.60	Madera	FRESNO RIVER
			COSTA VIEW FARMS #2, A CA GEN PARTNERSHIP Total		43,379.20		
A023231	16200	10592	COTTONWOOD CREEK VINEYARDS PARTNERSHIP	2/6/69	920	Madera	COTTONWOOD CREEK
			COTTONWOOD CREEK VINEYARDS PARTNERSHIP Total		920		
A012674	7675	7556	Couchman Brothers	9/2/48	1,622.70	Stanislaus	TUOLUMNE RIVER
			Couchman Brothers Total		1,622.70		
A024298	16638	11097	COUNTY OF MERCED	2/2/73	5	Merced	UNST
			COUNTY OF MERCED Total		5		
A027544	18910	12372	Cynthia A. Downing	9/30/82	0.30	Fresno	UNSP
			Cynthia A. Downing Total		0.30		
A028192	19732	12955	D & D LAND & WATER INC	7/16/84	907	Merced	SAN JOAQUIN RIVER
			D & D LAND & WATER INC Total		907		
A029966	20860		D.M. BRYANT FARMS INC	6/17/91	21.50	Madera	UNST
			D.M. BRYANT FARMS INC Total		21.50		
A023214	15869	10375	DAMAN PITTS	1/28/69	33.00	Fresno	UNST
			DAMAN PITTS Total		33.00		
A014104	8683	4081	DEER CREEK WATER ASSOCIATION	12/14/50	2.80	Fresno	DEER CREEK
			DEER CREEK WATER ASSOCIATION Total		2.80		
A026121	19395		DIRK J VLOT	10/22/79	2,534.00	Madera	EASTSIDE BYPASS
			DIRK J VLOT Total		2,534.00		
A027241	19140	12867	DM BRYANT FARMS INC	3/9/82	30.00	Madera	UNST
A027242	19141	12868	DM BRYANT FARMS INC	3/9/82	30.00	Madera	UNST
A027243	19142	12869	DM BRYANT FARMS INC	3/9/82	6.00	Madera	UNST
A027244	19143	12870	DM BRYANT FARMS INC	3/9/82	13.00	Madera	UNST
A027245	19144	12871	DM BRYANT FARMS INC	3/9/82	4.00	Madera	LITTLE FINE GOLD CREEK
			DM BRYANT FARMS INC Total		83.00		
A016465	10407	5578	DONALD HARCKSEN	7/14/55	19.6	Merced	MERCED RIVER
			DONALD HARCKSEN Total		19.6		
A014455	9568	4428	DONALD L SMITH	8/30/51	171.10	Madera	UNST
			DONALD L SMITH Total		171.10		
A013071	8703	4456	Donald L. Smith, Trustee	5/3/49	301.5	Merced	DUCK SLOUGH
			Donald L. Smith, Trustee Total		301.5		
A006467	3448	1295	DONALD M HEINY	10/26/29	190.2	Stanislaus	SAN JOAQUIN RIVER
			DONALD M HEINY Total		190.2		
A024520	19878	12836	DOROTHY R AYERS FAMILY TRUST	1/7/74	19.50	Madera	ARNOLD CREEK
			DOROTHY R AYERS FAMILY TRUST Total		19.50		
A025872	17656	11870	Double A Ranches	11/16/78	20	Stanislaus	UNST
			Double A Ranches Total		20		
A012396	7348	4949	EAST STANISLAUS RESOURCES CONSERVATION DISTRICT	3/11/48	487.9	Stanislaus	TUOLUMNE RIVER
			EAST STANISLAUS RESOURCES CONSERVATION DISTRICT Total		487.9		
A019738	12923	7494	EDWIN DANIELS	9/14/60	1.30	Madera	UNSP
			EDWIN DANIELS Total		1.30		
A017633	11484	6138	EL CAJON RETIREMENT RESIDENCE LP	5/31/57	77.4	Merced	UNST
A017812	11485	6139	EL CAJON RETIREMENT RESIDENCE LP	9/4/57	8.7	Merced	CANAL CREEK, UNST
A017813	11486	6140	EL CAJON RETIREMENT RESIDENCE LP	9/4/57	33.1	Merced	UNST

No comments

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A018329	11781	6141	EL CAJON RETIREMENT RESIDENCE LP	9/23/58	1.3	Merced	UNST
A018330	11782	6142	EL CAJON RETIREMENT RESIDENCE LP	9/23/58	2.2	Merced	UNST
A024071	16613	10681	EL CAJON RETIREMENT RESIDENCE LP	5/22/72	7	Merced	UNST
			EL CAJON RETIREMENT RESIDENCE LP Total		129.7		
A018993	12472	9790	ELSIE KING	9/18/59	590	Stanislaus	VIVIAN SLOUGH
			ELSIE KING Total		590		
A020244	13495	7998	EST OF D E JACKSON & DIXIE R JACKSON	6/2/61	4.50	Madera	UNSP
			EST OF D E JACKSON & DIXIE R JACKSON Total		4.50		
A016317	10209	7574	FORD RANCH INC	4/19/55	50.00	Fresno	UNST
A019577	12771	7631	FORD RANCH INC	7/26/60	26.00	Fresno	UNST
A019578	12772	7632	FORD RANCH INC	7/26/60	19.50	Fresno	UNST
A019581	12773	7635	FORD RANCH INC	7/26/60	13.10	Fresno	UNST
			FORD RANCH INC Total		108.60		
A011555	6742	3459	FRANK J GOMES DAIRY	9/17/46	941.2	Merced	MERCED RIVER
			FRANK J GOMES DAIRY Total		941.2		
A016329	11460	10393	GALLO CATTLE COMPANY, A PARTNERSHIP	4/21/55	9,020.00	Merced	LIVINGSTON DRAIN
A016604	11121	7220	GALLO CATTLE COMPANY, A PARTNERSHIP	9/15/55	7,239.80	Merced	UNSL
			GALLO CATTLE COMPANY, A PARTNERSHIP Total		16,259.80		
A012715	8354	4948	GALLO VINEYARDS, INC. (LIVINGSTON RANCH)	9/27/48	493.7	Merced	MERCED RIVER
			GALLO VINEYARDS, INC. (LIVINGSTON RANCH) Total		493.7		
A012987	7734	10045	GARY M BARTON	3/18/49	1,506.00	San Joaquin	STANISLAUS RIVER, UNSL
A013099	7768	9123	GARY M BARTON	5/17/49	83	San Joaquin, Stanislaus	STANISLAUS RIVER
A013100	7769	6130	GARY M BARTON	5/17/49	170.6	Stanislaus	STANISLAUS RIVER
A018715	12116	9960	GARY M BARTON	5/18/59	66	Stanislaus	STANISLAUS RIVER
			GARY M BARTON Total		1825.6		
A010255	5965	6445	GEORGE C JONES III	8/21/41	1,423.40	Merced	DRY CREEK
			GEORGE C JONES III Total		1,423.40		
A015680	9749	5653	GERTRUDE PELUCCA	1/11/54	273.7	Stanislaus	STANISLAUS RIVER
			GERTRUDE PELUCCA Total		273.7		
A020975	14129	9545	GIN FLATS LLC	10/9/62	2.20	Fresno	UNSP
			GIN FLATS LLC Total		2.20		
A010466	6064	3429	GIRARDI FARMS	5/25/42	1,279.40	San Joaquin	STANISLAUS RIVER
A014716	9011	4539	GIRARDI FARMS	3/17/52	474.5	San Joaquin	STANISLAUS RIVER
			GIRARDI FARMS Total		1753.9		
A023031	16060		GRAVELLY FORD WATER DISTRICT	4/18/68	5,000.00	Madera	COTTONWOOD CREEK
			GRAVELLY FORD WATER DISTRICT Total		5,000.00		
A003664	2360	1307	GRAVELSTONE RANCH LP	10/5/23	365	Merced	MERCED RIVER
A006603	3581	2429	GRAVELSTONE RANCH LP	3/17/30	660.6	Merced	MERCED RIVER
			GRAVELSTONE RANCH LP Total		1025.6		
A012262	7309	6985	Gregory B. Reed	1/26/48	2,171.90	Stanislaus	TUOLUMNE RIVER
			Gregory B. Reed Total		2,171.90		
A017208	12313	10673	HARRY H BAKER JR	8/3/56	580	Madera	FRESNO RIVER
			HARRY H BAKER JR Total		580		
A016662	10345	9816	HARRY H BAKER JR TRUST	10/10/55	230	Stanislaus	SAN JOAQUIN RIVER
			HARRY H BAKER JR TRUST Total		230		
A005702	3001	1880	HOOGENDAM FAMILY LIMITED PARTNERSHIP	9/29/27	426.5	Merced	NORTH SLOUGH MARIPOSA CREEK

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A005703	3002	1881	HOOGENDAM FAMILY LIMITED PARTNERSHIP	9/29/27	1,279.40	Merced	NORTH SLOUGH MARIPOSA CREEK
			HOOGENDAM FAMILY LIMITED PARTNERSHIP Total		1,705.90		
A016934	10634	5993	JACK J GARDELLA JR	3/13/56	15	Tuolumne	UNST
A019042	12593	6945	JACK J GARDELLA JR	10/21/59	55	Tuolumne	UNST
A020976	14123	8248	JACK J GARDELLA JR	10/9/62	19	Tuolumne	UNST
			JACK J GARDELLA JR Total		89		
A020271	13380	8124	JAMES CURTONI	6/20/61	9	Stanislaus	UNST
			JAMES CURTONI Total		9		
A020364B	13428	008351B	JAMES R CHANCE	3/18/88	8	Merced	UNST
A022977B	15637	009776A	JAMES R CHANCE	3/18/88	50.5	Merced	UNST
			JAMES R CHANCE Total		58.5		
A009301	5192	4576	JAMES R DEMARTINI	5/20/38	1,066.10	Stanislaus	TUOLUMNE RIVER
			JAMES R DEMARTINI Total		1,066.10		
A001195	588	4934	JAMES S CODDINGTON	2/26/19	15,897.80	Stanislaus	SAN JOAQUIN RIVER
			JAMES S CODDINGTON Total		15,897.80		
A027546	19615		JEFF A LION	8/5/96	15,700.00	Madera	EASTSIDE BYPASS (AKA CHOWCHILLA CANAL)
			JEFF A LION Total		15,700.00		
A026829	18359	12028	Jerry Hollingshead	5/21/81	0.20	Fresno	UNSP
			Jerry Hollingshead Total		0.20		
A028679	20259	13270	JIMMY W LIPE	12/23/85	2.40	Fresno	UNST
A028908	20258	13271	JIMMY W LIPE	9/25/86	3.60	Fresno	UNST
			JIMMY W LIPE Total		6.00		
A020364C	13428	008351C	JOHN SMALLEY	3/18/88	1	Merced	UNST
A022977C	15637	009776A	JOHN SMALLEY	3/18/88	11.3	Merced	UNST
			JOHN SMALLEY Total		12.3		
A006748	3880	2549	JOHN VANDERSCHAAF JR	7/24/30	729.9	San Joaquin	LONE TREE CREEK
			JOHN VANDERSCHAAF JR Total		729.9		
A011003A	007582A	9073	JOHN HANCOCK LIFE INS. CO.	3/9/45	5,727.40	Madera	FRESNO RIVER
			JOHN HANCOCK LIFE INS. CO. Total		5,727.40		
A001442F	940	000388F	JOHN J SHAW	9/10/19	40.6	Merced	MERCED RIVER
			JOHN J SHAW Total		40.6		
A025373	17078	11286	JOHN M LASGOITY	5/31/77	24	Madera	UNST
			JOHN M LASGOITY Total		24		
A006539	3403	2044	JOSE DA SILVA	1/20/30	27.1	San Joaquin	UNDR
			JOSE DA SILVA Total		27.1		
A001322	890	311	JOSEPH E GALLO	6/11/19	182.5	Merced	MERCED RIVER
			JOSEPH E GALLO Total		182.5		
A016895	10696	6421	JOSEPH J CARDOZA	2/15/56	45.8	Merced	MERCED RIVER
			JOSEPH J CARDOZA Total		45.8		
A013414	7929	5274	Karlene H Bert	10/24/49	799.3	Stanislaus	STANISLAUS RIVER
			Karlene H Bert Total		799.3		
A011814	7943	3955	Kelsey Ranch LP	4/4/47	1,002.80	Mariposa, Merced	SOUTH FORK DRY CREEK, UNST
A018344	11787	6738	Kelsey Ranch LP	9/29/58	8.8	Merced	UNCR
A018345	11788	6480	Kelsey Ranch LP	9/29/58	5.6	Merced	UNCR
A018346	11789	6481	Kelsey Ranch LP	9/29/58	4.2	Merced	UNCR
A018347	11790	6482	Kelsey Ranch LP	9/29/58	8.1	Merced	UNCR
A018348	11791	6739	Kelsey Ranch LP	9/29/58	9	Merced	UNCR
			Kelsey Ranch LP Total		1038.5		
A022294	15550	10429	L EUGENE MONDO	9/24/65	26	Stanislaus	STANISLAUS RIVER

No comments

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No comments

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			L EUGENE MONDO Total		26		
A026088	18077	12047	LEWIS MATHIS	9/13/79	188	Merced	UNST
			LEWIS MATHIS Total		188		
A027759	19031	12557	LINDA OUIMETTE	5/26/83	0.10	Madera	UNSP
			LINDA OUIMETTE Total		0.10		
A019746	12982	8031	LIVE OAK TRUST	9/20/60	17.00	Fresno	UNST
			LIVE OAK TRUST Total		17.00		
A018540	12215	8522	LURINE S TOPHAM	2/19/59	37.50	Fresno	UNST
A019005	12999	8523	LURINE S TOPHAM	9/28/59	45.00	Fresno	UNST
A020869	13897	8524	LURINE S TOPHAM	7/25/62	20.00	Fresno	UNST
A021951	15093	8525	LURINE S TOPHAM	11/4/64	10.00	Fresno	UNST
A022269	15094	9153	LURINE S TOPHAM	8/20/65	20.00	Fresno	UNST
A027159	19743	13028	LURINE S TOPHAM	12/23/81	3.10	Fresno	UNST
A027160	19744	13029	LURINE S TOPHAM	12/23/81	3.20	Fresno	UNST
			LURINE S TOPHAM Total		138.80		
A010710	6241	5077	M & R ZOLEZZI A PARTNERSHIP	9/11/43	273.7	San Joaquin	STANISLAUS RIVER
			M & R ZOLEZZI A PARTNERSHIP Total		273.7		
A017311	11172	9229	MADERA IRRIGATION DISTRICT	10/4/56	4,700.00	Madera	FRESNO RIVER
			MADERA IRRIGATION DISTRICT Total		4,700.00		
A013344	8355	6418	MAGNESON REVOCABLE TRUST	9/8/49	1,122.30	Merced	MERCED RIVER
			MAGNESON REVOCABLE TRUST Total		1,122.30		
A005316	2937	4912	MCMULLIN RECL DISTRICT #2075	12/24/26	35,293.90	San Joaquin	STANISLAUS RIVER
A017966	14674	10403	MCMULLIN RECL DISTRICT #2075	1/29/58	490	San Joaquin	STANISLAUS RIVER
			MCMULLIN RECL DISTRICT #2075 Total		35783.9		
A016136	10115	7561	MENEFEE RIVER RANCH COMPANY	11/15/54	856.9	Merced	FRESNO RIVER
A026875	19669	13106	MENEFEE RIVER RANCH COMPANY	6/16/81	4,470.00	Merced	SAN JOAQUIN RIVER
			MENEFEE RIVER RANCH COMPANY Total		5,326.90		
A028626	20066	13378	MERCED COUNTY FIRE DEPARTMENT	11/25/85	0.4	Merced	MERCED RIVER
			MERCED COUNTY FIRE DEPARTMENT Total		0.4		
A001224	914	2685	MERCED IRRIGATION DISTRICT	6/20/03	345,440.00	Mariposa, Merced	MERCED RIVER
A006807	5732	5227	MERCED IRRIGATION DISTRICT	9/27/30	1,251.20	Merced	DEADMAN CREEK
A008238	4893	6032	MERCED IRRIGATION DISTRICT	2/11/35	5,066.00	Merced	DUCK SLOUGH
A010572	6808	6047	MERCED IRRIGATION DISTRICT	6/20/03	63,719.90	Merced	MERCED RIVER
A018774	13088	9429	MERCED IRRIGATION DISTRICT	6/8/59	5,000.00	Merced	DUCK SLOUGH
			MERCED IRRIGATION DISTRICT Total		420,477.10		
A005269	2727	1173	MICHAEL PASSALAQUA	11/15/26	635.4	Stanislaus	TUOLUMNE RIVER
			MICHAEL PASSALAQUA Total		635.4		
A004233	2261	1616	MICHAEL J KNAPP	2/28/36	255.5	Madera	CHOWCHILLA RIVER
A004233	2261	1616	MICHAEL J KNAPP	2/28/36	255.5		
			MICHAEL J KNAPP Total		511		
A025113	17303	11417	MICHELLE MIDBOE	7/27/76	0.30	Fresno	UNSP
			MICHELLE MIDBOE Total		0.30		
A006393	3386	3044	MOONSHINE DAIRY	8/3/29	868.8	Stanislaus	SAN JOAQUIN RIVER
			MOONSHINE DAIRY Total		868.8		
A017729	11214	6782	MUIR TRAIL RANCH, INC	7/19/57	271.70	Fresno	SENGER CREEK
			MUIR TRAIL RANCH, INC Total		271.70		
A013218	8130	5170	Myers Ranch, LLC	7/8/49	1,630.40	Merced	SNAKE SLOUGH
			Myers Ranch, LLC Total		1,630.40		
A011048	7584	5753	N & W Land Co. LLC	6/30/59	3,979.70	Madera	FRESNO RIVER
			N & W Land Co. LLC Total		3,979.70		

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A020148	13372	7960	NANCY GASSETT	5/25/61	5.90	Fresno	UNST
			NANCY GASSETT Total		5.90		
A010957	6373	3036	NORTH FORK COMMUNITY DEVELOPMENT COUNCIL	1/15/45	44.20	Madera	SOUTH FORK WILLOW CREEK
			NORTH FORK COMMUNITY DEVELOPMENT COUNCIL Total		44.20		
A008892	4924	2634	OAKDALE IRRIGATION DISTRICT	2/3/37	1,665.90	Stanislaus	STANISLAUS RIVER
A009666	5421	2706	OAKDALE IRRIGATION DISTRICT	7/17/39	616.5	Stanislaus	STANISLAUS RIVER
			OAKDALE IRRIGATION DISTRICT Total		2282.4		
A025688	17834	11824	PATRICIA J MANNING	3/3/78	1,471.00	Madera	SAN JOAQUIN RIVER
			PATRICIA J MANNING Total		1,471.00		
A011324	6615	3051	PATRICK DAVID MARTIN	3/25/46	4.50	Fresno	UNSP
			PATRICK DAVID MARTIN Total		4.50		
A027777	19139		PHIL MUELLER	6/23/83	85	Merced	DUTCHMAN CREEK
A027880	19591		PHIL MUELLER	9/16/83	85	Merced	DUTCHMAN CREEK
			PHIL MUELLER Total		170		
A001633	784	2072	PHILIP DICKERSON	1/20/20	1,518.30	Stanislaus	TUOLUMNE RIVER
A004607	2357	2071	PHILIP DICKERSON	5/26/25	356.6	Stanislaus	TUOLUMNE RIVER
			PHILIP DICKERSON Total		1874.9		
A023561	16184	10646	PREMIERE AGRICULTURAL PROPERTIES LLC	7/20/70	720	Madera	COTTONWOOD CREEK
			PREMIERE AGRICULTURAL PROPERTIES LLC Total		720		
A014484	9229	5249	RANCHERIA WATER & IMPROVEMENT ASSN	9/14/51	3.90	Fresno	POTTER CREEK
			RANCHERIA WATER & IMPROVEMENT ASSN Total		3.90		
A015919	10316	8498	RAY GENE VELDHUIS	6/18/54	815.2	Merced	JONES DRAIN
			RAY GENE VELDHUIS Total		815.2		
A004945	2593	1336	RECLAMATION DISTRICT #2039	3/5/26	56,904.60	San Joaquin	MIDDLE RIVER, TRAPPER SLOUGH
			RECLAMATION DISTRICT #2039 Total		56,904.60		
A010365	5942	3035	REDEVELOPMENT AGENCY OF THE COUNTY OF MADERA	1/19/42	36.20	Fresno	SOUTH FORK WILLOW CREEK
			REDEVELOPMENT AGENCY OF THE COUNTY OF MADERA Total		36.20		
A001442C	940	000388C	RICCI THORESON	9/10/19	123.7	Merced	MERCED RIVER
			RICCI THORESON Total		123.7		
A026674	18416	12251	RICHARD LIAL	12/23/80	10.3	Stanislaus	UNST
A029133	20326	13324	RICHARD LIAL	11/9/87	6	Stanislaus	UNST
			RICHARD LIAL Total		16.3		
A011390	6631	7451	RICHARD MARCHY	5/4/46	818.2	Stanislaus	TUOLUMNE RIVER
			RICHARD MARCHY Total		818.2		
A004460	2277	8697	RIVER JUNCTION RECL DIST NO 2064	2/14/25	30,828.30	San Joaquin	SAN JOAQUIN RIVER, STANISLAUS RIVER
			RIVER JUNCTION RECL DIST NO 2064 Total		30,828.30		
A009834	5533	2827	Robert Albert Brocchini Trust	2/21/40	2,129.60	San Joaquin	STANISLAUS RIVER
A013628	8140	4918	Robert Albert Brocchini Trust	3/10/50	366	Stanislaus	STANISLAUS RIVER
			Robert Albert Brocchini Trust Total		2495.6		
A025168	17424	11416	ROBERT B FITZGERALD	10/5/76	0.40	Fresno	UNSP
			ROBERT B FITZGERALD Total		0.40		
A020364A	13428	008351A	ROBINSON CATTLE COMPANY	3/18/88	16	Merced	UNST
A022976	15636	9777	ROBINSON CATTLE COMPANY	1/31/68	37	Merced	UNST
A022977A	15637	009776A	ROBINSON CATTLE COMPANY	3/18/88	1.9	Merced	UNST
			ROBINSON CATTLE COMPANY Total		54.9		
A001628	692	289	Roger K Beeman	1/15/20	251.8	Stanislaus	STANISLAUS RIVER
A003516	1620	2009	Roger K Beeman	4/1/40	901.5	Stanislaus	STANISLAUS RIVER
			Roger K Beeman Total		1153.3		
A020135	13652	8479	ROY H RICHARDS	5/17/61	48.9	Merced	UNST

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
			ROY H RICHARDS Total		48.9		
A017362	10979	6834	ROY N TALLMAN	11/19/56	10.00	Fresno	UNXX
A017363	10980	6835	ROY N TALLMAN	11/19/56	48.00	Fresno	UNXX
A017364	10981	6836	ROY N TALLMAN	11/19/56	8.00	Fresno	UNXX
			ROY N TALLMAN Total		66.00		
A004061	1901	937	Sharon D. Naraghi	3/9/42	182	Stanislaus	DRY CREEK
A009225	5127	2374	Sharon D. Naraghi	1/12/38	477.6	Stanislaus	DRY CREEK
			Sharon D. Naraghi Total		659.6		
A004709	2381	2131	SHEILA KLIEWER	7/21/25	0.70	Madera	UNSP
			SHEILA KLIEWER Total		0.70		
A015924	10002	5636	SHIRLEY M WELDON	6/21/54	48.00	Fresno	LITTLE DRY CREEK, UNST
A015925	10003	5637	SHIRLEY M WELDON	6/21/54	48.00	Fresno	LITTLE DRY CREEK, UNST
			SHIRLEY M WELDON Total		96.00		
A020138	13359	9235	SIERRA LINDA MUTUAL WATER COMPANY INC	5/19/61	16.80	Madera	UNSP
			SIERRA LINDA MUTUAL WATER COMPANY INC Total		16.80		
A005271	2761	741	SIERRA PINES YOUTH CAMP, INC	11/16/26	14.50	Madera	UNSP (2)
			SIERRA PINES YOUTH CAMP, INC Total		14.50		
A017751	11504	6280	SPRING CREEK IMPROVEMENT ASSN	8/1/57	2.80	Fresno	SPRING CREEK
			SPRING CREEK IMPROVEMENT ASSN Total		2.80		
A018950			STATE WATER RESOURCES CONTROL BOARD	8/28/59	0	Madera	FRESNO RIVER
			STATE WATER RESOURCES CONTROL BOARD Total		0		
A028166	19456	12734	STEVE FIELDS	6/21/84	10	Stanislaus	UNST
			STEVE FIELDS Total		10		
A001885	893	5397	STEVINSON WATER DISTRICT	1/14/59	16,716.90	Merced	MERCED RIVER
A005724	5726	5940	STEVINSON WATER DISTRICT	10/17/27	79,534.40	Merced	BEAR CREEK, OWENS CREEK
A006111	5729	5941	STEVINSON WATER DISTRICT	11/5/28	58,552.90	Merced	ARENA SPILLWAY, BEAR CREEK, MCCOY SPILLWAY, OWENS CREEK
A007012	5733	6222	STEVINSON WATER DISTRICT	7/20/31	35,619.70	Merced	ARENA SPILLWAY, BEAR CREEK
			STEVINSON WATER DISTRICT Total		190,423.90		
A027326B		12759	SUSIE MOODY	4/26/91	0.70	Fresno	UNST
A027469	19303	12763	SUSIE MOODY	8/10/82	29.00	Fresno	UNST
			SUSIE MOODY Total		29.70		
A020049	13203	8939	TAMAR V ARMSTRONG	3/24/61	10.60	Madera	UNSP
			TAMAR V ARMSTRONG Total		10.60		
A001925	838	366	The Irrevocable Flying M Ranch Trust	7/15/24	424.5	Merced	BURNS CREEK
			The Irrevocable Flying M Ranch Trust Total		424.5		
A029279	20627		THE PROTESTANT EPISCOPAL BISHOP OF S J	6/24/88	11	Madera	LEWIS FORK FRESNO RIVER, UNST
			THE PROTESTANT EPISCOPAL BISHOP OF S J Total		11		
A010797	6505	5402	THE VANDER WOUDE FAMILY REVOCABLE TRUST OF NOV 25 2003	4/11/44	223.1	Merced	NORTH SLOUGH MARIPOSA CREEK
A024973	17419	11605	THE VANDER WOUDE FAMILY REVOCABLE TRUST OF NOV 25 2003	1/13/76	394	Merced	NORTH SLOUGH MARIPOSA CREEK
			THE VANDER WOUDE FAMILY REVOCABLE TRUST OF NOV 25 2003 Total		617.1		
A015628	11092	12268	U S FISH & WILDLIFE SERVICE	12/2/53	6,868.00	Merced	BRAVEL SLOUGH, DEEP SLOUGH
A020246	14323	10139	U S FISH & WILDLIFE SERVICE	8/5/61	360	Merced	DUCK SLOUGH
A027586	19473		U S FISH & WILDLIFE SERVICE	11/17/82	3,000.00	Merced	DEADMAN CREEK
			U S FISH & WILDLIFE SERVICE Total		10,228.00		
A012416	7363	5342	U S SIERRA NATL FOREST	3/18/48	2.40	Fresno	BEAR CREEK, MONO CREEK
A013904	8656	4608	U S SIERRA NATL FOREST	8/18/50	96.00	Madera	MCCLURE LAKE CREEK
A013907	8659	4609	U S SIERRA NATL FOREST	8/18/50	155.00	Madera	LILLIAN LAKE CREEK
A014150	8681	4064	U S SIERRA NATL FOREST	2/6/51	0.30	Fresno	RANCHERIA CREEK

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A016424	10496	8203	U S SIERRA NATL FOREST	6/20/55	9.20	Madera	UNSP
A016426	10270	6263	U S SIERRA NATL FOREST	6/20/55	5.20	Fresno	COON CREEK
A017209	10992	6266	U S SIERRA NATL FOREST	8/3/56	100.00	Madera	RUTHERFORD LAKE CREEK
A017439	11009	7270	U S SIERRA NATL FOREST	1/28/57	29.00	Madera	UNST
A017594	11166	7587	U S SIERRA NATL FOREST	5/10/57	0.50	Madera	UNSP
A017595	11167	7588	U S SIERRA NATL FOREST	5/10/57	0.20	Madera	UNSP
A018245	12266	7274	U S SIERRA NATL FOREST	7/30/58	8.00	Fresno	BEAR CREEK
A018318	12267	8388	U S SIERRA NATL FOREST	9/15/58	16.10	Fresno	BIG CREEK
A019420	12420	7325	U S SIERRA NATL FOREST	5/6/60	103.00	Madera	MCCLURE LAKE
A019634	12729	7589	U S SIERRA NATL FOREST	8/1/60	0.10	Fresno	UNSP
A019635	12730	7590	U S SIERRA NATL FOREST	8/1/60	0.10	Fresno	UNSP
A019636	12731	6696	U S SIERRA NATL FOREST	8/1/60	0.40	Fresno	UNSP
A019637	12732	6697	U S SIERRA NATL FOREST	8/1/60	0.40	Fresno	UNSP
A019638	12733	6698	U S SIERRA NATL FOREST	8/1/60	0.10	Fresno	UNSP
A019639	12734	6699	U S SIERRA NATL FOREST	8/1/60	0.10	Fresno	UNSP
A019640	12735	6700	U S SIERRA NATL FOREST	8/1/60	0.40	Fresno	UNSP
A019641	12736	6914	U S SIERRA NATL FOREST	8/1/60	0.10	Fresno	UNSP
A019676	12738	7781	U S SIERRA NATL FOREST	8/18/60	0.40	Madera	UNSP
A019839	13175	8145	U S SIERRA NATL FOREST	11/3/60	8.80	Fresno	LINE CREEK
A019930	13146	9121	U S SIERRA NATL FOREST	1/24/61	11.20	Madera	UNSP
A021107	14247	9089	U S SIERRA NATL FOREST	1/2/63	0.70	Madera	MOUSE TRAP SPRING
A023979	16611	10878	U S SIERRA NATL FOREST	2/10/72	0.20	Fresno	UNSP
A027719	19882	13043	U S SIERRA NATL FOREST	4/12/83	0.20	Fresno	UNST
			U S SIERRA NATL FOREST Total		548.10		
A000023	273	1986	U.S. BUREAU OF RECLAMATION	3/27/15	44,340.00	Madera	SAN JOAQUIN RIVER
A000234	11885		U.S. BUREAU OF RECLAMATION	6/29/59	2,124,486.50	Madera	SAN JOAQUIN RIVER
A001465	11886		U.S. BUREAU OF RECLAMATION	6/29/59	2,124,486.50	Madera	SAN JOAQUIN RIVER
A005638	11887		U.S. BUREAU OF RECLAMATION	6/29/59	3,917,477.50	Madera	SAN JOAQUIN RIVER
A014858B	20245		U.S. BUREAU OF RECLAMATION	7/18/88	1,000,000.00	Calaveras, San Joaquin	STANISLAUS RIVER
A018714	16301		U.S. BUREAU OF RECLAMATION	5/15/59	143,000.00	Madera	CHOWCHILLA RIVER
A018733	16584	13836	U.S. BUREAU OF RECLAMATION	8/25/11	71,600.00	Madera	FRESNO RIVER
			U.S. BUREAU OF RECLAMATION Total		9,425,390.50		
A013345	8356	6419	UMRHAMMER PROPERTIES	9/8/49	405	Merced	MERCED RIVER
			UMRHAMMER PROPERTIES Total		405		
A011438	6672	3314	V A RODDEN INC	6/17/46	1,273.40	Stanislaus	UNION SLOUGH
A030613	21156		V A RODDEN INC	7/10/03	3,769.50	Stanislaus	UNION SLOUGH
			V A RODDEN INC Total		5,042.90		
A006160	5731	4638	VANDER WOUDE FARMS	1/14/29	138.7	Merced	NORTH SLOUGH MARIPOSA CREEK
			VANDER WOUDE FARMS Total		138.7		
A005386	2847	1518	VANDER-WOUDE DAIRY	3/21/27	14,479.60	Merced	DUCK SLOUGH
			VANDER-WOUDE DAIRY Total		14,479.60		
A013496	8037	4747	VERNA M MURRAY	12/2/49	83.9	Stanislaus	TUOLUMNE RIVER
			VERNA M MURRAY Total		83.9		
A006479	3582	1443	VISTA LIVESTOCK COMPANY	11/6/29	36.6	Merced	DRY CREEK
			VISTA LIVESTOCK COMPANY Total		36.6		
A006114	5730	2911	W P RODUNER CATTLE & FARMING COMPANY	11/9/28	2,945.50	Merced	DUCK CREEK
A011653	7585	4910	W P RODUNER CATTLE & FARMING COMPANY	12/10/46	14,519.20	Madera	ASH CREEK
A012635	8702	4909	W P RODUNER CATTLE & FARMING COMPANY	8/6/48	12,810.20	Merced	OWENS CREEK
			W P RODUNER CATTLE & FARMING COMPANY Total		30,274.90		

No comments

- n/a -

Application ID	Permit ID	License ID	Holder Name	Date	Face Amt	County	Source
A020268	13377	7963	WALTER D HARRIS TRUSTEE OF THE WALTER D HARRIS TRUST DATED SEPTEMBER 29 2005	6/20/61	23.80	Fresno	UNST
A020269	13378	7964	WALTER D HARRIS TRUSTEE OF THE WALTER D HARRIS TRUST DATED SEPTEMBER 29 2005	6/20/61	28.00	Fresno	UNST
A020270	13379	7965	WALTER D HARRIS TRUSTEE OF THE WALTER D HARRIS TRUST DATED SEPTEMBER 29 2005	6/20/61	45.00	Fresno	UNST
			WALTER D HARRIS TRUSTEE OF THE WALTER D HARRIS TRUST DATED SEPTEMBER 29 2005 Total		96.80		
A016936	10636	5995	WILLIAM J FOGARTY	3/13/56	22.7	Stanislaus	UNST
A019044	12595	6947	WILLIAM J FOGARTY	10/21/59	30	Stanislaus	UNST
A020928	14122	8247	WILLIAM J FOGARTY	9/5/62	20	Stanislaus	UNST
			WILLIAM J FOGARTY Total		72.7		
A015371	9578	5478	WILLIAM J HALL	6/8/53	91.2	Stanislaus	TUOLUMNE RIVER
			WILLIAM J HALL Total		91.2		
A023861	16610	10928	WILLIAM J JAWIEN	9/3/71	0.70	Fresno	UNSP
			WILLIAM J JAWIEN Total		0.70		
A019227	12707	7805	William O Jamison	2/9/60	61.50	Madera	UNST
A022724	15563	9796	William O Jamison	5/26/71	20.3	Madera	UNST
A022727	15566	9848	William O Jamison	3/13/67	11.60	Madera	UNST
			William O Jamison Total		93.40		
A001442B	940	000388B	WILMA R THOMPSON	9/10/19	119.1	Merced	MERCED RIVER
			WILMA R THOMPSON Total		119.1		
A026152	18151	12012	WILSHIRE ALEC	12/26/79	0.40	Fresno	UNSP
			WILSHIRE ALEC Total		0.40		
			Grand Total		10,484,617.10		

No comments

- n/a -

No comments

- n/a -

Appendix D

Section D.7
Priority Rankings for Sacramento River Water Rights Claimants

Sacramento + Trinity + East and West Creeks Above Feather River Confluence by Priority - Post-1914 Appropriative Water Rights

Post-1914 Water Right Holder Name	Priority Date	Face Amount
Reclamation District 1004	4/2/1915	56.0
Reclamation District 108	1/25/1917	97.5
River Garden Farms Company	1/25/1917	29.3
Sutter Mutual Water Company	2/1/1917	21.9
Tisdale Irrigation & Drainage Co	7/26/1917	12.5
Reclamation District 108	8/27/1917	270.7
Oji Brothers	1/3/1918	1.9
Sutter Mutual Water Company	1/3/1918	265.7
Provident Irrigation District	1/18/1918	40.1
Stanford Vina Ranch Irrigation Co	8/5/1918	4.6
Natomas Central Mutual Water Co	8/22/1918	16.2
Lomo Cold Storage	9/10/1918	2.0
Meridian Farms Water Company	9/10/1918	67.3
Sutter Mutual Water Company	1/24/1919	19.7
Conaway Preservation Group LLC	3/1/1919	43.6
Natomas Central Mutual Water Co	3/5/1919	58.4
Natomas Central Mutual Water Co	8/27/1919	36.7
Provident Irrigation District	9/2/1919	3.4
Glenn-Colusa Irrigation District	12/3/1919	28.1
Glenn-Colusa Irrigation District	1/14/1920	10.8
Rancho Esquon, Inc	2/5/1920	3.7
Sycamore Mutual Water Company	2/9/1920	42.5
Reclamation District 999	2/11/1920	58.4
Sutter Mutual Water Company	4/9/1920	1.5
US Bureau of Reclamation	2/17/1921	50.2
Butte Valley Irrigation District	2/28/1921	17.2
Rancho Esquon, Inc	10/9/1921	1.8
Rancho Esquon, Inc	3/4/1922	3.8
Gorrill Land Company	3/6/1922	4.6
Rancho Esquon, Inc	6/27/1922	3.0
Hot Springs Valley Irrigation District	4/12/1923	48.4
Sacramento River Ranch II	5/17/1923	2.6
Reclamation District 999	7/18/1924	3.9
Gorrill Land Company	6/30/1925	4.5
Rancho Esquon, Inc	6/30/1925	4.6
Sutter Mutual Water Company	6/22/1926	3.3
M & T Incorporated	7/17/1926	5.1
Parrott Investment Company	7/17/1926	5.1
Sacramento River Ranch II	2/17/1927	1.8
Subtotal Before Initial State Filings in 1927		**1,352.4**
US Bureau of Reclamation	7/30/1927	11,153.8
US Bureau of Reclamation	7/30/1927	3,349.9
Sutter Mutual Water Company	1/31/1928	0.1
Lomo Cold Storage	11/14/1929	20.3
Conaway Preservation Group LLC	4/18/1930	5.4
Natomas Central Mutual Water Co	5/28/1931	15.4
County of Sacramento	6/6/1931	2.7
Lomo Cold Storage	3/21/1932	0.7
South Fork Irrigation District	3/5/1934	17.0
Reclamation District 883	5/1/1934	2.2
M & T Incorporated	12/1/1934	5.1
Parrott Investment Company	12/1/1934	5.1
M & T Incorporated	2/27/1936	3.1
Parrott Investment Company	2/27/1936	3.1
Maxwell Irrigation District	4/8/1936	29.0
Glenn-Colusa Irrigation District	5/28/1936	0.7
Subtotal Before Second State Filings in 1938		**14,613.5**
US Bureau of Reclamation	8/2/1938	7,818.8

No comments

- n/a -

Post-1914 Water Right Holder Name	Priority Date	Face Amount
Calif Dept of Fish & Game	6/19/1939	5.5
M & T Incorporated	9/22/1939	13.6
Parrott Investment Company	9/22/1939	13.6
Sutter Mutual Water Company	11/3/1939	0.6
Gorrill Land Company	3/13/1942	3.9
Sutter Mutual Water Company	6/16/1943	3.7
Oji Brothers	1/11/1945	2.9
Oji Brothers	3/6/1946	0.6
Reclamation District 108	5/26/1947	27.4
River Garden Farms Company	5/29/1947	6.3
Sutter Mutual Water Company	6/23/1947	2.7
Conaway Preservation Group LLC	9/8/1947	70.1
Glenn-Colusa Irrigation District	10/8/1947	3.4
Sycamore Mutual Water Company	3/17/1948	2.2
Pelger Mutual Water Company	4/13/1948	22.8
Sutter Mutual Water Company	4/13/1948	15.3
Sycamore Mutual Water Company	3/25/1949	2.3
US Fish & Wildlife Service	1/12/1950	44.2
Oji Brothers	2/20/1950	1.0
Reclamation District 108	2/24/1950	78.0
Maxwell Irrigation District	8/25/1950	4.9
Maxwell Irrigation District	6/28/1951	1.6
Subtotal Before Feather River Project Rights Filed in 1951		**8,145.4**
CA DWR	8/25/1951	1,575.2
Natomas Central Mutual Water Co	10/8/1953	11.8
M & T Incorporated	5/10/1954	0.5
Parrott Investment Company	5/10/1954	0.5
Lomo Cold Storage	11/28/1955	0.2
Tisdale Irrigation & Drainage Co	4/3/1956	1.4
Princeton-Codora-Glenn Irrig Dist	5/2/1956	15.1
US Bureau of Reclamation	11/28/1956	1,335.4
US Bureau of Reclamation	11/28/1956	1,230.8
CA DWR	3/15/1957	1,100.0
Maxwell Irrigation District	6/24/1957	34.6
Calif Dept of Fish & Game	10/24/1957	5.3
US Fish & Wildlife Service	10/25/1957	8.0
US Bureau of Reclamation	4/30/1958	160.0
US Bureau of Reclamation	9/16/1959	3,030.8
South Fork Irrigation District	3/14/1960	2.2
US Bureau of Reclamation	7/28/1960	1,335.4
US Bureau of Reclamation	4/12/1961	9,032.0
US Fish & Wildlife Service	7/3/1961	21.7
Subtotal of Most Feather River and CVP Filings 1951-1961		**18,901.0**
Rancho Esquon, Inc	2/5/1965	5.5
US Fish & Wildlife Service	7/19/1965	14.5
Gorrill Land Company	10/25/1965	2.5
Hot Springs Valley Irrigation District	3/17/1966	20.0
Reclamation District 999	4/1/1966	35.6
Sutter Mutual Water Company	9/7/1967	2.0
Butte Valley Irrigation District	4/10/1968	10.0
Calif Dept of Fish & Game	7/24/1968	5.2
Reclamation District 1004	12/26/1968	21.0
Pelger Mutual Water Company	3/13/1972	1.7
Calif Dept of Fish & Game	12/21/1972	5.5
Sycamore Mutual Water Company	12/22/1972	1.0
Sacramento River Ranch II	3/1/1973	12.7
Calif Dept of Fish & Game	4/10/1974	7.4
Gorrill Land Company	4/12/1978	4.4

No comments

- n/a -

Sacramento + Trinity + East and West Creeks Above Feather River Confluence by Priority - Post-1914 Appropriative Water Rights

Post-1914 Water Right Holder Name	Priority Date	Face Amount
Reclamation District 1004	12/1/1978	36.0
County of Sacramento	8/19/1982	0.5
Pelger Mutual Water Company	9/16/1994	5.0
Maxwell Irrigation District	2/17/1995	13.6
Princeton-Codora-Glenn Irrig Dist	11/19/1998	24.4
Provident Irrigation District	11/19/1998	26.7
Glenn-Colusa Irrigation District	2/18/1999	182.9
City of Sacramento	10/30/2000	81.8
Provident Irrigation District	2/27/2001	124.5
Princeton-Codora-Glenn Irrig Dist	12/17/2001	71.8
US Bureau of Reclamation	7/29/2002	2,203.1
Glenn-Colusa Irrigation District	5/3/2006	53.7
Sacramento County Water Agency	2/15/2008	71.0
Reclamation District 108	10/18/2010	36.0
Woodland-Davis Clean Water Agency	4/14/2011	45.0
Subtotal Since 1963		**3,125.0**
Total		**46,137.3**

Source: State Water Resources Control Board; California Water Impact Network.

No comments

- n/a -

Appendix E
Water Availability Analysis Model Assumptions and Methodology

Analysis of water supply availability must account for water rights claims in addition to the variability contained within watershed hydrology. C-WIN's method of water supply availability has three components: watershed hydrology, known water rights claims, and yield estimation from the interaction of hydrology and water claims. All analytic methods contain assumptions.

Hydrology and Instream Flow Assumptions:

- The State Water Resources Control Board adopts a Delta inflow criterion for the major tributaries of the San Joaquin River Basin of 60 percent of unimpaired flow. This implies a diversion cap not to exceed 40 percent of unimpaired flow in the San Joaquin River Basin.

- The State Water Resources Control Board adopts a Delta inflow criterion for the major tributaries of the Sacramento River Basin of 75 percent of unimpaired flow. This implies a diversion cap not to exceed 25 percent of unimpaired flow in the San Joaquin River Basin. As with the San Joaquin, C-WIN is well aware that this is an assumption, not a foregone conclusion.

- C-WIN's water supply availability analysis relies on the 82-year unimpaired flow hydrology prepared for water years 1922 through 2003 by the California Department of Water Resources (2007). These data are arrayed by major watershed of the Central Valley and Delta. C-WIN calculated monthly decile, quartile and median flows by month and year, and then calculated the subtotals for key regulation periods: November through June for the Sacramento River Basin, and February through June for the San Joaquin River Basin. The percent of regulated period to total flows in the unimpaired hydrology was also calculated for each year, from which deciles, quartiles, medians, averages, and minima and maxima were calculated.

- The annual total and regulated period subtotals were then employed in the water rights yield analysis component. Remaining flows in the non-regulation season (July to October in the Sacramento Basin, July to January in the San Joaquin Basin) are estimated by simply subtracting regulation season flows from annual totals.

- All non-regulated flows are assumed to be fully available for diversion by water right holders; no instream flow requirements are assumed for the unregulated flow period. This assumptions inflates the amount of water that junior water right holders would be allocated during this period of the year, and may ignore temperature restrictions for fish protection.

- No monthly breakdown of flows and diversion allocations is attempted.

- Use of an 82-year unimpaired flow hydrology accounts for inter-annual flow variations in assessing the potential for paper water.

Water Rights Claims Assumptions:

- C-WIN sought to gather water rights information from a variety of sources. Using the Public Records Act, C-WIN requested from nearly 100 different public water districts and agencies information concerning any and all pre-1914 water rights they may have. Many had no pre-1914 water rights. Others provided copies of pre-1914 notices, copies of adjudication decrees, operation agreements, diagrams, statements of diversion and use, and other

No comments

- n/a -

information that described their early water rights claims. C-WIN wishes to express our gratitude for their helpful responses, which are too numerous to mention here.

- C-WIN also gathered from the State Water Resources Control Board's web site copies of adjudication decrees from the Pit River watershed, the Stanislaus River, Butte Creek, and the Indian Creek and Middle Fork Feather River watersheds.

- State law requires that pre-1914 and riparian water right holders file Statements of diversion and use with the State Water Resources Control Board annually. The Board has made most, but not yet all SDUs available online. The Board's eWRIMS database search engine itemizes each SDU but does not provide usage quantities when query answers are returned in the vast majority of cases. Consequently, C-WIN staff downloaded as many as possible to study and record the highest usage claims, as well as year of first usage. C-WIN includes only SDUs with cumulative usage claims by the same claimant that exceed 1,000 acre-feet. This kept the research scope manageable, while also capturing statistically significant cumulations of water usage.

- C-WIN's reliance on SDUs assumes that each usage report they contain is accurately measured. The highest amount claimed is employed to represent the maximum claim that might be exerted by the water right holder on behalf the right under which the reported diversion was made. This is assumed to be the case regardless of whether the type or right claimed is riparian or pre-1914.

- Many SDUs do not provide adequate usage information, however, and were ignored. Therefore, it is quite possible that C-WIN's use of SDU data in this analysis understates the magnitude and location of riparian and pre-1914 water rights claims throughout the Sacramento and San Joaquin river basins.

Yield Analysis Assumptions:

- The water rights priority system would operate subordinate to the application of water quality instream flow objectives.

- The obverse of the Board's instream flow objectives is referred to in our method as a "diversion cap." a 75 percent of unimpaired flow criterion thus is converted to a 25 percent of unimpaired flow diversion cap for Sacramento River Basin rivers in this analysis. In other words, if 75 percent of unimpaired flow is available for fish and aquatic beneficial uses, the 25 percent of unimpaired flow is available for diversion to consumptive uses. For the San Joaquin River Basin, a 60 percent of unimpaired flow objective is reflected in the analysis as a 40 percent of unimpaired flow diversion cap.

- Under the diversion cap, paramount riparian water rights are given first diversion rights, followed by senior pre-1914 water right holders, based on highest usage claimed, the cumulative face amount of water rights claim notices, adjudications, or other water rights claim source. For some river models, riparian and pre-1914 water rights claims are bundled together to simply the analysis when the pre-1914 rights are senior to all other succeeding rights. Only after major pre-1914 water rights claims are any post-1914 appropriative water rights granted by the State of California provided with any remaining flows. Post-1914 water rights that are not shown in a specific river model's results are left off because no flows are left for these rights to divert given the model's operation.

- SDU highest use claims, adjudication allocations, and pre-1914 water right notice claims by the same entities are summed. While this appears to be double-counting, we believe it is important to cumulate them on the assumption that when the Board or a court undertakes

No comments

- n/a -

to adjust water rights, the Board or court must be aware of all claims (both in notices as well as in uses) made in order to remove clouds from their titles.

- As noted above, the unimpaired flow hydrology data is analyzed to determine an average percent of regulated period to total flow for each river. This average indicates that share of the hydrograph's overall flows that occur during the regulated period. We assume that water right claimants claim their supplies under the diversion in a manner that is directly proportional to the regulated period's share of the overall total flow for that river. (This is a water diverter's way of "mimicking the natural hydrograph.") For all riparian and many pre-1914 water right holders, this seemed a reasonable assumption; for post-1914 water right holders whose rights may have limited seasons of diversion or contributions to storage, this assumption may break down. However, but this assumption might only come into play during the wettest portions of each river's overall unimpaired flow hydrology, if at all. The factors used for each river system is shown in Table E-1:

Table E-1
Factors Used to Determine Water Right Claimants' Diversions During Regulated Period in Sacramento River and San Joaquin River Basins

Sacramento River Basin		San Joaquin River Basin	
River	Regulated Period as Percent of Total Unimpaired Flow	River	Regulated Period as Percent of Total Unimpaired Flow
Trinity	94%	Stanislaus	85%
Sacramento River at Feather River Confluence	87%	Tuolumne	76%
Feather	90%	Merced	81%
Yuba	94%	San Joaquin	77%
Bear	97%		
American	95%		

Sources: California Department of Water Resources 2007; California Water Impact Network.

- Default calculation method for pre-1914 water rights notices are often expressed in cubic feet per second (cfs) without seasonal limitation are to multiply the cfs by 3600 (seconds per hour), then by 24 (hours in a day), then by 365.25 days per year. The result is then divided by 43,560 square feet to the acre to obtain the face amount expressed in acre-feet.

- Default calculation method for pre-1914 water rights notices expressed in miners inches is to divide the miners inches by 50 to convert the claim to cubic feet per second, then follow the calculation for converting cfs claims to acre-feet of face amount. We see this as a conservative conversion assumption. Some pre-1914 water right holders may have legal documents that suggest that the conversion should be 40 miners inches to 1 cubic feet per second. This would increase the face value of such pre-1914 water rights by 20 percent.

No comments

- n/a -

- Default calculation method for water rights claims (particularly in SDUs) expressed in gallons per day was to divide the gallons by 325,851 gallons per acre-foot, then multiply by the number of days in the usage season disclosed in the SDU.

- These calculation methods are employed for estimating the quantity of rights administered under adjudication decrees as well. Diversion seasons mandated under the decrees were used as well.

No comments

- n/a -

Appendix F
California Water Code Article 1.3
Declaration of Fully Appropriated Streams

1205. (a) Following notice and hearing, the board may adopt a declaration that a stream system is fully appropriated. As used in this article, "stream system" includes stream, lake, or other body of **water**, and tributaries and contributory sources, but does not include an underground **water** supply other than a subterranean stream following through known and definite channels.

(b) A declaration that a stream system is fully appropriated shall contain a finding that the supply of **water** in the stream system is being fully applied to beneficial uses where the board finds that previous **water** rights decisions have determined that no **water** remains available for appropriation.

(c) Upon its own motion or upon petition of any interested person, and following notice and hearing, the board may revoke or revise a declaration that a stream system is fully appropriated.

1206. (a) From and after the date of adoption of a declaration that a stream system is fully appropriated, and subject to subdivision (b), the board shall not accept for filing any application for a permit to appropriate **water** from the stream system described in that declaration, and the board may cancel any application pending on that date.

(b) Notwithstanding subdivision (a), the board may provide, in any declaration that a stream system is fully appropriated, for acceptance for filing of applications to appropriate **water** under specified conditions. Any provision to that effect shall specify the conditions and may contain application limitations, including, but not limited to, limitations on the purpose of use, on the instantaneous rate of diversion, on the season of diversion, and on the amount of **water** which may be diverted annually. The board may make those limitations applicable to individual applications to appropriate **water**, or to the aggregate of the applications, or to both.

(c) Subdivision (a) shall not apply to applications for temporary permits made pursuant to Chapter 6.5 (commencing with Section 1425) or to any provision of this **code** respecting change in point of diversion, place of use, or purpose of use.

1207. Notice of hearing pursuant to this article shall be given as follows:

(a) The notice shall be published at least once a week for four consecutive weeks in one or more newspapers of general circulation published in each county in which any part of the stream system is situated, and publication shall be complete at least 60 days prior to the date of hearing.

(b) At least 60 days prior to the date of the hearing, the notice shall be mailed to all persons known to the board who own land that appears to be riparian to the stream system, who divert **water** from the stream system, or who have made written request to the board for special notice of hearing pursuant to this article.

No comments

- n/a -

Appendix G
Selected Fully-Appropriated Rivers and Creeks of the Bay-Delta Estuary's Central Valley Watershed

River	Fully-Appropriated Season	Critical Reach
Trinity	1/1 to 12/31	North Fork from Salmon-Trinity Primitive Area to Helena at river mouth (W&S)
	1/1 to 12/31	South Fork Trinity from State Route 36 to river mouth at Salver (W&S)
	1/1 to 12/31	Main stem from 100 yards below Lewiston Dam to river mouth at Weitchpec (W&S)
Pit River	4/1 to 11/30	North and South Forks, Franklin Creek, and Pit River in Big Valley adjudications
	3/15 to 10/31	Ash Creek from confluence with Pit River upstream (adjudication)
McCloud	1/1 to 12/31	Mainstem from Algoma to Lake McCloud, mainstem from McCloud Dam to Shasta Lake (W&S)
Squaw Creek	1/1 to 12/31	Squaw Valley Creek from Section 14, T38N, R3W to confluence with McCloud River
Feather	1/1 to 12/31	Middle Fork from confluence of its tributary streams 1 KM south of Beckwourth, CA. (W&S)
	5/15 to 9/30	Middle Fork at Beckwourth, CA upstream (D-831)
	4/1 to 11/30	Indian Creek from North Fork Feather upstream (adjudication)
	3/1 to 10/31	South Fork Feather from confluence of Oroville Dam and Middle and South Forks of Feather River upstream (D-25)
	7/1 to 9/30	From confluence of Feather with Sacramento River upstream (D-1275)
	4/15 to 9/30	Sierra Valley channels from the confluence of Middle Fork Feather River at Beckwourth upstream (D-1391)
	7/1 to 11/30	West Branch of Feather River from upper Miocene Canal Head Dam located in Section 30, T23N R4E, upstream (D-844)
Yuba	8/1 to 10/31	From Englebright Dam upstream (D-934)
	4/1 to 11/30	From Shady Creek within Section 17, T17N R7E and upstream of South Fork Yuba River (adjudication)
Bear	5/1 to 11/30	From Camp Far West Reservoir upstream (D-1091)
	4/15 to 11/30	From Wolf Creek upstream (above Bear River, D-1059, D-1091)
American	1/1 to 12/31	North Fork of American River from source to Iowa Hill Bridge (W&S)
	1/1 to 12/31	North Fork of American River from point 0.3 miles above Heath Springs to 1,000 feet upstream of Colfax-Iowa Hill Bridge, including Gold Run Addition area. (W&S)
	7/1 to 10/31	From the Sacramento River upstream (D-1108)

No comments

- n/a -

Appendix G
Selected Fully-Appropriated Rivers and Creeks of the Bay-Delta Estuary's Central Valley Watershed

River	Fully-Appropriated Season	Critical Reach
	5/1 to 10/31	White Rock Creek from the confluence with South Fork American upstream (D-1522, D-1211)
	7/1 to 12/31	Silver Creek from confluence with South Fork American upstream (D-163, D-1211)
	6/15 to 10/31	Sugar Loaf Creek from confluence with South Fork American upstream (D-776)
Butte Creek	4/1 to 11/30	Butte Creek from confluence with Butte Sink in T17N R1E (adjudication)
	6/1 to 9/30	Butte Creek from confluence of Butte Slough upstream (D-1329)
Stony Creek	4/1 to 11/30	Stony Creek from confluence with Sacramento River upstream (adjudication)
Cache Creek	4/15 to 10/31	Cache Creek from confluence with Yolo Bypass upstream (D-1506)
Putah Creek	1/1 to 12/31	Putah Creek from Monticello Dam upstream (D-869, WR Order 96-002)
Stanislaus River	4/1 to 11/30	From confluence with San Joaquin River upstream (adjudication)
	7/1 to 10/31	From confluence with San Joaquin River upstream (D-1422)
Tuolumne	1/1 to 12/31	From source on Mount Lyell and Mount Dana to Don Pedro Reservoir (W&S)
	7/1 to 12/31	From Don Pedro Reservoir upstream (D-995)
Merced	1/1 to 12/31	From south side of Mount Lyell in Yosemite National Park to 300 feet upstream of confluence with Bear Creek (W&S)
	1/1 to 12/31	South Fork Merced River from Triple Divide Peak to confluence with mainstem of Merced River (W&S)
Chowchilla	1/1 to 12/31	From confluence of Chowchilla River with San Joaquin River upstream (D-1365)
Fresno River	5/1 to 11/30	From Hidden Dam and Fresno River upstream (D-1407)
San Joaquin	1/1 to 12/31	From confluence with Mendota Pool upstream (D-935)
Fresno Slough	1/1 to 12/31	From confluence with San Joaquin River upstream to Kings River and including upstream watershed of Kings River (D-1290)
Sacramento -San Joaquin Delta	6/15 to 8/31	From the Delta upstream - allowing no diversions from the Delta less than 1 cubic foot per second or less than 100 acre-feet in storage. (D-1594)

Source: State Water Resources Control Board, 1998. Key: W&S = Wild & Scenic Designation; adjudication = decree issued adjudicating water rights in that critical reach; D-"[Some number]" refers to a Board Water Rights Decision.

No comments

- n/a -

L2622
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California Senate Interim Committee On Water Projects

(Senator Stephen P. Teale, Chairman)

OPINION OF ATTORNEY WALTER M. GLEASON REGARDING VARIOUS LEGAL ASPECTS OF BURNS-PORTER ACT (SB 1106) (PROPOSITION ONE)

(In response to a request of Chairman Teale by letter dated October 4, 1960)

WALTER M. GLEASON,
333 Montgomery Street,
San Francisco 4, California.

Dated: October 28, 1960.

WATER RESOURCES
CENTER ARCHIVES
UNIVERSITY OF CALIF.

No comments

- n/a -

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No comments

- n/a -

Members
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Vice Chairman
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California Legislature
SENATE INTERIM COMMITTEE
on
PROPOSED WATER PROJECTS
(Senate Resolution No. 180)

Senator Stephen P. Teale
Chairman
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West Point, California
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Sacramento, California

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Marysville, California
Senator Nelson S.Dilworth
Hemet, California

4 October 1960

Mr. Walter M. Gleason
Attorney at Law
333 Montgomery Street
San Francisco, California

Dear Mr. Gleason:

The People of California will soon be called upon to vote upon the Burns-Porter Act (Senate Bill 1106) (Proposition One on the November ballot). Unfortunately, there seems to be a rather widespread lack of understanding on the part of many people as to the real significance of this very important proposed Bond Act, especially its legal aspects and implications.

As you are aware, our Committee has been working diligently in an effort to study these various phases and to acquaint the People of California with them. However, we find ourselves seriously handicapped in having varied, and to some extent, conflicting legal analysis from various water lawyers as to the various legal facets of this proposed multi-billion dollar Bond Act and the Water Plan which it will finance.

Having in mind your long and distinguished record in the field of water law and water litigation, and also your past invaluable service to legislators in their effort to protect the interests of all California in connection with California's water planning, I desire to now take advantage of your kind offer some time ago to furnish our Committee with an analysis of the legal aspects of SB 1106, which is now Proposition One.

We would particularly like to have your views with respect to the following salient points which have given various members of our Committee serious concern, to wit:

No comments

- n/a -

1. DOES SB 1106 FULLY PROTECT NORTHERN CALIFORNIA'S VESTED WATER RIGHTS?

2. CAN THESE VESTED WATER RIGHTS BE IMPAIRED OR SERIOUSLY INVOLVED UNDER THE WATER PLAN ENVISAGED BY SB 1106?

3. DOES THIS WATER PLAN ADEQUATELY PRESERVE AND PROTECT THE SO-CALLED "AREA OF ORIGIN" RESERVATIONS OF NORTHERN CALIFORNIA (i.e., "COUNTY OF ORIGIN" AND "WATERSHED OF ORIGIN") PROTECTION?

4. DOES S, B, 1106 AFFORD PROPER PROTECTION FOR THE SACRAMENTO - SAN JOAQUIN DELTA (SALINITY CONTROL, LEVEE PROTECTION, ETC.)?

5. COULD SB 1106 BRING ABOUT THE "LEGAL FRANKENSTEIN" FEARED AND PREDICTED BY THE ENGLE COMMITTEE?

6. DOES SB 1106 CONTAIN ADEQUATE LEGAL SAFEGUARDS TO PROTECT THE TAXPAYERS OF THIS STATE AGAINST THE POSSIBILITY OF DEFICITS IN CONNECTION WITH THIS PROPOSED MULTI-BILLION DOLLAR BOND ISSUE?

7. WILL THE GOVERNOR AND HIS EXECUTIVE OFFICIALS HAVE THE AUTHORITY AND POWER (IF SB 1106 IS APPROVED) TO FIX AND DETERMINE, IN THEIR SOLE DISCRETION, THE TERMS AND CONDITIONS OF THE "WATER CONTRACTS" WHICH WILL BE THE SOLE SOURCE OF REVENUES (OTHER THAN THE GENERAL FUNDS OF THE STATE) TO PAY OFF THIS HUGE BOND ISSUE? WILL THE LEGISLATURE HAVE ANY VOICE IN SUCH MATTERS?

No comments

- n/a -

We would appreciate it if you will try to express your views on these several legal points in language which will be readily understandable to laymen. We fully appreciate that some of these phases are highly technical in nature but hope that you can cover them in as nontechnical a manner as possible.

I might add that we will desire to submit your opinion on these phases to other legal experts for their appraisal and comments. If you have any objection to such procedure please so advise us.

With kindest personal regards,

/s/ STEPHEN P. TEALE

Senator Stephen P. Teale

No comments

- n/a -

never been fixed or determined by any comprehensive adjudication. * For historical and other reasons it has generally been unnecessary, up to now, to adjudicate in any comprehensive way the quantitative extent of this vast maze of vested water rights. The "rate of flow" ** schedules governing these water rights have adequately served their purpose in Northern California. *** However, this new water planning

* The monograph submitted by Henry Holsinger, Esq., in his testimony before the Engle Congressional Committee in 1951 (entitled "Necessity for Comprehensive Adjudication of Water Rights on the Sacramento and San Joaquin Rivers in aid of the Central Valley Project") contains an excellent explanation (by this outstanding water expert) of this "un-adjudicated characteristic" of these Central Valley water rights. His testimony is contained in the voluminous report published by the Engle Committee (in 1956) (House Document No. 416 - Volume 1, pp. 765-784). This official publication will be cited herein by the designation "Engle_____".

Mr. Holsinger (long time chief attorney for the Division of Water Resources and, subsequently, Chairman of the State Water Rights Board) summed up this absence of any comprehensive adjudication in the Central Valley as follows:

"In substantial degree existing rights to the use of water on the San Joaquin River has been litigated but not in such manner that each might be enforced against the other. On the Sacramento and in the delta, however, comparatively few rights have been litigated at all, and only a small proportion of these rights on both rivers are of record anywhere." (Engle 772)

** For the benefit of persons not acquainted with "water measurement terminology" there are two distinct "dimensions" to a water right. The first is rate of flow. This means the rate at which a given diversion flows (ordinarily expressed in terms of "cubic feet per second"). Such a "rate of flow" does not denote any quantity of water (any more than "miles per hour" in automotive travel gives any indication of the distance traveled). To get quantity (in water measurement) another "dimension" must be known which is the length of time such flow has persisted. For example, a rate of flow of one cubic foot per second (1 cfs) past a given point for 24 hours will produce a total quantity of water of approximately 1.98 acre feet (commonly and roughly expressed as approximately two acre feet). An acre foot of water is the amount of water necessary to cover one acre a foot in depth.

*** The phrase "Northern California" as used in this "Opinion" is intended to include all of California north of the Tehachapi Mountains; and principally the great Central Valley and its adjacent watersheds.

No comments

- n/a -

completely changes this situation. If the Brown Water Plan (SB 1106) * is put into effect, a comprehensive determination of the quantitative scope of all these water rights will become necessary because of the peculiar nature of this plan and the failure of this legislation to adequately "insulate" these vested water rights against involvement under this water plan.

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3. The Controlling Criterion of "Beneficial Use".

All water rights in California are controlled and limited by the yardstick of "beneficial use". In other words, this criterion pervades all California water rights. It is embedded in our California Constitution (Art. XIV, Section 3) which makes it mandatory that the "water resources of the State be put to beneficial use to the fullest extent of which they are capable" and forbids "unreasonable use" and any "unreasonable method of use" of water.

This means, in so far as our Northern California irrigation water rights are concerned (which comprise the great bulk of the North's water rights), that they are limited to the amount of water reasonably needed, from time to time (i.e., month to month and year to year) for the proper irrigation of the lands in question (with reasonable allowances for conveyance losses).

This problem as to how much water a given area of land can beneficially use is not a simple one. To the contrary, it is a complex one. "Water duty" (which is an expression used to denote "beneficial use") varies from parcel to parcel. Soil conditions and many other technical facets of climatology and hydrology (e.g., ground water depths) must be considered. **

* SB 1106 has no precedent in our prior California water planning. It is a completely new piece of legislation, formulated entirely by the Brown Administration. Therefore, I will (for sake of identification) refer to the water project therein authorized (State Water Resources Development System) as the "Brown Water Plan."

** The complexity of "water duty litigation" can be illustrated by one such case (beginning in the late 20's) in which the writer was counsel for the defendants. Although it was only a localized controversy, its actual trial required in excess of two years.

No comments

- n/a -

One of the corollaries of this basic legal doctrine of "beneficial use" is that no matter how long (i. e., for how many years or decades) a given diversion of water has taken place and irrespective of how continuously this amount of water has been used on the land involved, the water right in question is restricted (under said controlling yardstick) to the actual amount of water which some court may determine (in a "water duty adjudication") to be necessary properly to irrigate such land. *

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4. A "junior appropriator" can, in the absence of any binding adjudication of the quantitative extent of the senior water rights, freely litigate the quantitative scope of such prior "vested" rights.

Did Pisani foresee in his review of CA water law?

One of the necessary consequences of the aforementioned controlling criterion of beneficial use is that any person who desires to acquire the right to use allegedly "surplus" water in a given stream or water basin can (unless prevented by a prior adjudication binding upon him) throw into question the quantitative extent of any and all "vested water rights" on said stream (no matter how long established). In short, a covetous "water exporter" (a proposed junior appropriator) can thus litigate any and all "senior" rights by simply resorting to the expedient of questioning the water duty of the senior diversion rights.

I should also mention, in order to indicate that this is a "hard reality" (as distinguished from a purely theoretical aspect) in California water right administration that our water history is replete

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* One of the many enunciations by the California Supreme Court of this settled legal principle is:

> "In so far as the diversion exceeds the amount reasonably necessary for beneficial purposes, it is contrary to the policy of the law and is a taking without right and confers no title no matter for how long continued." (citing authorities) (Tulare Irrigation District v. Lindsay-Strathmore Irrigation District, 3 C 2d 489, 45 P 2d 972) The Court also stated therein: "In determining what is a reasonable quantity for beneficial uses, it is the policy of the State to require within reasonable limits the highest and greatest duty from the waters of the State."

No comments

- n/a -

with just such episodes. * I will cite but two thereof.

The first is the famous:

Lindsay-Strathmore Irrigation District
Litigation with the Kaweath Delta
"vested water rights" (Tulare County)

This involved the Kaweah River and the "vested" water rights of the Kaweah Delta in Tulare and Kings Counties, California. Over a period of many decades the water right owners (irrigation districts, mutual water companies, riparianists, etc.) along said Kaweah stream system settled their respective water rights by a multitude of local adjudications and agreements. The end result was a complex river schedule to govern the diversions from the two main branches of the Kaweah River (Kaweah and St. Johns). These scheduled water diversions covered all of the normal flows of the river. Naturally, these water right owners felt that at long last they had finally and completely settled their water rights. However, in 1916 along came Lindsay-Strathmore Irrigation District, a large irrigation district situated to the south of (and outside) the Kaweah Delta. It was desperate for water. Its supply of "residual" underground water was fast nearing exhaustion due to inordinate pumping brought on by extensive and excessive planting of citrus and other groves during the preceding decade of prosperity. The District was faced with either eliminating much of this planted acreage or of obtaining an "outside" source of water. It therefore "invaded" the Kaweah Delta and established a series of large pumping plants in the heart of this Delta. It then proceeded to pump and "export" large quantities of water to the South (i.e., to the District). Litigation ensued. It went to the California Supreme Court twice. **

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* If the writer has learned anything from his several decades of exposure to California water right problems and practices it is that there is a fundamental difference between a purely theoretical approach to such matters and a realistic and pragmatic understanding of the "hard realities" of such water problems and practices. I might add that it is my impression that far too much of the current water planning at Sacramento (including some of the legal phases) has been by theoreticians rather than by pragmatic realists schooled by adequate experience with the "hard realities" of irrigation practices and problems.
Incidentally, Mr. Holsinger reviewed many of the "hard realities" of California water practices (from a legal viewpoint) in his aforementioned testimony before the Engle Committee.

**A glance at the voluminous decision of the Supreme Court on the second appeal (Tulare Irr. Dist. v. Lindsay-Strathmore Irrigation District, 3 C 2d 489, 45 P 2d 972) will indicate the complicated nature ofthis lawsuit. The main case also generated a number of collateral disputes and lawsuits (in some of which the writer participated as counsel for Kaweah Delta interests in the late 20's and early 30's.)

No comments

- n/a -

It lasted for about fifteen years and its cost (fees of attorneys, engineers, court costs, etc.) ran into millions of dollars. The defense of Lindsay-Strathmore consisted principally of a resort to the aforementioned relatively simple device of questioning the "water duty" of the Kaweah Delta water right owners and users. Lindsay claimed, for example, that these Delta farmers were using far too much water to irrigate their alfalfa and other crops, and that under an "optimum" method of irrigation (expounded at length over a period of many months of trial by various engineering and irrigation experts)* the actual amount of water reasonably needed by the Delta was far less than the amount claimed and diverted pursuant to the Kaweah River schedules. This litigation finally was settled after both sides were pretty much exhausted. The irony and tragedy of the whole affair was that the expenditure of these millions of dollars did not produce a single drop of "new" water.

A second and more recent example of this involves the:

City of Fresno and Kings River

The Kings River rises in the Sierra Nevada Mountains in Fresno County and flows through the County of Fresno into Kings County where it terminates in Tulare Lake. In a part of its course, it is quite near the City of Fresno. As is well known, a vast and highly developed agricultural area (orchards, vineyards, extensive cotton acreages, etc.) depends (almost entirely) for its irrigation upon the waters of Kings River. Many irrigation districts, mutual water companies, and other irrigation units own water rights in this stream. The writer represents some of these Kings River water right owners.

During a period of about seventy years these water right owners, by a long series of adjudications and agreements, finally settled their respective water rights and priorities. ** The end result was a complicated

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* One of the principal features of such "water duty" litigation is the widely disparate and conflicting testimony of the opposing able hydraulic engineers and other irrigation experts concerning this subject of how much water is needed properly to irrigate the area of land in question. An examination of the lengthy testimony of these experts in any of these cases will confirm this. I mention this aspect not to reflect on the good faith of these eminent experts but simply to further point up one of the many facets of the complexity of such litigation.

** Our engineers estimate that upwards of eighty millions of dollars have been invested by these various irrigation units in developing their water rights and diversion systems.

No comments

- n/a -

river compact specifically setting forth these various and interrelated rights and priorities. All of the flows of the river (high and low) are thus scheduled and apportioned among and between these units. These river schedules occupy many printed pages in the current issue of this controlling water right compact. A few years ago a large dam (Pine Flat) was built in the upper reaches of Kings River to provide storage and a regulated river flow. This project was promoted over a period of years by these irrigation units with a considerable expenditure of time and money. All of the available irrigation storage space in Pine Flat Reservoir has been contracted for and allotted to these units. However, the final contract covering this aspect (as distinguished from the interim contract) has not been finally signed by the Federal government (Dept. of the Interior) at Washington.

Now, to turn to the City of Fresno. This city has been expanding in every direction and it is predicted by responsible authorities that during the next few decades it will experience another almost phenomenal growth. Consequently it needs an additional and dependable water supply (mainly for domestic use). However, instead of planning and building its own mountain project (such as San Francisco's Hetch Hetchy, or the Mokelumne project of EBMUD) the City of Fresno is now casting covetous eyes upon the waters of Kings River. Among other things, it has petitioned the Federal government to allocate to it a large block of storage space in the Pine Flat project notwithstanding that all thereof has been allocated to the irrigation interests who own or control these waters of Kings River. Furthermore, to obtain water to fill any such storage space which it hopes to thus secure, Fresno is now asserting that there is a "surplus" of water in Kings River and that, under its domestic priority, it is entitled to this "surplus". This means that unless Fresno abandons this attack on the water rights of the Kings River irrigationists, a lengthy and costly legal proceeding will ensue, the chief feature of which will probably be an extended examination into the subject of the proper "water duty" of the lands in the Kings River service areas. This comes as a dismal surprise, of course, to the farmers along Kings River who thought (up until this attack by the City of Fresno) that they had finally and at long last settled their water rights (after decades of litigation, etc.).

Incidentally, is it any exaggeration to apply the phrase "hard realities" to this earlier Lindsay-Strathmore episode or to this current Kings River problem?

No comments

- n/a -

5. Relevancy of foregoing legal considerations to Brown Water Plan (SB 1106).

This phase may be summed up very simply. Under the Brown Water Plan the South will acquire a completely novel and unprecedented "contract water right" out of the Central Valley water resources (i.e., at the Delta). In the absence of any safeguards, once the South acquires this "water right" it will be in an excellent position to question and litigate all of the vested water rights in the Central Valley (and its adjacent watersheds most of which are tributary in one way or another to the Delta). I will deal more fully with this phase in a subsequent section of this memorandum. At this juncture, I wish to answer the question:

Does SB 1106 contain any provisions or restrictions to prevent such an attack by the South on these Northern "vested" rights?

The clear and indisputable answer is that it does not. This is one of the basic defects in this illy-conceived legislation. I might also mention, in this connection, that some of us strongly urged Governor Brown to include in SB 1106 appropriate provisions so that the South could not thus question and litigate these "vested water rights" of the North. In short, we sought proper provisions to fully "insulate" these vital rights against such unfair attacks. For example, several of us met with the Governor at an evening conference on February 25, 1959, and endeavored to emphasize the importance (to the North) of thus "insulating" these water rights. This was followed the next day by a lengthy letter from me to the Governor in which various phases (necessary for the protection of the North) were explained at length, including such topics as:

Feb 26, 1959 Letter by Gleason

1. Necessity for the "insulation" and full protection of Northern water rights.
2. Adequate protection for Northern "Areas of Origin".
3. Protection of the Delta.

As to the first point (i.e., the "insulation" of Northern water rights) this letter stated:

> "This phase is of vital importance to us. It is fully reviewed in earlier memoranda prepared by the writer for the California Water Development Council and other organizations (with which you may already be familiar..." (giving dates thereof, etc.)

No comments

- n/a -

In any event, I will do no more herein than to sketchily review this phase and then repeat our suggestions made the other evening.

"If the CWP is authorized without full and adequate protection for Northern vested water rights these rights can be seriously affected and jeopardized by this water plan. Why? Because practically all of these rights are "open-ended'. What does this mean? It means, among other things, that the quantitative extent of these rights has never been fixed or settled. Historically, and because of the flow regimens of our Northern streams and other practical considerations, it has not been necessary that these rights be quantitatively determined. The writer cited last evening, as one example of this, our complex water right schedule (Water Right Indenture, etc.) on Kings River. Not one of these many important water rights has ever been quantitatively determined or fixed.

"Presently, none of these valuable rights is subject to any question or attack by Southern California water interests. Why? Because geography and topography preclude this. In other words, the South might as well be in Mexico, from the standpoint of any present ability it may have to concern itself with, or attack these rights (or litigate the quantitative scope thereof).

"With the advent of the California Water Plan, however, this whole picture changes. From a water right standpoint, the effect will be the same as if Southern California were to be physically moved up to and placed next to the Delta. Unless proper safeguards are incorporated in the fundamental CWP legislation, the South will then be in a perfect position to question and litigate (in Lindsay-Strathmore type litigation) the quantitative extent of all these vested Northern water rights. We then would have the "Legal Frankenstein" which the Engle Committee worried so much about.

"Legal Frankenstein"

"It should be remembered, in this connection, that the South would enjoy various preponderant advantages in such litigation. One of these would be that to the South a given quantity of water would be many times more valuable than to the Central Valley farmer. Therefore, the South could spend much more 'to win the water' than the farmer could. In other words, this water to the farmers is worth X dollars (per acre foot). To the South it will be worth at least 10-X, and probably a great deal more. All the South would have to do (in such Lindsay-Strathmore type 'water duty' litigation) would be to spend 2-X (or more) and they would end up with most of the water. In short, the farmers could not sustain the expense of such a 'Legal Frankenstein.'"

No comments

- n/a -

Again, under date of May 1, 1959, the writer sent a lengthy memorandum to the Governor urging the inclusion (in SB 1106) of five different elements of protection for the North (including adequate protection for Northern "vested" water rights). The Governor's personal reply (dated May 8, 1959) stated, among other things, that:

how to view this correspondence ?

> "I think it is vital to California that we move ahead in this water program, and I agree with you in all five fundamentals in every particular.* We may disagree as to how we reach them, but not in objective.
>
> "I would direct your attention to the fact that at this time we are only drawing the 'physical works'. We are not drawing conclusions or allotting water. When we come to that, which will be after the bond issue is passed, then you and I can sit down and discuss some of the other things mentioned in your letter."

Unfortunately (and in connection with the last suggestion of the Governor) there are two serious roadblocks in the way of any "post-election patching up" of SB 1106. The first is that if the People approve SB 1106 in its present form, it will be legally impossible (in the opinion of the writer as well as many other lawyers) for the Legislature to subsequently amend it in any substantial way. Secondly, the Governor and his water staff are now engaged in somewhat frenetic efforts to consummate a vital "water contract" with The Metropolitan Water District of Southern California (i.e., even before the People approve SB 1106.)** If this is consummated, it would likewise be impossible (in our opinion) to correct (by subsequent legislation) some of these basic defects in SB 1106. This phase is also dealt with in a subsequent portion of this Opinion.

In any event, we were unsuccessful in our efforts to have these protective provisions incorporated in SB 1106.***

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* All emphasis in this Opinion, either by underlining or otherwise, is mine, unless otherwise noted.

** A contract with an initial term of seventy-five years, and renewable at the option of Metropolitan.

*** It is my personal opinion (from a rather close observation of the processing of this legislation through the Legislature, with its many drafts and counter-drafts) that the omission of these necessary and salutary protective provisions was not at all accidental. I might add that it is an "open secret" that various of the South's water lawyers and other experts closely collaborated with the Administration in the drafting and processing of this legislation.

No comments

- n/a -

This brings me to its so-called "exclusionary clause", viz:

6. Paragraph 12931 of SB 1106

This paragraph contains a provision that nothing contained in SB 1106 shall

> "affect or be construed as affecting vested water rights"

The administration spokesmen have been pointing with pride to this simple statement as being "full protection" for our Northern vested water rights. This contention is, in my humble opinion, specious. In fact, it is little short of fatuous.

There are several reasons why this is so:

The first one is that this provision will not in any manner whatsoever prevent or preclude the South (or any other Delta water "exportee") from questioning, by litigation and otherwise, the quantitative extent of these Northern vested water rights. As shown above, these "junior appropriators" (once they are placed in a position, under SB 1106, to receive water out of the so-called Delta Pool) will have, because of the aforementioned principles of water law, the unfettered power to do exactly that (acting through the State). Nothing in SB 1106 precludes or prevents them from doing so.

In other words, the mere statement in SB 1106 that "nothing herein" shall affect "vested water rights" does not at all meet the issue or cure the evil. The South will not derive its right or power to thus "raid" Northern water rights by virtue of anything expressed in SB 1106. Rather, it will acquire that opportunity and power by virtue of being placed in an excellent position (physical and legal) to do so by this Brown Water Plan (SB 1106).

Stating this differently, the use of the phrase "vested water rights" still leaves open the all-important question as to the quantitative extent of these vested water rights, a vital dimension which (as shown above) has never been fixed by any comprehensive adjudication which would in any manner be binding upon the South (or any other Delta "exportee"). In short, the South will be in the same position as was Lindsay-Strathmore which (in invading the Kaweath Delta) somewhat piously proclaimed, in effect, to the Kaweath Delta vested water right owners:

> "Gentlemen of the Kaweath Delta, we do not intend to impair your vested water rights, but we most assuredly desire and intend to dispute and, if necessary, to litigate the quantitative extent thereof."

No comments

- n/a -

In conclusion, the foregoing are the principal considerations, factual and legal, on which is based my aforesaid answer to your first question.

Incidentally, in leaving this phase I desire to note that some of these aspects (i.e., as to the "open-ended" nature of these Northern water rights, etc.) are more fully covered in other opinions and memoranda previously prepared by the writer, including the following:

Opinion dated February 8, 1957, to Mr. Bert Phillips, President of California Water Rights Protective Association.

Opinion dated March 13, 1957, to California Water Rights Protective Association (re ACA #38).

Opinion dated April 13, 1957, to Senator Edwin J. Regan.

Opinion dated December 31, 1959, to Mr. Gordon Garland, Executive Director of California Water Development Council. ("The California Water Plan - The Two Divergent Roads Ahead and their Litigation Potential").

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No comments

- n/a -

QUESTION NO. 2. CAN THESE VESTED WATER RIGHTS BE IMPAIRED OR SERIOUSLY INVOLVED UNDER THE WATER PLAN ENVISAGED BY SB 1106?

I - OPINION: My answer is yes. My firm opinion is that this Brown Water Plan will not only expose these vested water rights to the danger of impairment but that it is inevitable, under the "hard realities" of the new hydrological situation which will be brought about by this Water Plan, that this involvement will occur.

II - SUPPORTING ANALYSIS AND ARGUMENT: The foregoing analysis in support of my answer to your Question No. 1 also applies herein. The essence of said discussion above is that because of the presently "open-ended" nature of these Northern "vested" rights, the South will be placed by this Water Plan in a perfect position to question and involve, by litigation and otherwise, these Northern "vested rights". However, and in order to demonstrate that this is not a fanciful and unrealistic appraisal of the new situation which will be brought about by this plan I will now touch upon some additional salient facts and considerations.

1. The New Central Valley "Water Picture"

Water-rightwise, the end result of this new Water Plan will be exactly the same as if all of Southern California were to be physically uprooted and set down at Tracy (i.e., next to Delta). In short, the length of the aqueduct between the Tracy Pumping Plants and Southern California is immaterial.

This end result will therefore mean that the South will, for all practical and legal purposes, be sitting next to the Delta with a right to receive water out of the Delta (through its "water contract" with the State).*

* As has been frequently pointed out by the writer (and many others) the name "Feather River Project" (which until recently was widely used in labelling this Water Plan) is a complete misnomer; and a deceptive and misleading one. This is and always has been a Delta Project. Under all this water planning the Feather River was to contribute but a relatively small fraction (approximately 1/4th) of the water to be exported from the Delta. (See Gleason letter of April 23, 1957 to Senator Edwin J. Regan). However, it is interesting to note, in this connection, another facet. Apparently, some of the State's own independent engineering consultants, (who are checking the feasibility of this Water Plan) have recently concluded that it is dubious as to whether even this "Feather River Phase" can be built (i.e., out of the funds to be provided by Proposition One).

No comments

- n/a -

A direct consequence of this new "hydrology" is that for the first time in history the South will become directly and legally interested in the water resources of the Central Valley and the water rights (existing and prospective) in connection therewith. Up to now the South has had, of course, no interest in or any ability to interfere with or involve any of these Northern rights. Why? Because geography and topography have taken care of this. In other words, Southern California might as well be in Mexico insofar as any present ability to take or interfere with any water or water rights in Northern California is concerned. For these reasons, it would seem that the South would be only too ready, in reciprocation of this very important privilege of thus being put into a position (by a State project) of receiving water from Northern California, to agree to any and all proper restrictions and provisions needed to prevent any involvement or impairment of these long standing "vested" water rights. Unfortunately, this has not proven so. The South has resisted (and I might add successfully resisted) all such efforts on our part to secure such protection.

The great practical importance and perilous nature to the North of this new "hydrological picture" can, I believe, be demonstrated by several "hard realities" implicit in this situation. The first is:

a. The South's direct interest in establishing and preserving as much "surplus" water in the "Delta Pool" as possible.

Theoretically, the South (and the other Delta Pool "exportees") are only supposed to receive "surplus" waters in the so-called Delta Pool. What is "surplus"? How and when will it be determined? And by whom?

To properly determine what is "surplus" water one must first measure and determine "non-surplus". Over-simplifying the matter, the latter concept (i.e., "non-surplus") is the amount of water belonging to the vested water right owners. In short, these two things are correlatives. They are opposite sides of the same coin. *

* These "surplus" and "non-surplus" concepts are more fully treated in the writer's aforementioned "Letter Opinion" dated Feb. 8, 1957. As explained therein, this "water allocation" process can be likened to the slicing of a huge watermelon representing, in its totality, all of the capturable Northern California water (i.e., in the Central Valley and its adjacent watersheds). One slice thereof is the quantity which is now and will be needed (through the endless decades to come) to adequately service these presently existing vested water rights, including many "latent" riparian water rights. A second slice is the quantity which will be needed in the future for the "areas of origin". The third slice is the "surplus" available for export (i.e., to Delta "exportees").

No comments

- n/a -

b. Determination of "surplus"

Now, one naturally would assume and expect that before any "water export contracts" would be entered into between the State and the South for export of water from the Delta Pool, there would be a proper and comprehensive determination by appropriate legal procedure of the quantitative extent of any such "surplus" under this water planning. This would include, among other things, a proper determination of the quantitative needs and extent of this vast multitude of vested water rights in Northern California.

Incidentally, Mr. Holsinger emphasized (in his aforementioned testimony before the Engle Committee) the vital necessity for and importance of a comprehensive determination and adjudication of such vested rights before project construction or operation, viz:

> "It has in fact long been widely recognized that full adjustment of water rights should precede not only project operation but also project construction". (Engle 776)
>
> "In the absence of a comprehensive definition, interminable conflicts, disputes, and litigation will be necessarily ensue." (Engle 774)
>
> "If this is not accomplished, the result will necessarily be uncertainty, doubt and conflict." (Engle 772)

This (and other) testimony of Mr. Holsinger was fully concurred in by then Governor Earl Warren and other State officials in their testimony before the Engle Committee. For example, Governor Warren testified:

> "We have felt in State Government for many years that there should be a complete adjudication of the water rights on the Sacramento River, and we believed that it should be done before the Central Valley project was completed and in operation."
>
> "As a matter of fact, on May 1, 1939, Walker R. Young, supervising engineer of the Bureau in Sacramento, recommended this adjudication of water rights of the two rivers. A copy of the letter also went to the then Commissioner of Reclamation, John C. Page. The letter said in part:
>
> > 'I concur in the opinion of the State Engineer that a judicial determination of existing rights on the Sacramento and San Joaquin Rivers is necessary in order to operate the Central Valley project efficiently and successfully and such determination should be effected before the project is placed in operation.'" (Engle 710)

No comments

- n/a -

While the then Attorney General (Edmund G. Brown) apparently did not recommend such litigation, he did point out (in a memorandum submitted to the Engle Committee) the advantage of such proposed litigation:

> "The advantage of such a suit appears to be that the judgment, when reached, would furnish an encyclopedic ranking of water rights in the Sacramento stream system according to quantity divertible and priority. Such ascertainment of rights would aid orderly administration of the Central Valley project and related projects. Whether such suit should extend to the ascertainment of water rights in the Sacramento-San Joaquin delta has not been made clear but such extension might be found logical. The ascertainment of rights in the delta to the flow of Sacramento River water would be complicated by the fact that some portion of the water enjoyed by the delta region is derived from the San Joaquin River as well as the Sacramento." (Engle 714)

The Brown Water Plan, however, makes no provision for any such comprehensive legal determination and adjudication of the existence and extent of surplus water. In other words, under this Water Plan no such prerequisite determinations of "surplus" and "non-surplus" will be made before project construction or operation. To the contrary, the Brown Administration proposes to proceed immediately with the consummation of "export water contracts" and the allocation thereby of huge amounts of water out of the Delta for export to the South. In fact, the Governor and his water advisers are now rather feverishly attempting to consummate such a contract with Metropolitan Water District.

no determination of surplus waters in Pop I.

Furthermore, not only has there not been any such requisite comprehensive judicial adjudication planned or provided for, but the truth is that there has not even been any accurate or proper administrative determination by the State (or any of its departments or officials) of the extent of the "surplus" water which is or will be available in the Central Valley for export. In fact, the Department of Water Resources does not even know the identity (let alone the quantitative scope) of many of these multiple thousands of vested water rights in the North. For example, in its recent publication: "Water Facts for Californians" (1958) this Department stressed one facet of this situation as follows:

> "Since some water rights have existed from early mining days and some were acquired before the laws requiring the posting of notices and recordation of evidence of the rights were codified in 1872, and since riparian rights attach without any legal record being required, it is virtually impossible to determine the total water rights which exist without inventorying them by walking each stream in the State and noting all the diversions of stream flows which are in operation." (p. 7)

DWR quote

No comments

- n/a -

Mr. Holsinger's aforementioned testimony before the Engle Committee also confirms this absence of any accurate knowledge by the Department of many of these Northern "water rights," viz:

> "Only a small proportion of these rights on both rivers are of record anywhere." (Engle 772)

The further truth is that the computations heretofore made by the State's water experts as to the probable extent of the "surplus" water which they hope will be available for export from the Delta Pool are, at best, rough estimates (i.e., little more than educated guesses). Furthermore, they are legally binding upon no one.

Incidentally, the Engle Committee had before it similar "estimates" by State officials (in connection with the planning of the Central Valley Project) and it was shocked to learn how erroneous they proved to be:

> "Instead of an increased use of 300,000 acre-feet in the Sacramento Valley beyond that which existed when the project plan was first published the 'increased valley use' is 945,914 acre feet and the estimated amount of 'surplus water' for transfer to the San Joaquin Valley must be reduced accordingly.
>
> "Such an error reduces the amount of available 'surplus water' by about 650,000 acre-feet if the Sacramento Valley uses are valid as was claimed by witnesses in the recent hearings at Sacramento. (Engle 690)
>
> "Chairman Engle has received information indicating present uses are about 1,000,000 acre-feet greater than they were when project plans were made and the 300,000 acre-feet was originally allocated to meet probable increased uses in the Sacramento Valley." (Engle 694)

Now, what is the relevancy of all of this to the problem before us? It is that once the South enters into these "water export contracts" with the State the South:

a. will become (and continue to be) directly and financially interested in the extent (from time to time through the decades to come) of the amount of "surplus" water in the Delta Pool; and

relevancy of the legal Frankenstein ("unknown surplus")

No comments

- n/a -

b. will take (or compel the State to take) all possible steps (including litigation) to preserve and increase the amount of "surplus" in the Delta Pool; and

c. will inquire into and question the quantitative extent of every diversion right on the San Joaquin River System and the Sacramento River System (including all tributaries); and

d. will insist upon continued deliveries out of the Delta Pool of these huge quantities of water thus allocated to the South under any "export water contracts" and

e. will resist any attempt to reduce this "export pumping" out of the Delta.

When we add to the foregoing the indisputable consideration that the State will obligate itself (under the Brown Water Plan) to deliver these large quantities of water to the respective Delta Pool "exportees", the implications of this water plan become even more alarming to those of us who have spent years in the defense of Northern vested water rights, viz:

The completely unprecedented role of the State

It is evident from the foregoing considerations that, water-rightwise, the State and the South will be "on the same side of the fence." They will be bedfellows. Their mutual interest, at all times through the endless decades to come, will be to build up "surplus" and to cut down "non-surplus." In fact, the very financial solvency of the State in future years may very well hinge upon the success of these efforts to thus secure enough water out of the Delta to fully service these vital water contracts which will be the only source (i.e., apart from general taxation) of the large sums which the State will have to pay, each year for many decades, to amortize the billions of dollars of bonded indebtedness which Proposition One proposes to create.

In brief, this new "water posture" of the State under the Brown Water Plan augurs no good for the Northern water right owners.

It should also be remembered, in all of this, that the State has already filed on practically all of the (surplus) water still remaining in Northern California. In short, it has thus put itself in a position (water-rightwise) directly adverse to and inconsistent with these vested water rights of Northern California (i.e., the "non-surplus").

No comments

- n/a -

It is interesting to note, in this connection, that Metropolitan inserted in its draft of proposed water contract (dated June 9, 1960) a paragraph (4-a) as follows:

> "The State shall proceed with diligence in the acquisition and perfecting of water rights required for servicing all contracts, and shall protect with vigor the integrity of rights so obtained." (p. 4/1)

This was slightly "toned down" in a subsequent draft submitted by the State (September 3, 1960) as follows:

> "The State shall make all reasonable efforts to perfect and protect water rights necessary for the System and for the satisfaction of water supply commitments under this contract". (Par. 16-b; page 16/1)

what does contract say in my copy?

Therefore, the complete mutuality of interest between the State and the South (in thus preserving, protecting and increasing these "export waters" in the Central Valley) is clear and indisputable.

Now, with this as a background we will next deal with another and to me one of the most ominous aspects of this novel water plan, viz:

c. The Brown Water Plan provides absolutely no effective "controls" of any kind to so regulate or control this Delta "export pumping" that it will not invade or affect vested water rights of the Delta and the rest of the Central Valley.

Once these huge pumping plants start pumping water out of the Delta for export to the South, what will stop them? When and under what conditions will these pumping operations cease or be curtailed? Who will determine and control this? Under what criteria?

The Brown Water Plan is absolutely silent as to all of this'.

The answer to these several questions is, in my reasoned opinion, that these pumps will continue to operate unless and until they are stopped by litigation by the Valley farmers to protect their vested water rights.

The primary reason for this conclusion is that this Water Plan (SB 1106) contains absolutely no such "controls". *

* This "void" reminds one of the current international disarmament talks in which it is stressed that without effective controls agreements to disarm are meaningless.

No comments

- n/a -

Furthermore, in the absence of a comprehensive determination and a completely binding adjudication (i.e., binding upon the State and all other interested parties) there will be no effective and readily ascertainable demarcation (i.e., "boundary line") between "surplus" (on the one side) and "non-surplus" on the other. In the absence of such an obligatory definition of these two correlatives, there can be no effective (i.e., automatic) controls to delimit this "export" of water. When this "hard reality" is coupled with the indisputable fact that it will be directly to the mutual interest of both the State and the South to maintain this "export flow to the South" as continuously and on as large a scale as possible, the inevitability of direct and serious conflict between these vested water rights of the North and these "export allocations" is, I believe, patent. *

The serious import of all of this to Northern California is further indicated, I believe, when consideration is given to another "hard reality" of existing Central Valley hydrology:

d. There is a grave doubt as to whether any dependable and sizeable "surplus" of water exists in the Central Valley.

There are, of course, two major stream systems in the Central Valley, the San Joaquin River and the Sacramento.

It is indisputable that the San Joaquin River has no surplus. In fact, due to the huge inter-basin transfers of water under the Central Valley project, the San Joaquin River no longer exists (in large part) as a natural stream. ** Under the CVP it is, in the main, an artificial stream supplied with supposedly "surplus" water from the Sacramento River (by the Delta-Mendota Canal, Mendota Pool, etc.).

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* It should be stressed that the serious involvement and possible impairment of vested water rights which is being discussed in this Opinion will not be limited to the Delta Area or the other nearby "water areas". To the contrary, all vested water rights, including those in the various "water-rich sections" in the San Joaquin Valley (Merced River, Kings River, etc.) will be exposed to these same dangers.

** Its flows are impounded in its upper reaches by Friant Dam. Most of this water is sent southward to Tulare and Kern Counties by the Friant-Kern Canal. Some is sent to Madera County through the Madera Canal.

No comments

- n/a -

Furthermore, even the present existence of any substantial "surplus" water in the Sacramento River is questionable. In fact, the Engle Committee (after its exhaustive 1951 investigation of this very subject of "surplus" in the Central Valley) was surprised to learn that this alleged "surplus" was rapidly disappearing, if not actually non-existent, even then (i.e., as far back as 1951). In its formal "findings" that Committee concluded (inter alia):

> "Only one answer can be obtained from the foregoing testimony ..... That one logical answer is: If diversions continue at the rate they were being made in 1951, and there is no reason to believe they will be reduced, then the developed waters of the Sacramento River are overcommitted and oversubscribed.
>
> "The obvious result is that much less water is available for transfer to the San Joaquin Valley than was originally contemplated." (Engle 692)
>
> "Findings - (a) That for all practical purposes, the developed water supplies of the Sacramento River are overcommitted and oversubscribed;
> (b) Increased uses of water from the Sacramento River from the beginning of project construction in 1935 to the present are about three times the expected increase of 300,000 acre feet which was estimated by the State of California and Bureau of Reclamation officials in their original plans for operation of the Central Valley project;
> (c) Testimony indicated diversions from the Sacramento River would have caused the river to be dry for about 40 miles in July 1951 if stored water had not been available from Shasta Reservoir for Sacramento Valley use, and a large part of this water is destined for the San Joaquin Valley under the proposed Central Valley project operation;
> (d) Applications for use of American River water to be developed by Folsom Dam, an additional storage unit of the project now under construction, exceed by 'several times' the probable supply that can be made available through this source."* (Engle 679)

1951

* It is interesting to note that Congressman Poulson (now Mayor of Los Angeles) participated in the hearing and thereby learned of this "paucity" of "surplus" water in the North. He also concurred in these Findings. Yet this same gentleman is a very vocal advocate of the Brown Water Plan, the basic predicate of which is the aforementioned unwarranted assumption that a large amount of "surplus" water exists in the Central Valley.

No comments

- n/a -

Another interesting statistic pertinent on this "surplus" phase is the explicit statement in the "Preview of the California Water Plan" (published by the State in 1956) that there is only enough water in the Central Valley to take care of the needs of this Valley (i.e., present and future), viz:

> "As regards the Central Valley Area, it is coincidental that with 48 per cent of the State's run-off this area should ultimately require almost exactly 48 per cent of the developed water supplies." (Preview, p. 6)

What more cogent confirmation could there be of the fact that there is no "surplus" water in the Central Valley available for permanent export over the Tehachapi Mountains to Southern California!

Furthermore, the dangerous nature (to the North) of this new "hydrological picture" which the Brown Water Plan will create becomes even more manifest when another "hard reality" of our California hydrology is noted, viz:

e. California's frequent "dry cycles" drought

An unfortunate characteristic of California hydrology is, of course, the very irregular regimen of the flows in our stream systems, particularly those draining into the Central Valley from the Sierra watersheds. These flows vary radically, not only from month to month but from year to year. This aspect is summed up in the aforementioned "Preview of the California Water Plan" as follows:

> "In addition to the characteristic variation in its natural water supply within the year, California is subject to extended wet and dry periods. In the late 20's and early 30's we suffered a severe drought--one of a great many in the past--during which runoff in the streams throughout the State for a 10-year period averaged only a little more than 50 percent of the long-time mean. In this connection, while the state-wide runoff has averaged some 71,000,000 acre-feet per season, the actual seasonal flows have varied from as little as 18,000,000 acre-feet to more than 135,000,000 acre-feet.

> "The normal monthly variations in occurrence of the water supplies of California, as well as the periodic droughts, create a most basic problem relative to the development and use of water...." (Preview, pp 7-8)

No comments

- n/a -

Now, when these dry cycles recur in the future (as they undoubtedly will) what will stop (or even slow down) these Tracy pumping plants? What will be the governing or effective legal controls in such a situation? The simple answer is that under the Brown Water Plan there are and will be no such effective controls. Which means (among other things) that (as Henry Holsinger so aptly expressed it):

> "interminable conflicts, disputes, and litigation will necessarily ensue."

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f. Fair Play, Justice, etc.

Some persons may endeavor to minimize or explain away this basic defect in the Brown Water Plan by contending, in effect, that we must presume that the State (in its aforementioned novel and unprecedented role as financier, owner, operator and "export right protector") will be fair, just and honorable, and will so operate these Tracy Pumps (and the other facilities of this project) as to preclude any such involvement or impairment of vested water rights.

Any such attempted answer to this legal criticism is, in my humble opinion, patently unsound and specious for several distinct reasons:

The first is that in the absence of any comprehensive adjudication of the legal extent of "surplus" and "non-surplus", the State would not have any effective "control criteria" to apply to this "export pumping", even if it wanted to be fair and just to the vested water right owners.

Secondly, the State's aforementioned direct and vital financial interest in the continuation of this "export pumping" would, of course, be a strong and perhaps preponderant motivation in any such decision by it. As stated above, the very financial stability of the State will directly depend upon such "water exports" and the net revenues produced therefrom. Furthermore, the State must act (under the Brown Water Plan) as the South's "water protagonist" to protect and preserve any allegedly "surplus" water in the Delta Pool.

In other words, any hope or expectation that the State (or its "export ally" - the South) would thus worry about these "open-ended" vested water rights of the North bespeaks, I believe, a naivete and altruism wholly inconsistent with and unconfirmed by the "hard realities" of California water practices.* To borrow an apposite

* Mono County is but one of the many illustrations in California history of the inanity of hoping for or depending upon any such altruism.

No comments

- n/a -

phrase from Mr. Holsinger:

> "However, attention to realities should convince any reasonable person that any such anticipation is Utopian and not reasonably possible of fulfillment". (Engle 766)

And, in concluding this chapter, there is a very rough analogy which occurs to me which may point up for laymen unacquainted with the intricacies of water law or water rights, the essence of this new "water picture" which SB 1106 will bring into being (with the so-called Delta Pool as its central feature).

Mr. Pigmy and Mr. Giant find themselves stranded in the Mojave Desert on an arid day. There is but one bottle of water between them (in the possession of Mr. Pigmy). He has "vested" rights therein, which Mr. Giant readily agrees to recognize. Mr. Pigmy therefore generously consents to share this water with Mr. Giant. Each inserts his "sucking straw". Naturally, Mr. Giant's thirst is gargantuan. Likewise, his straw is king-size. The avid draughts begin. Unfortunately, however, for Mr. Pigmy, the quantitative extent of his "vested right" has not been pre-determined, nor agreed upon, nor marked on the bottle. Does it require a water lawyer to envisage the dire results for Mr. Pigmy? Or the resulting impairment of his "vested right"?

And, to carry this homely analogy a step further: Mr. Pigmy, aghast at this impairment, complains to a passing policeman for protection but finds, to his chagrin, that this chap is a close associate (both financial and otherwise) of Mr. Giant! *

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* I trust that this Honorable Committee will pardon this digression into the Mojave Desert. Its sole justification is the "aridity" (if not "rigidity") of this "Opinion".

No comments

- n/a -

QUESTION NO. 3. DOES THIS WATER PLAN ADEQUATELY PRESERVE AND PROTECT THE SO-CALLED "AREA OF ORIGIN RESERVATIONS" OF NORTHERN CALIFORNIA (i.e., "COUNTY OF ORIGIN" AND "WATERSHED OF ORIGIN" PROTECTION)?

I - OPINION: SB 1106 does not properly preserve and protect these important "water reservations". To the contrary, the Brown Water Plan exposes them to a serious danger of severe diminishment, and to possible extinction.

II - SUPPORTING ANALYSIS AND ARGUMENT: Before reviewing the several salient legal reasons underlying my said conclusion, I will first briefly describe (for the benefit of any interested layman) the legal nature of these "preferential water rights" in favor of our Northern "areas of origin" and their importance to Northern California.

1. Nature of these "preferential rights"

These important "preferential water reservations" are based on two distinct sets of statutory provisions. The first is the so-called:

a. County of Origin Statute (Sections 10500-10505 of Water Code)

These provisions of our law have the effect of reserving for every county all of the water originating in such county which will be needed at any time in the future for the development of any portion of such county (i.e., either by public or private agencies).

This "reservation" or "preferential right" of a county to recapture and use in the future its "surplus" water (i.e., over and above that needed for "vested" water rights in said county) is obviously one of great importance to all Northern California's counties. This affects all counties in the Central Valley, including those in the San Joaquin Valley.*

Incidentally, a more detailed explanation of this "County of Origin" phase is to be found in the writer's aforementioned Opinion of February 8, 1957 (to the CWPA).

* Certain water interests in Fresno County recently learned in a water right proceeding before the State Water Rights Board (Application Nos. 6733, etc.) of the vital importance to them of this "County of Origin" statute.

No comments

- n/a -

b. "Watershed of Origin" Provisions (Sections 11460 to 11463 of Water Code)

This is the second (and an entirely distinct) phase of our "area of origin protection." In essence, this "watershed of origin statute" gives our Northern "watersheds" (and the "areas immediately adjacent thereto which can conveniently be supplied with water therefrom") a "preferential right" (for their future water needs) in and to the waters naturally occurring in such "watersheds".

It should be noted that these statutory provisions form a part of the legislation in the Water Code dealing with the Central Valley Project. The "County of Origin Statute" is not a part of the Central Valley Project legislation. The legal significance of this difference will be explained hereinafter.

context of area of origin laws

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2. Vital Importance to the North of these "Reservations"

These "reservations" are obviously of crucial importance to the North. They constitute the prime (if not only) source of water which will be needed for the future expansion and development of Northern California during the endless decades to come. It is apparent, therefore, that this question as to whether the Brown Water Plan (SB 1106) adequately preserves and protects these "area of origin reservations" is a most important one to the North.

3. Deficiencies in SB 1106 on this phase

With the foregoing as a brief background, I will now explain why I firmly believe that SB 1106 fails to adequately protect and preserve these important "preferential water rights" of the North.

Summarily stated, my principal criticisms of SB 1106 from the standpoint of this "area of origin phase", are:

a. This "area of origin protection" should have been made a permanent feature of the Brown Water Plan, but this was not done. It is now purely statutory and if the South gets control of the Legislature at any time in the future such protection can be entirely wiped out.

No comments

- n/a -

objective of the South which was to acquire a perpetual and irrevocable quantitative allocation out of these already "over-drawn" water resources of the Great Central Valley.

Governor Brown repeatedly promised throughout Northern California that these important "water reservations" would be fully preserved and protected under his water plan.* We therefore submitted various proposed legislative provisions to accomplish this. Among other things, we tried to have these "area of origin reservations" expressly recognized and incorporated in SB 1106 so that they would thereby become a permanent feature and condition of this legislation. These provisions would also have made it mandatory for the State to expressly incorporate these "reservations" in every "export water contract" and thus make all "export" of waters from the Delta strictly subordinate thereto.

Unfortunately, we failed to achieve these objectives. One of the reasons for our failure was, I believe, said close collaboration between the Governor's water advisers and legislative draftsmen and various legal and engineering experts of the South. I might add, however, that we at least managed to exact a promise from Mr. Harvey Banks (Director of the Department of Water Resources) that as long as he had anything to do with these "water contracts" (i.e., under SB 1106) he would insist that they contain appropriate provisions expressly recognizing these "area of origin reservations". He made this promise on various occasions. It is regrettable, however, that this is not the present "policy" of the Administration. The proposed contract with Metropolitan is completely silent on this important aspect.

Banks' promise

Sub contracts silent

Justice and propriety of this request for permanent preservation and protection of these reservations.

It may be argued by some that inasmuch as this "area of origin protection" is now only statutory (and thus "impermanent"), it should not be made a permanent feature of the Brown Water Plan. I believe, however, that the legal and moral justification for "permanence" can be demonstrated by several considerations.

The first is that (as pointed out in another portion of this Opinion) the South presently has no physical or legal ability to become interested in (or intermeddle with) the water resources in or water rights of the North.

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* This "area of origin protection" was one of the five points covered in my letter to Governor Brown of May 1, 1959, with which he agreed in every particular in his letter to me of May 8, 1959 (p. 11, supra)

No comments

- n/a -

One result of this is that these "area of origin reservations" are not now in jeopardy. Under this present state of affairs, they are virtually permanent because there is no reason nor incentive for attacking (or repealing) them. As between the water right owners of the North (i.e., in different sections of the Central Valley) they have worked quite satisfactorily to date and will in all probability continue to do so.

This whole picture will radically change, however, if and when the South is permitted to become physically and legally interested in these Northern waters (under the Brown Water Plan). These "water reservations" will then constitute a constant "thorn in the side" of the South and it no doubt will (unless precluded by appropriate and continuing legal restrictions) make every effort to obviate or vitiate these "water reservations."*

It would seem only fair and just that if the South is to be given this desired and important privilege of participating in these water resources in the North it should be willing (as a fair price for its "ticket of admission" to such participation) to readily agree that these "area of origin reservations" for the North should be made a permanent feature of any new State Water Plan. It might also be mentioned, in this connection, that Northern California (which has always stood ready to allow the South to participate in these Northern waters under a fair and sound water plan) will, in effect, guarantee (by its large percentage of the assessed values in the State) the huge general indebtedness which the State proposes to assume in order to thus make it possible for the South (for the first time in history) to be put in a position to thus become directly interested in, and gain benefits from these water resources in the North.

Unfortunately, however, despite much importuning by Northern representatives, the Brown Administration did not see fit to make this present statutory protection for these Northern areas of origin a basic and permanent feature of this new water plan. In short, SB 1106 does not contain this vital protection which our group of Central Valley water lawyers deemed so necessary.

but why?

As a matter of actual fact, there are no direct references whatsoever (in SB 1106) to the aforementioned statutory provisions which presently embody this "area of origin protection". Furthermore, the aforementioned

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* The detailed monograph prepared by Mr. Samuel B. Morris, one of the South's leading water "experts" and spokesmen (and formerly General Manager and Chief Engineer of the L.A. Dept. of Water & Power) under date of September 19, 1956 and entitled "The Feather River Project and the California Water Plan" shows how clearly and carefully the South's experts have studied these "area of origin reservations" and various means of solving (from the South's viewpoint) the problems created thereby for the South.

No comments

- n/a -

"County of Origin Statute" is not even indirectly referred to in SB 1106. It is not mentioned or incorporated in this legislation either directly or indirectly.

There is, however, a most indirect and quite "left-handed" reference (in SB 1106) to the "Watershed Protection Act." This is to be found in paragraph 12931 of SB 1106 which provides (inter alia) that:

> "any facilities heretofore or hereafter authorized as a part of the Central Valley Project or facilities which are acquired or constructed as a part of the State Water Resources Development System with funds made available hereunder shall be acquired, constructed, operated, and maintained pursuant to the provisions of the code governing the Central Valley Project, as said provisions may now or hereafter be amended."

These are the only provisions of SB 1106 to which the Administration can point as incorporating any of this "area of origin protection" in SB 1106. These provisions make it manifest, of course, that if the Central Valley Project Act is subsequently amended so as to eliminate this "watershed reservation" this "protection" in the CVP legislation will vanish and no longer apply to any part of the Brown Water Project (SWRDS). Incidentally, we strenuously but unsuccessfully fought the inclusion (by the Administration's representatives) in this legislation of this short but significant phrase:

"as hereafter amended"

This brings us to my second principal criticism:

b. The Brown Water Plan (SB 1106) will place both the South and the State in a position directly antagonistic to these important "preferential water rights" of the North. This will lead to future serious involvement and possible impairment thereof (as well as much trouble and confusion for the North.)

As shown in a previous portion of this Opinion, the end result of the Brown Water Plan will be that the South will be "sitting next to the Delta." It will, in effect, be a gigantic and powerful "water octopus" sitting astride of the Delta Pool with its potent tentacles reaching into

water octopus image

No comments

- n/a -

every nook and cranny of our Northern stream systems, even to the uppermost reaches thereof. Among other things, this will mean that the South (and the State) will be directly interested in and affected by every future water application filed in the North (under these "area of origin preferences"). Why? Because to the extent that any such appropriations of water are hereafter allowed (i.e., in connection with the future growth and development of the North), to that very same extent the "surplus" available in the Delta for export to the South is thereby diminished. This is one of the problems covered at length by Mr. Samuel Morris in his aforementioned 1956 analysis of the so-called Feather River Project.

It should also be stressed, in this connection, that these "water reservations" for the North are not self-executing or automatic. To the contrary, as and when portions of this "reserved water" are needed in the future, the people (public agencies, etc.) seeking to make an appropriation and use thereof will have to file (and duly process) in the Department of Water Resources (in accordance with established procedure) specific applications covering the appropriation and use of this water. They also will have to secure any necessary "assignment" or "release" from the State.

All of these applications will, of course, be subject to protest. Many issues could be raised by a vigorous protestant (including the "fuzzy phases" of this present legislation - some of which are touched upon hereinafter).

I will leave it to your judgment as to whether the South (and its new "water ally" - the State) will sit silent in the face of such future attempts to thus diminish the available "surplus" in the Delta Pool. ←

Next is my third criticism, viz:

c. The various existing ambiguities and uncertainties in this "area of origin protection" should have been corrected and eliminated as a part of this new water legislation. This was not done.

Time limitations will not allow any extended analysis herein of the many shortcomings of and uncertainties in this existing "area of origin protection". They are serious and should have been clarified in this new legislation. We tried to accomplish this but failed, due to the

No comments

- n/a -

complete lack of cooperation by the "water spokesmen" and draftsmen of the Administration. I will, however, touch upon but a few highlights in this connection.

"County of Origin Statute"

There could be an extended dispute as to whether this important statute applies at all to this Brown Water Plan (i.e., the State Water Resources Development System). The reason is that this is, of course, a State project. There is a school of thought that this "County of Origin Statute" (and particularly its vital Section 10505) would not apply to the State in its new role as owner and operator of the water project contemplated by SB 1106. In fact, a committee of "water experts" (including eminent lawyers) concluded, in 1956, that this "County of Origin Statute" did not apply to the State. This was a special subcommittee of the Statewide Water Resources Committee of the California State Chamber of Commerce. This subcommittee was appointed for the particular purpose of studying and reporting upon this "area of origin" phase in connection with the California Water Plan. The chairman was Burnham Enersen, Esq. Among its other members were such distinguished water lawyers as Chas. C. Cooper, Jr., Esq. (counsel for Metropolitan); Gilmore Tillman, Esq., (counsel for the Los Angeles Department of Water & Power); Wallace Howland, Esq., (Assistant Attorney General of the State of California); Martin McDonough, Esq., of Sacramento, Mark C. Nosler, Esq. (principal attorney for the California Department of Water Resources). In fact, the entire committee consisted of lawyers except for two ranchers (one of them being Mr. Bert Phillips) and two engineers (one being Mr. Samuel B. Morris). This subcommittee made its report on November 30, 1956. Among other things, it concluded that Section 10505 does not apply to the State as such. This conclusion is expressed as follows in its formal report:

COS might not apply to the State

> "Although the section is brief and is expressed in simple terms it has been the subject of much controversy and its meaning and effect have been much misunderstood. The principal and significant features of the section appear to be these:
>
> "(a) The section does not by its terms restrict or otherwise affect the use by the State itself of water appropriated by the State pursuant to the Feigenbaum Act. Rather, it appears to be focussed upon the assignment of State applications to other parties, such as, for example, municipal corporations, districts, private parties or the United States

No comments

- n/a -

Government. Stated very broadly, the section applies primarily to non-state water resource development." * (p. 6 of Report)

The writer disagrees with this conclusion of said subcommittee. It is quoted, however, to show that (even before SB 1106 was formulated) this "County of Origin Protection" was a subject of conflicting views.

Two other things should be noted in this connection.

The first is that the aforementioned conclusion was reached by said Subcommittee notwithstanding the fact that Section 10504 (as it existed in 1956) contained an "assignee definition" similar to that contained in the present statute.

The second is that this "County of Origin Statute" is not a part of the Central Valley legislation and therefore has not been included (either by reference or otherwise) in SB 1106.

Therefore, the applicability of this important phase of the "Area of Origin Protection" to the Brown Water Plan is thus left in a somewhat "clouded condition". To say the least, the matter is not beyond the possibility of dispute.

"Watershed Protection Statute"

There are various substantial uncertainties in connection with this phase of the "Area of Origin Protection". In fact, some of these were pointed out by then Attorney General Edmund G. Brown in a formal Opinion (No. 53/298, under date of February 5, 1955 - issued in response to a request from Senator Edwin J. Regan). This Opinion covered the subject of "Area of Origin Protection". After discussing various uncertainties in these statutes, the Attorney General concluded:

> "However, if litigation and the need for judicial construction is to be minimized, in all candor it must be stated that the certainty of this description leaves something to be desired."

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* In all fairness, it should be added that this formal report was not signed by various "Northern" members of the Subcommittee. It did, however, receive the support of Mr. Samuel Morris and other "Southerners".

No comments

- n/a -

I might add that the Governor and his staff were reminded by us (on more than one occasion during the processing of SB 1106 through the Legislature) of this "fuzzy condition" of these statutes; and the need for correction thereof in connection with his new Water Plan. *

Another phase of the present "fuzziness" of this "Area of Origin Protection" should also be touched upon, viz:

General vs. Specific Reservations

There are two schools of thought on the question as to whether these "water reservations" for the areas of origin must be general or specific. There is a vast and important difference between these two concepts. **

A specific reservation means that a definite quantity of water must be fixed and reserved for the future needs of the "area of origin" (i.e., "county", etc.). On the other hand, a "general reservation" would entitle the area in question to all the water it might need in future decades, without any quantitative limit being fixed at the time the reservation is made (i.e., in connection with a proposed "assignment" or "release" of a state filing). This basic difference was pointed out by the Division of Water Resources in its testimony before the California Water Project Authority on August 31, 1954. It stated:

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* This was discussed in our meeting on the evening of February 25, 1959 and also adverted to in my letter to the Governor's secretary on February 26, 1959:
"The deficiencies of our present statutory protection for these "areas of origin" are well known to the Governor (as a result of the report of his Attorney General's Water Lawyers Committee, etc.). As epitomized the other evening, this situation is in a 'fuzzy' condition (to say the least).
"It has been generally agreed in the various prior discussions and debates by both Northern and Southern water spokesmen that these 'areas of origin' deserve full and adequate protection under the California Water Plan (when authorized).
"Therefore, there should be no great difficulty in working out in the Administration's 1959 CWP legislation a fair formula to cover this phase. We believe that this protection should be firmly embedded, as a basic policy, in such legislation."

** This subject is dealt with fully in my Memorandum Opinion of February 8, 1957, to the California Water Rights Protective Association.

No comments

- n/a -

"The principal advantage to the counties of origin to be gained by having a general reservation is that the general reservation would, in effect, reserve for those areas all the water that may ultimately be needed for reasonable beneficial use in the future. This general reservation would provide for various factors which are unknown at the present time while a specific reservation, being necessarily based on an estimate might provide for either too small or too great an amount. A specific reservation would limit the amount of water that would be available to the counties of origin under the State filings." (See "Answer to Question No. 4, Program For Financing and Constructing the Feather River Project". Appendix H, p. 117)

general vs. specific reservation of water

The various water representatives of the South have been contending and urging for a number of years that these "reservations" should be specific, not general. In fact, the aforementioned "area of origin" subcommittee of the State Chamber of Commerce specifically recommended this in its report dated November 30, 1956. Speaking of the "reservations" to be made under the "County of Origin Statute" this report states:

"Assignments or releases containing such general reservations present the same difficulties as do the present provisions of Section 11460 to 11463 with respect to the operations of State water projects. They leave the rights of the county of origin undefined, and they leave the exported water subject to 'recapture' whenever needed locally. It is the recommendation of the subcommittee, therefore, that the agency which passes upon this question (i.e., the State Water Rights Board) should make a quantitative determination of the water which is to be reserved to the county of origin. The attached proposal contains provisions designed to accomplish this result." (p. 20)

← recapture

The unfairness and impracticability of any such attempts to thus definitively forecast the future quantitative needs of these "areas of origin" (through the many decades to come) was well pointed out in our final report of Attorney General Brown's Water Lawyers Committee (dated January 3, 1957)(Assistant Attorney General Wallace Howland, Chairman). Speaking of the South's desire to thus (i.e., by specific reservations) put quantitative tags and limits upon Northern California's future water requirements, this report states:

"Hence, it is argued that the ultimate future needs of the areas of origin must be determined now, as a necessary mathematical step in placing a quantitative limit on the water reserved for use in such areas and that this, in turn, is a necessary step in the determimtion of the surplus available for export.

No comments

- n/a -

"On the other hand, from the viewpoint of the areas of origin it must be admitted that there is no crystal ball in which to foresee the future. What the future needs of the areas of origin will be, only time will tell. Present determinations of future needs can only be estimates of the minimum needs made in the light of present day knowledge. Moreover, the most "consistent thing" about California history of the past thirty years has been the extent to which the State has exceeded the best estimates of its rate of growth and the resulting need for expanding services of all types." (p. 15 of Report)*

Incidentally, ample evidence of this quite understandable inability (in public works), to foretell the future, abounds all around us. One good example is our many outmoded and inadequate highways (including some freeways) which were built but a relatively short time ago, presumably adequate to serve us for many decades, but already largely outmoded. And planned and built by able and conscientious engineering staffs!

It would seem evident from the foregoing that, for the proper protection of the North and in all fairness and justice, any and all uncertainties and "fuzzy phases" in connection with this important problem of "general v. specific" reservations for these "areas of origin" should have been definitely resolved and eliminated as a part of this new water planning. In brief, this legislation should have expressly provided for "general reservations" for these "areas of origin". However, despite our repeated efforts to accomplish this (and other proper protection for these areas), this was not done. The "water experts" of the Administration were deaf to such suggestions.

The foregoing comprise some of the reasons why the writer is of the firm opinion that SB 1106 falls far short of any adequate protection for these "area of origin reservations."

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* The danger and impracticability of such specific reservations was also pointed out by me in my "Interim Report" as Chairman of the 1956 Water Lawyers Committee of the San Francisco Bar Association (dated December 28, 1956), viz: "In short, this proposed procedure would necessitate a high degree of 'crystal ball gazing' into the future in an effort to guess at many imponderables, a 'determination process' which appears to me to be quite dangerous and impracticable."

No comments

- n/a -

Before leaving this subject there is one other facet which I briefly wish to discuss, viz:

4. The Impossibility of Subsequently "Correcting" these Deficiencies by Future Legislation

Various Administration spokesmen are now attempting to allay the rather widespread fears arising as a result of the aforementioned and other shortcomings of SB 1106, by representing to the electorate that all such defects can and will be corrected by subsequent legislation. They are proclaiming, in effect, that: "It is better to have a water plan with problems and defects (which can and will be remedied later), than no water plan at all."

From a legal standpoint such "propaganda" is indefensible. The juridical truth is that if SB 1106 is approved by the People, it will be beyond the power of the Legislature to make any substantial changes in it (e.g., to implant therein, as a permanent feature of the Brown Water Plan, this important "area of origin protection"). As Hon. Dion Holm, Esq., stated, in his formal opinion to the City of San Francisco (No. 1426 - dated March 8, 1960) (re SB 1106), viz:

> "My purpose in pointing out the foregoing to you is based on the fact that the Legislature will have no power to amend the act once it is approved by the people and no power to repeal it once general obligation bonds are sold." (p. 5)

--o0o--

No comments

- n/a -

QUESTION NO. 4. DOES SB 1106 AFFORD PROPER PROTECTION FOR THE SACRAMENTO-SAN JOAQUIN DELTA (SALINITY CONTROL, LEVEE PROTECTION, ETC.)?

I - OPINION: It is my firm opinion (based on a close personal knowledge of the Delta and its multiple and complex hydrological aspects) that SB 1106 does not, from a legal standpoint, properly protect the Delta. On the contrary, this Brown Water Plan (SB 1106) will seriously aggravate and intensify the already existing and critical legal and hydraulic problems of the Delta.

As a legal minimum, this legislation should have required, as a basic and indispensable legal condition precedent to any "export" of water out of the Delta, that which we call in water law a "physical solution" ~~fully~~ to ensure complete and effective protection for the Delta in connection with its complicated and perplexing hydrological difficulties. This has not been done (or even hinted at) in SB 1106.

II - SUPPORTING ANALYSIS AND ARGUMENT: It would take a rather large volume (e.g. exceeding the size of the excellent Engle Committee report of almost two thousand pages) to discuss in detail these many serious hydrological and legal problems of the Delta (all of which are relevant to your question). As this Honorable Committee knows, various and voluminous reports have been published over the years by the State and others with respect to these problems of the Delta (e.g., salinity control, etc.). Therefore, and because of time limitations, I will do no more herein than sketchily touch upon some of them with the hope of demonstrating (at least by generalties) the soundness of my foregoing appraisal of SB 1106 (insofar as it relates to the Delta).

Summarily stated, my reasoned conclusions as to the legal inadequacy of SB 1106 on this phase are:

1. It neither requires nor provides for any mandatory and effective "physical" solution of the already critical salinity problem. In fact, the Brown Water Plan will substantially aggravate this serious Delta difficulty with possible huge losses to the Delta landowners and water users.

2. It fails to legally protect, in any way, the vested water rights of the Delta. Moreover, it actually exposes such rights to a very real and imminent danger and probability of infringement and impairment.

No comments

- n/a -

3. The Brown Water Plan (as now formulated) could seriously and adversely affect the intricate levee systems so vital to the Delta.

4. It will bring about serious drainage problems.

5. It does not adequately preserve and protect, from a legal standpoint, the important recreational features of the Delta.

Before briefly dealing with these phases, I will set forth (for the benefit of those interested persons who are not familiar with the Delta) a few "highlights" as to its location and physical characteristics.

The Sacramento-San Joaquin Delta

This area comprises several hundred thousand acres of excellent and highly developed agricultural lands. It is reputed to be one of the prime and richest farming areas in the world. It lies at the confluence of the Sacramento and San Joaquin River; and is situated mainly in San Joaquin, Sacramento and Contra Costa counties.

At the western extremity of the Delta is located a very extensive industrial complex with many large factories and other industrial units, most of which are directly dependent upon the continued availability of fresh water of good quality from these nearby stream systems.

One of the principal hydraulic features of this Delta area is the myriad of natural river channels, sloughs and other watercourses which meander in a highly irregular pattern throughout this entire area. One consequence is that a large part of the Delta consists of many islands entirely surrounded by these water channels.

Another physical feature is that much of the land in the Delta is considerably below the level of the adjacent water channels. Consequently, a vast and intricate system of earthen levees (with an aggregate length of many hundreds of miles) is used to prevent the inundation of these low-lying lands.

In some portions of the Delta (particularly in its westerly reaches) a serious and continuous problem of land subsidence exists, due to the nature and texture of the soils in such areas, etc.

No comments

- n/a -

All of these many disparate but interrelated hydraulic characteristics create for the Delta (as all competent experts concede) an extremely complex "hydrological picture", with numerous interlocking hydraulic and other physical facets, all in close and delicate physical balance. Naturally, this intricate hydrological situation makes the Delta's legal problems (water-right and otherwise) peculiarly difficult and complicated.

In the light of this short "physical background", I will now briefly discuss some of the legal criticisms of SB 1106 set forth above in summary fashion.

---

1. SB 1106 neither requires nor provides for any mandatory and effective solution of the already critical "salinity problem". In fact, the Brown Water Plan will substantially aggravate this problem, with possible huge losses to the Delta landowners and water users.

The critical nature of this "salinity problem" is, of course, well known. It suffices to state that, due to tidal and other hydraulic phenomena occurring in the San Francisco Bay (and its upper reaches - Suisin Bay, etc.) there is an ever present and extremely serious menace of "salt-water intrusion". In other words, the salt water from the bay (and ocean) thus moves upstream and (unless prevented from doing so) intrudes into these "fresh water channels" of the Delta, with consequent serious injury (if not complete ruin) of these Delta lands and the crops thereon.

From time immemorial, the outflow of "fresh water" (coming down the Sacramento and San Joaquin Rivers) has provided a natural barrier to repel this "salt water intrusion". However, during some periods of the past these river flows of "fresh water" down to and through the Delta have not been adequate. This has been particularly true in several past "dry cycles". The severity of this salinity problem, even in the "pre-project era" (i.e., before the advent of the Central Valley Project) can be illustrated by reference to the following official report:

> "Gradually, as reclamation of the Delta and development of the use of water took place upstream, the amount of water available for natural salinity control decreased until in 1924, 1931, and other dry years, the encroachment of saline waters reached serious proportions.

No comments

- n/a -

During the late summers of those years irrigation in a large part of the Delta was made impossible by the degree of concentration of salinity in the waters of the channels." (Report on 1956 Cooperative Study Program, Department of Water Resources, Vol. 1, p. 27)

Another official depiction of this hydrological problem is:

"The greater part of the water diverted for irrigation, from the Sacramento River above Knight's landing, is for rice culture. As a result of these diversions, combined with the natural lack of water following three consecutive years of very low precipitation, the amount of water reaching the city of Sacramento in the summer of 1920 fell to the minimum of 500 to 700 second-feet and in consequence salt water was able to work its way upstream in harmful quantities as far as Grand Island on the Sacramento River and Andrus Island on the San Joaquin and Mokelumne Rivers (see inclosure No. 12 and pp. 85-87 of the Report of Division of Water Rights, inclosure No. 17). The crops of the delta, valued at $35,730,800 that year, were seriously endangered by the salinity of the river, and the land escaped permanent damage on a large scale only by reason of the heavy sustained rains of the following winter, which effectually flushed the salt out again." (Engle 165)

Central Valley Project (CVP)

One of the primary objectives of this project was that of providing much better salinity control and protection for the Delta. This objective was supposed to be accomplished by the maintenance (by water "releases" from the upstream reservoirs of the CVP-Shasta Lake, etc.) of sufficient flows of "fresh water" to, through and from the Delta to effectively repel and control this ever threatening "salinity intrusion".

The voluminous official reports (both State and Federal) prepared in the planning of this CVP project make it manifest that this "salinity control" was one of the important phases of the Central Valley Project.

No comments

- n/a -

Surprisingly enough, however, the Federal government has in recent years (i.e., now that the CVP is operating and it appears that the amount of alleged "surplus water" in the Delta is far below the previous official estimates), been indicating that it disclaims any real responsibility (as operator of the CVP) for such salinity control (i.e., as a mandatory feature of the CVP). This is a situation which in my opinion can and probably will lead to extensive litigation (a subject treated in a subsequent section of this Memorandum).

I do wish to stress, however, in connection with this CVP project (which, of course, is already built and functioning) that it involves the storage and detention in its upstream reservoirs (on the Sacramento River, etc.) of large quantities of water which otherwise, in a state of nature, would normally flow down these streams and thereby serve to "repel salinity intrusion"; as well as to periodically "flush out" the saline consequences thereof in the lower reaches of the Delta. It is true that these "stored flows" are subsequently released from these reservoirs and then flow down stream. However, if the Federal government is successful in its aforementioned avowed purpose of not devoting these "delayed flows" primarily to "salinity control" and secondarily to "export" to the San Joaquin Valley, the gravity of the Delta's "salinity problems" (both physical and juridical) created or aggravated by the CVP is, I believe, patent.

The Brown Water Plan

One of the widely publicized purposes of the so-called Feather River Project (as officially proclaimed over a period of years) has been that of providing (among other things) full and effective "salinity control" for the Delta. It would be expected, therefore, that SB 1106 (i.e., this proposed permanent legislative implementation of the FRP) would contain clearcut and effective provisions making such full and effective "salinity control" a mandatory feature of this new water plan. More specifically, this legislation should have made effective "salinity control" a legal condition precedent to any export of water out of the Delta.

Has it done so? It patently has not. This phase will be dealt with further hereinbelow in connection with my discussion of the subject of a "physical solution". However, in leaving this "salinity phase" for a moment, I wish to stress that this Brown Water Plan will also involve (as does the CVP) the impounding and periodical detention, in various upstream reservoirs, of large portions of the flows of the Sacramento River, with a consequent substantial alteration of the regimen of seasonal flows of "fresh water" to and through the Delta; and a resultant aggravation of the Delta's "salt water intrusion" problem.

No comments

- n/a -

This brings me to the second criticism above, viz:

2. SB 1106 fails to legally protect, IN ANY WAY, the vested water rights of the Delta. Moreover, it actually exposes such rights to a very real danger and probability of infringement and impairment.

This subject has been covered in prior portions of this Opinion. It will also be dealt with in a subsequent "litigation section". It suffices to state at this juncture that, from a water-right standpoint, the serious involvement and possible impairment of water rights (which subjects are discussed in prior sections of this Memorandum) will be especially severe and critical for these Delta water right owners. They are, of course, in the immediate "zone of influence" of these huge pumping drafts of water out of the Delta (i.e., both under the existing CVP and the proposed Brown Water Project)

In view of the aforementioned entire absence in SB 1106 of any governing legal criteria or effective and mandatory legal controls to restrict this "export pumping" the inevitable result of this "legally uncontrolled water exportation" will, in my opinion, be acute "water-right problems" for these Delta water right owners.

My third criticism is:

3. The Brown Water Plan (as now formulated) will seriously and adversely imperil the intricate levee systems so vital to the Delta. SB 1106 contains no legal protection against this.

One of the hydrographic features of the Delta which operate in "delicate balance" is the aforementioned extensive system of earthen levees. (and the water diversion facilities incidental thereto)

The writer can testify as to this from long personal experience as a director of one of the large reclamation districts in the Delta. Although our district is supposed to have (according to our engineer) one of the (if not the) finest and strongest levee systems in the entire Delta, the writer and his co-directors have, during the past fifteen years, "sweated out" a number of critical flood crises. One of the physical features of most of these earthen levee systems is the relative shortness (or scarcity) of "freeboard" (i.e., the distance between the normal water

No comments

- n/a -

line and the top of said earthen levees). The hydraulic problems thereby created are quite serious. A couple of them might be noted in passing. The first is that, if, due to the proposed radical alterations in the hydrology of the Delta (under the Brown Water Plan) the water levels in these channels (i.e., thus "contained" by these levees) are held at a higher level in these channels for any substantial additional period (or periods) of the year, severe (if not disastrous) weakening of these earthen levees can and will occur. There is no legal protection against this in the Brown Water Plan.

Another of the important hydraulic features incident to this extensive system of levees is that the diversion facilities and devices (mainly pumps) used to extract and transport water from these channels (through or over these levees) for irrigation of the adjacent farmlands are, in the main, quite critically related to the existing water levels in these water channels. Here again, if any substantial and abnormal alterations in channel flows or channel characteristics occur, the results for these water diversions will be quite serious. There is, in SB 1106, no legal protection against this.

Now, the Brown Water Plan will presumably involve the construction of large new water channels (i.e., the so-called master "water channels", "wasteways" etc.) In short, as now theoretically and tentatively planned on paper, most (if not all) of these Delta levee systems will be radically altered.

In view of this huge proposed "plastic surgery" on the face of the Delta, one would naturally expect that this proposed permanent legislation (SB 1106) would spell out (in clear detail) specific legal requirements to adequately and fully protect these existing and critical levee systems (and the channel flows " corralled" thereby) against any substantial changes which would prove injurious to these reclamation districts, and their extensive acreages of rich farmlands which are so vitally and continuously dependent upon these protective levees.

However, SB 1106 completely fails to do this.

The foregoing remarks also serve, I believe, to confirm the soundness of the other criticisms set forth above of this Brown Water Plan legislation (i.e., insofar as it relates to the Delta). I will therefore conclude this rather hurried discussion of some of the Delta's legal problems (under the Brown Water Plan) with a brief treatment of the subject of:

No comments

- n/a -

"A physical Solution"

Our "water jurisprudence" contains an important legal concept known as a "physical solution". Our modern California water practice is replete with such legal "solutions". In essence, they constitute a legally binding set of predetermined and instantly applicable "legal controls and criteria", which are utilized, among other things:

a. to prevent any improper or excessive pumping of "export" water from a basin (such as the Delta).

b. to prevent other improper or illegal hydrological activities (e.g. undue lowering of groundwater tables; inadequate or inordinate drainage of waste waters, etc.).

c. to make mandatory any required "upstream" releases of stored water or stream flows in order to ensure adequate water supplies for lower diverters; to protect fish, etc.

If there ever was a legal and hydraulic situation requiring a rigid and detailed "physical solution" for the preservation and legal protection of vested water rights (as well as for the preservation of the other juri; dical aspects of the "water status quo") it is, (in my firm and studied opinion) this Delta situation, with its multiple hydrological and related legal problems. The principal feature of such a solution should be a carefully worked out set of definitive legal provisions (conditions, restrictions, etc.) to make certain (as far as physically and legally feasible) that, (by way of illustration):

1. No water will be "exported" out of the Delta at any time under the Brown Water Plan which is needed for irrigation or other uses by the vested water right owners.

2. No water will be "exported" out of the Delta (under said plan) which is needed, at any time, to fully and effectively control salinity.

3. Before any water is committed by contract for export out of the Delta (under SB 1106), the State must actually build and operate successfully in or near the Delta, for a sufficient number of years of trial operation, suitable physical works and facilities to fully accomplish the various solutions (i.e., salinity control, etc.) which the State's experts now hope they will be able to achieve under their present incomplete and largely theoretical "paper planning."

No comments

- n/a -

I stress, in the foregoing, the theoretical nature of the present planning of the State (in connection with these Delta problems) because although it may come as a surprise to many, the simple truth is that much (if not all) of this "water planning" for the Delta is still quite tentative, tenuous and incomplete. For example, one of the hoped for solutions to the salinity problem is a "bay barrier". Various schemes have been studied and rejected. One thereof (the so-called "Biemond Plan") is still under study. This is made clear by the aforementioned 1958 publication of the Department:

> "One of the integral parts of The California Water Plan still under study is a proposed multi-purpose water barrier project for the Sacramento-San Joaquin River Delta known as the Biemond Plan." ("Water Facts for Californians", p. 11)

Now, what is the relevancy of all of this to the legal question before us? It can be epitomized, I believe, by a simple question:

> What if all these now purely THEORETICAL "Delta schemes" prove to be unsound or inadequate?

In other words, the Brown Administration now proposes (as soon as Proposition One is approved) to immediately consummate obligatory and long-term "export water contracts" (i.e., for "export" of water out of the Delta), which contracts will impose onerous burdens on the State for many decades. These long-term and serious contractual obligations (for "export" of water, etc.) will be assumed long before the soundness and feasibility of these various theoretical schemes (now under study) (i.e., to solve the Delta's problems) are built and demonstrated by actual operation to be a success. If these proposed schemes are unsuccessful this "export project" will fail.

Furthermore, the bonds to be authorized by SB 1106 will be sold forthwith and the proceeds spent to construct (among other things) the enormously costly aqueduct to Southern California long before such a "physical solution" of the Delta's problems is first achieved and demonstrated to be feasible.

These and other equally cogent considerations which I have not time to review herein, demonstrate, I believe, the absolute necessity for incorporation in this legislation of a requirement of such a "physical solution" as a legal condition precedent to any of the other aforementioned steps in this water plan. The absence of any such a requirement in SB 1106 is, I believe, but another of the numerous deficiencies, from a legal standpoint, in this vital legislation.

No comments

- n/a -

One final point on this "Delta" phase:

Senate Bill No. 1327 (1959) Delta Protection Act
(Adding Part 4.5 to Division 6 of the Water Code)

Some may assert that this particular legislation answers the aforementioned need (from both a legal and practical standpoint) of a physical solution. It is my reasoned judgment that any such argument is clearly unsound for various reasons:

One is that this statute neither contains nor makes mandatory any such a "physical solution". Rather, it amounts simply to:

a. A legal delineation of the boundaries of the Delta (by metes and bounds); and

b. Legislative findings as to the severity and uniqueness of the "water problems" of the Delta; its importance as a "hub" of the proposed State Water Resource Development System, etc.; and

c. A generally stated set of legal principles (i.e., "juridical policies" to govern the operation of the Delta as this "hub" of the SWRDS; etc.)

These generalized provisions in SB 1327 (commendable as they are) do not even remotely constitute the requisite "physical solution" which the writer(and others) feel is an absolutely indispensable legislative and legal sine qua non if the Delta is to receive the full legal protection to which it is entitled (either under the Brown Water Plan or any other water plan involving the use of the Delta for "export" operations).

Another significant aspect of SB 1327 is that it is purely statutory. Therefore, unlike SB 1106, it has no assurance of permanence. In short, any and all of its provisions can be repealed at any future session of the Legislature. It is quite significant, I respectfully submit, that these excellent "policy statements" in SB 1327 were carefully omitted from SB 1106. Had they been included in the latter we at least would have had in this Brown Water Plan legislation a permanent (though generalized) juridical statement of the necessity of protecting the Delta, and solving its "unique" problems.

For all of the foregoing reasons, therefore, SB 1106 is, in my opinion, basically and legally deficient insofar as the Delta is concerned.

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No comments

- n/a -

QUESTION NO. 5: COULD SB 1106 BRING ABOUT THE "LEGAL FRANKENSTEIN" FEARED BY THE ENGLE COMMITTEE?

I - OPINION: My firm opinion is that not only can SB 1106 (if adopted) bring about the almost interminable water litigation in the Central Valley which was so aptly described by the Engle Committee as a "Legal Frankenstein", but that (in all probability) it will have this result.

The absence of any comprehensive adjudication of the vested water rights of the Central Valley; the complete failure of SB 1106 to provide any effective legal controls to regulate this "export pumping"; and the extremely complex and confused hydrological situation in the Delta which the Brown Water Plan will bring about, constitute the principal considerations which impel me to this conclusion as to the probability of this scourge of litigation (i.e., if Proposition One is approved by the People).

II - SUPPORTING ANALYSIS AND ARGUMENT: Before briefly renewing my reasoning with respect to this phase, I desire to touch upon two preliminary aspects. The first is:

The Engle Committee's appraisal of the "litigation potential" in the Central Valley.

As indicated in a prior section of this Memorandum, this Engle Congressional Committee held extensive hearings (in 1951) in California, which were devoted almost entirely to this intricate "water right situation" in the Central Valley. One of the specific subjects receiving its attention was the aforementioned recommendation of Governor Earl Warren (and other state officials) that this very confused, unsettled and complex water right situation in the Central Valley should be completely clarified and definitively settled by a comprehensive adjudication of all of these interrelated water rights. The Engle Committee was aghast at the enormity of this proposed litigation, concluding, among other things:

> "(b) The State of California and Bureau of Reclamation officials may create a 'legal Frankenstein' which would destroy all hope for State control of Central Valley water rights, especially if the adjudication is in the Federal Court with Department of Justice representation in behalf of the government ....;
> .....

No comments

- n/a -

(d) The cost of the proposed lawsuit would be enormous and the number of persons who would be involved is indefinite, having said to be 'astronomical' in number by one Federal witness;

(e) .... Further, it would embroil the Central Valley Project in litigation for decades." (Engle 681)

Another aspect which caused this Engle Committee serious concern (and one which will make the Delta's problems under the Brown Water Plan even more severe, complex and difficult) is the basic legal conflict between the Federal Government (as operator of the CVP) and the State (as proposed operator of the FRP).* Both of these gigantic projects involve, of course, the pumping of huge quantities of "export water" from the Delta. The Committee also made a formal finding as to this:

"Findings - (a) The record clearly shows a conflict between the Bureau of Reclamation and the State of California over the water rights of the Feather River - the Bureau claiming those water rights under an assigned water-right application which is needed for the operation of the Central Valley project, and the State claiming the water is available for the State to construct and to operate the proposed billion and a quarter dollar Feather River Project;

(b) The proposal of the State engineer to utilize the Feather River water resources without proper coordination and consultation with the Bureau of Reclamation impinges on the assignment already made by the State engineer to the Federal Government which is necessary to operate the Central Valley Project." (Engle 684)

The Committee also concluded that: "This conflict is so basic to the operation of the project that it should be resolved as quickly as possible." (Engle 702)

It might also be mentioned that this basic conflict between the Federal government (CVP) and the State (FRP) over the waters of the Central Valley still persists. The recent State-Federal Agreement (May 16, 1960) for a "co-ordinated operation" of these projects (constructive though it may be) does not, in my opinion, eliminate this conflict nor obviate the severe effect these "competitive" "Delta Export Projects" will have upon the Delta, and aforementioned hydrological and

* This subject is dealt with in detail in the writer's Memorandum Opinion of December 31, 1958, to Mr. Gordon Garland, Executive Director of CWDC. (see pp 29 to 32)

No comments

- n/a -

legal problems. Rather, it underscores and emphasizes the magnitude of the hydrological impact of these huge pumping "drafts" out of the Delta; calling (as it does) for annual "diversion requirements" by the United States of up to 8,300,000 AF, and for the State of up to 5,260,000 AF.

It incidentally should also be noted, in this regard, that a vital and basic condition of this recent Federal-State agreement is that, for all practical purposes, it does not become effective until "after the construction of the major storage facilities of the Feather River and Delta Diversion Projects" (see par. 12, p. 6). When this is coupled with the fact that it now appears probable that the Oroville Dam (i.e., as a major reservoir) will not be built for many years to come, even this phase as to "starting point" of this recent "cooperative agreement" becomes considerably clouded.

The second consideration preliminary to my analysis of this "litigation potential" of the Brown Water Plan is:

> The utter "water-right complexity" in the Central Valley which this plan will bring about.

This subject as to the complexity of the Central Valley "water-right situation" is reviewed at length in my aforementioned Memorandum Opinion of December 31, 1958 (to CWDC) I will, therefore, do no more herein than to give a summarization thereof (with cross references to my said earlier Memorandum).

The complexity of this Central Valley water-situation in the pre-project era (i.e., before the CVP), and the completely unsettled and unadjudicated status of this multitude of vested water rights, was excellently portrayed by Mr. Holsinger in his aforementioned testimony before the Engle Committee (Memo of 12/31/58, pp 16-19).

With the advent of the CVP this "water-right situation" became much more complicated (Memo, 12/31/58, pp 19-25). As Mr. Holsinger so succinctly summed up this CVP project (from a water-right standpoint):

> "Never in the history of the State has there been an instance where a water conservation project was put in operation which involved such violent and extensive changes in the regimen of any stream". (Engle 765)

The Engle Committee also stressed the unprecedented nature of this mammoth project, viz:

No comments

- n/a -

"The integrated operation of the initial features of the Central Valley project commencing July 5, 1951, brings into being huge man-made transfers of water from one watershed to another. This huge transfer is unprecedented in our State..." (Engle 675)

The magnitude of this project is also aptly described in a recent opinion (1956) of the U. S. District Court (at Fresno) in Rank v. Krug, viz:

"As hereinbefore pointed out, the Central Valley Project of California is a colossal undertaking, or as stated by Justice Jackson - 'A big bundle of big projects'. The gigantic dams envisioned, some of which are built, the tremendous canals and diversions of waters of rivers, with the resulting change of diversion and of underground waters affects millions of acres of land, tens of thousands of farmers, and practically all, if not all, of the cities in the valley which secure their water mostly from wells." (142 F. Supp. 98)

The Brown Water Plan (SB 1106)

This enormous project (or series of projects), which has as its "hub" the so-called Delta Pool, with its pumping of huge quantities of water from the Delta, (i. e, in addition to the CVP "drafts") will obviously superimpose upon an already extremely complex water-right situation, tremendous additional hydrological changes and problems, some of which are indicated in earlier portions of this memorandum.

Truly, the hydrological and water-right situation which will then exist will be one of almost incredible complexity. It must be remembered, in all of this, that these huge amounts of so-called "project water" (i. e., the "surplus") will be completely commingled with "vested right" water (i. e., the "non-surplus"), both in transit along the Sacramento River and in the so-called Delta Pool. In other words, their individual identities will, of course, be completely lost. To again borrow a colorful phrase from Mr. Holsinger, none of these several sources of water thus to be commingled have "any distinctive coloring". (Engle 773)

One of the many adverse results of all of this complexity and this confusion, to the water right owners in the Central Valley (riparianists, etc.) (and especially to those in the Delta) will be that, unless a proper "physical solution" is worked out, they will never know or be able (as a practical matter) to quickly and inexpensively determine (i. e., without litigation) the extent to which their vested water rights are being invaded

No comments

- n/a -

from day to day by this mammoth man-made manipulation of water in the Central Valley. Stephen W. Downey, Esq., lucidly explained this phase in his statement submitted at the hearing before the Engle Committee. Speaking in behalf of Sacramento River water users and with respect to the five water right applications by the Bureau of Reclamation in connection with the CVP, he testified:

> "My concern is to explain why every water user in this basin is affected by these applications...."
>
> Such a massive appropriation of water naturally alarms the Sacramento River agriculturists. All normal ways for protecting a valuable water right and for acquiring a right to additional water as it is needed disappear. The river is controlled by a Federal agency through giant reservoirs and canals so that the individual water user cannot tell what has become of his water or how to get it back. There is little wonder that the Bureau's applications have created as much furor as they have." (Engle 787)

enclosure and commodification by the state

The Nature of this Probable Litigation

The litigation which I believe will occur if the Brown Water Plan is put into operation could happen in several different ways. One thereof would be:

> Litigation by the water right owners in the Central Valley to protect their vested rights against excessive "export" pumping from the Delta.

It is inevitable, in my opinion, that these Central Valley water right owners (and particularly those in the Delta) will find themselves in a most difficult situation (under this new "hydrological picture") as future dry cycles occur. The Delta is, of course, "at the end of the ditch", in the sense that it lies at the lower end of the Sacramento and San Joaquin Rivers. The heavy burden this physical situation imposes upon these "lower users" is well described by Mr. Holsinger:

> "The uppermost user, it is axiomatic in water-right litigation, is in possession of the source of supply and by physical law necessarily the water will become available to the lower users only to the extent he who has control upstream allows it to flow past his point

No comments

- n/a -

of diversion. The old adage therefore applies that 'possession is nine points of the law.' This position therefore casts a heavy burden upon the lower users." (Engle 768)

Also:

"In the existing condition of human nature, it may be confidently predicted that those intervening users, finding an abnormal increment in the stream, will each for himself define and exercise their rights in their own favor with substantial elasticity." (Engle 773).

The end result will be, in my opinion, that these water right owners in the Delta will find themselves in a gigantic "hydraulic squeeze", resulting from this "upstream" diminution in the flows (i. e. from the North) and the huge CVP and FRP Delta "exports" (i. e., to the South.) In short, they will be "caught in the middle".

financed by revenue bonds.

It should also be noted (in connection with this "water squeeze") that it now appears that SB 1106 will not finance the Oroville Reservoir and that this unit will be delayed for many years. In other words, the large amount of "conserved water" which this reservoir was supposed to conserve and feed into the Delta will not be available to alleviate this water squeeze in the Delta. Ironically, this was to be the "key unit" of the Brown Water Plan:

actually, it was completed by ~1975?

"The key unit of the project is a dam to be constructed on the Feather River, almost five miles above the City of Oroville. This structure will be 730 feet high, which is 20 feet higher than Hoover Dam. Behind the dam will be a reservoir with a storage capacity of 3,500,000 acre-feet of water, and a shoreline of 167 miles". (Water Facts For Californians, 1958, p. 10)

In short, this future "water squeeze" would thus be further aggravated by this important change in "project plans".

The foregoing are some of the "hard realities" which could, and in my opinion will, cause (in future dry cycles) the "legal Frankenstein" depicted by the Engle Committee.

No comments

- n/a -

Incidentally, it should be noted that similar (but far less severe) "hydrological pressures" gave rise to "a flood" of water litigation in the Central Valley during the "dry cycle" of the 20's. This was described by the Engle Committee as follows:

> "Throughout 1928, the Joint Legislative Water Problems Committee continued to study the Bulletin No. 12 plan in an increasingly serious situation of ground-water depletion that was intensified by a 2-year drought. The Joint Committee reported to the 1929 Legislature that ground-water levels from the Kings River south were falling to such an alarming extent that Federal farm loans had been discontinued. At the same time, the Joint Committee reported that irrigation, power, and domestic uses had drawn so heavily on summer flows of the Sacramento and San Joaquin Rivers that salt water intrusions were causing damage in the delta, and a vast number of legal controversies had been instituted between cities and others, power companies and other appropriators, and between delta interests and all irrigators or appropriators in the Sacramento and San Joaquin Valleys." (Engle 7)

I might add that in one of these many lawsuits of the 1920's (Town of Antioch v. Williams Irrigation District, etc., Superior Court of Alameda County, No. 62328) there were over six thousand defendants (including those named by fictitious designations.)

This early litigation also confirms one other salient aspect which I wish to emphasize: The Central Valley water right litigation which the writer believes will occur as a result of this Brown Water Plan will not be a "piecemeal" or "localized" affair. To the contrary, it will, of necessity, have to be a comprehensive adjudication involving all water rights and water resources in the Central Valley. A partial adjudication would have no more efficacy nor utility than "half a bridge".

1995 WQCP resulting from Racanelli

A second "litigation potential" is:

> Litigation by the State to protect the "surplus" water in the Delta Pool.

Most of the considerations expressed above apply to this situation. Time will not permit herein any review of the many ramifications of this phase of the "litigation potential" of this proposed new water picture. It suffices to state that it too would necessarily result in the "monstrous lawsuit" described by the Engle Committee.

No comments

- n/a -

Third Alternative

Another "Legal Frankenstein" which could (and the one which I believe will) occur would be a suit by Delta water-right owners (and other Delta water interests) to secure and compel a "physical solution" of the type which I have briefly described above. Burdensome as it may be, this, in my reasoned judgment, is the only logical course for these water interests to follow (if SB 1106 becomes law). In this way, these Central Valley water right owners instead of awaiting and suffering the various adverse and grave consequences above described, would be able to accomplish a sound and legal solution of these many problems before this project is built or operated. Among its advantages, this legal action would, in my opinion, bring about the following salutary results (among various others):

1. A legally enforceable set of effective controls to fully and adequately protect these "vested water rights" (at all times) in connection with any "export pumping" out of the Delta.

2. None of these proposed "Delta water exports" (under the Brown Water Plan) could legally occur unless and until satisfactory and adequate "physical works" (e.g. such as a bay barrier, etc.) are first built and operated successfully (for a trial period of years), so as to solve the aforementioned hydrological problems of the Delta.

Among other things, such litigation would directly dispute the existence of the alleged "surplus" water which is the indispensable predicate of the Brown Water Plan. It is my opinion that one result of this will be that no bonds authorized by SB 1106 will be saleable until this litigation is finally resolved.

Incidentally, I might add that the writer is already authorized by his clients to institute this type of litigation if Proposition One is passed. I hope it can be avoided. If not, it will ensue.

Please also let it be noted for the record that my clients have made every reasonable effort to avoid any such undesirable results by bringing about a sound water plan; one which (on the one hand) would fully "insulate" and protect these vital and indispensable water rights of the North, and, (on the other) would result in the South securing a perpetual and irreducible water right out of the North Coastal Basin, which, as the State's own water statistics show, is the only true source

No comments

- n/a -

and locale in Northern California of substantial amounts of "surplus" water. (see Memorandum of December 31, 1958). The aforementioned "Preview" states:

eg - Trinity; Klamath; Smith rivers

> "The North Coastal Area with its large natural water supply, 41 per cent of the State's total" (i.e. 71,000,000 AF annual mean) "should ultimately require only about 4 per cent of the water consumptively used throughout California." (p. 6)

Incidentally, the "Statement of Policy" widely circulated in 1958 by the California Water Development Council (a client of the writer) (under the leadership of Gordon Garland, Executive Director) outlined the salient features of a sound water plan. This was submitted for the consideration of Governor Brown and various other interested parties (including the South). This "Statement of Policy" states (as its Point 16) as follows:

> "THE ONLY AREA OF UNQUESTIONED SURPLUS IS THE NORTH COASTAL AREA. For this reason a new major water export project from this area should be committed and constructed concurrently with the Feather River Project"

And, in concluding this chapter as to the probability of a "legal Frankenstein", it should be stressed that this "litigation scourge" will also seriously militate against the South's best interests. Among other things, it will, in my opinion, "freeze" the South's (as well as the State's) water planning (at least in so far as "exports" from the Delta Pool are concerned) for a long time to come. This should be contrasted with the sound water plan which the CWDC advocated:

> "PART TWO - THE NORTH COASTAL ROUTE"
>
> "This is the solution which your Council has advocated for so long. It is a sound solution. Its 'litigation potential' is practically nil.
>
> "Furthermore, this solution will enable the South to acquire a perpetual right to a huge quantity of water, a right not at all dependent upon 'diligence,' and one which cannot be eroded away by future increased Northern water uses in the Central Valley. Moreover, this excellent and very desirable 'water right' can be assured to the South by a basic 'water compact', confirmed (if desired) by a constitutional amendment (see p. 9 infra)" (Memo, 12/31/58; p. 6)

No comments

- n/a -

QUESTION NO. 6. DOES SB 1106 CONTAIN ADEQUATE LEGAL SAFEGUARDS TO PROTECT THE TAXPAYERS OF THIS STATE AGAINST THE POSSIBILITY OF DEFICITS IN CONNECTION WITH THIS PROPOSED MULTI-BILLION DOLLAR BOND ISSUE?

I - OPINION: Various important legal safeguards which should have been incorporated in this legislation for the proper protection of the State and its taxpayers are absent therefrom.

These proposed bonds are general obligation bonds and therefore will have to be paid by the California taxpayers if the net revenues from this Water Project are not sufficient to meet the more than four billion dollars (principal and interest) which must be paid by the State in large annual installments over a period of many decades to come. These are not "revenue bonds" (as some people seem to think). To the contrary, if the revenues from this water project are not adequate, the general taxpayer will have "to foot the bill". Therefore, every proper legal safeguard for the protection of the State and its taxpayers should have been included in SB 1106. This was not done.

II - SUPPORTING ANALYSIS AND ARGUMENT: It is not within the purview of this opinion to deal with the many fiscal problems which will arise in connection with the vague and loosely drawn provisions of SB 1106 dealing with this proposed bonded indebtedness.* We will, however, mention two "fiscal facets" as a preliminary to a brief discussion of some of the legal defects in SB 1106 from the standpoint of its lack of proper protection for the California taxpayers.

The first is that this huge proposed bond issue will have a very serious and adverse impact on the bonding capacity of the State for a long time to come. It will make it more difficult and costly to market many other types of bonds which California (and its many local districts - such as school districts, local improvement districts, etc. etc.) will have to sell during the coming decades in order to finance many needed local developments (schools, etc.).

---

* The legal aspects of many of these doubtful "fiscal phases" are reviewed in the "Interim Report" of Chas. T. Main, Inc. (July, 1960.)

No comments

- n/a -

The second "fiscal fact of life" is that with its already huge bonded and other indebtedness, California must be most careful in incurring further general indebtedness lest the State reach the point of serious financial involvement. As State Treasurer Bert Betts recently (in September 1960) warned (in discussing the already existing saturation of the national bond market with California Veterans bonds), the credit of the State is being dried up and impaired. He flatly stated that "we must look out for the credit of the State now before we go into bankruptcy". *

This same admonition was voiced in a recent issue (July 11, 1960) of Barron's (the national financial journal), in an article entitled "Strained Finances May Jeopardize California's Investment Status".

Now, in the light of these indisputable fiscal considerations (upon which all financial experts seem to be in accord) I will briefly outline a few of the basic legal shortcomings in SB 1106 from the standpoint of its failure to protect the State and its taxpayers against possible huge deficits under the Brown Water Plan.

---

* "California has to pay higher interest than the national average, largely because of the great volume of bonds we market. I've been East promoting our bonds four or five times since I took office and everywhere I go bond people ask 'when is your veterans program going to end?' Eventually we're going to fill every bond portfolio in the country with Cal-Vet bonds. We are going to reach the point one day where the State of California will not get a bid on a bond sale.

"We must look out for the credit of the State now, before we go into bankruptcy. ...And I happen to be a veteran of the State of California." (S. F. Chronicle, Sept. 25, 1960)

The Governor apparently participated in this same "veterans conference" at Sacramento. He is reported as saying: "Vet bonds glut the market and force higher interest rates on other types of bonds."

No comments

- n/a -

1. Absence of any legal safeguards to prevent expenditures of the bond proceeds fund before sufficient "water contracts" are first consummated.

Under the Brown Water Plan the State officials can proceed (as soon as SB 1106 is approved by the People) to expend these hundreds of millions of dollars on the aqueducts and other facilities comprising the project (State Water Resources Development System) irrespective of whether or not PROPER "water contracts" with financially sound water districts have FIRST been consummated. This is, in my opinion, a basic legal defect. There should be in SB 1106 a clear prohibition against the expenditure of these huge sums (of borrowed money) unless and until the State has first carefully formulated and consummated proper "water contracts" of such a nature (e.g., with a sound price formula, etc.) that the seasonable amortization of this huge debt will be absolutely assured. This, in my humble opinion, is a minimal requisite protection for the general taxpayers. Without such a provision the general taxpayer is entirely at the mercy of these State officials. Any serious mistakes on their part in this respect could prove disastrous to the State.

Metropolitan Water District caught this fundamental defect in SB 1106. In its draft of proposed water contract (Draft of 6/9/60) (which it submitted to the Governor on June 9, 1960) Metropolitan inserted a paragraph (9-f) requiring that no bonds be sold nor funds expended under the Bond Act (SB 1106) for the construction of any aqueduct or other water facilities of the SWRDS (with certain minor exceptions):

> "until the State shall have entered into contracts which will provide for repayment of at least 75% of the construction costs thereof, allocated to water supply for reimbursement by the contractors, with contractors having an adequate tax base or other evidence of ability to perform their respective contractual obligations." (p. 9/6)

While this commendable effort to thus "plug" this deficient legislation is cogent confirmation of its basic inadequacy, such "patching by contract" is, in my opinion, an inadequate and dangerous substitute for proper legislation.

No comments

- n/a -

2. Absence of any requirement of a proper determination of "surplus" before physical facilities are built.

The indispensable keystone of the entire Brown Water Plan is these "water and power contracts". Why? Because they are the sole source of revenue to pay off this huge bonded indebtedness (apart from general tax revenues).

Now, these vital "water contracts" are in turn based on the assumption that there will be sufficient "surplus" water available in the Delta Pool through these many decades to come, to properly service these contracts.

But what legal assurance is there that this will be so? Absolutely none. To the contrary, the record (including the State's own data) plainly shows (as above indicated) that there is a grave doubt as whether or not this alleged "surplus" exists or will hereafter exist in the Delta; particularly if the Central Valley is to continue to expand and develop its natural resources (including its invaluable and indispensable water resources). *

However, and entirely apart from the question as to whether or not there is any serious doubt as to the existence of this necessary "surplus", one thing seems crystal-clear to me. It would seem to be simple prudence and plain common sense to determine, in a proper and legal way, the existence or non-existence of adequate "surplus water" before these hundreds of millions of dollars are spent on physical works. Empty reservoirs or aqueducts will not pay off this enormous bond issue.

Covering the same matter from a little different approach, what will happen if these physical works are built and then a "Legal Frankenstein" occurs (as above indicated) and such litigation results in a legal demonstration of the non-existence of an adequate amount of "surplus water" to properly service these "Delta export water contracts"? It does not require a water lawyer to foresee the critical financial situation in which the State would then find itself.

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* It should never be forgotten that this future expansion and development is directly dependent upon proper protection of the North's "area of origin" water preferences and reservations." (p. 26 supra)

No comments

- n/a -

Furthermore, it is no answer to this to assert that the State would then be forced to "switch horses" and turn to the North Coastal Basin for a water supply. One fallacy in any such argument is that it overlooks the fact that SB 1106 does not include the funds which will be needed for this admittedly costly North Coast development. In fact, there is now a serious doubt, (in view of the findings of the State's independent consultants), as to whether SB 1106 will provide sufficient funds to complete the Oroville Dam project (on the Feather River), which up until recently has been the widely heralded hydraulic keystone of the Brown Water Plan.

---

3. Absence of any adequate provisions in SB 1106 to ensure that these vital water contracts will contain all necessary protective provisions (e.g., price formulas, etc.)

Governor Brown and his staff have already attempted to construe SB 1106 as conferring upon them the full and unfettered discretion to determine what "terms and provisions" should be incorporated in these vital "water contracts" (which bear so directly on the State's future solvency). As stated above, pursuant to this interpretation, the Governor and his staff have recently been engaged in rather frantic attempts to consummate the aforementioned important water contract with Metropolitan Water District.

This interpretation of SB 1106 is, in our opinion, an unsound one. It is now the subject of litigation recently instituted by us in the Kings County Superior Court, which is briefly discussed in a subsequent section of this Opinion.

However, we will assume in this portion of our Opinion that SB 1106 can be so interpreted. Assuming this, it obviously is a legally defective statute from the viewpoint of proper protection for the taxpayer. Why? Because the very least this law should have done (on this phase) was to provide basic and controlling criteria (including proper "pricing formula") to make certain that these vital water contracts will always yield sufficient revenues to fully pay off this bonded indebtedness.

Time exigencies will not permit any further analysis of this phase herein but I do wish to point out, in leaving it, that your Honorable Committee and other legislative committees have heretofore spent a considerable amount of time studying this very aspect of "water contracts" and

No comments

- n/a -

their basic terms and conditions. One interim result of these studies is the "Report" issued by the Senate Fact Finding Committee (in March 1960) containing many excellent suggestions (e. g., price formulas, conditions of power sales, etc.) for study in connection with these vital "water contracts". The tragedy, however, is that these important protective provisions are no part of this Brown Water Plan legislation. Furthermore, if the Administration's interpretation of SB 1106 is correct, (i. e., that the Department has a full and unfettered power to decide what provisions should go into these "water contracts"), there will be no real opportunity to adopt, by appropriate legislation, any of these necessary safeguards and protective provisions so essential to the future welfare of California and its taxpayers.

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No comments

- n/a -

QUESTION NO. 7. WILL THE GOVERNOR AND HIS EXECUTIVE OFFICIALS HAVE THE AUTHORITY AND POWER (IF SB 1106 IS APPROVED) TO FIX AND DETERMINE, IN THEIR SOLE DISCRETION, THE TERMS AND CONDITIONS OF THE "WATER CONTRACTS" WHICH WILL BE THE SOLE SOURCE OF REVENUES (OTHER THAN THE GENERAL FUNDS OF THE STATE) TO PAY OFF THIS HUGE BOND ISSUE? WILL THE LEGISLATURE HAVE ANY VOICE IN SUCH MATTERS?

I - OPINION: My opinion is that the Legislature and not the Executive Branch has the exclusive right and power (and responsibility) of fixing the basic criteria (i.e., the fundamental terms and conditions) of these vital "water contracts", to be executed pursuant to SB 1106.

II - SUPPORTING ANALYSIS AND ARGUMENT: This question goes to the very heart of the Brown Water Plan (SB 1106). Why is this true? Because unless all of the many important aspects of these vital water contracts are carefully and providently planned, the State can and will find itself in serious trouble. Your Honorable Committee is familiar, of course, as a result of your aforementioned detailed studies, with the many ramifications (both legal and fiscal) of this all-important "water contract phase". There is, therefore, no need to detail them herein.

Rather, I will merely summarize the salient aspects relevant to this question as to which branch of the State government has the power to formulate the basic terms and conditions of these "water contracts".

1. Pertinent Provisions of SB 1106

Paragraph 12937-(b)-(4) of the Act provides (in part) that:

"The department, subject to such terms and conditions as may be prescribed by the Legislature, shall enter into contracts for the sale, delivery or use of water or power, or for other services and facilities, made available by the State Water Resources Development System with public or private corporations, entities, or individuals."

No comments

- n/a -

2. Pending Litigation

This question as to what these provisions mean (in the sense of "contract power") is now being litigated in the case of "E. C. Salyer vs. Edmund G. Brown, Harvey O. Banks, Ralph M. Brody, et al." Action No. 14952 in the Superior Court of Kings County, California. A temporary restraining order was issued (and is now in force) enjoining the execution of the proposed contract with Metropolitan. The writer (and the legal firm of Rosson & Pearson of Hanford, California) represent the plaintiff. We have recently filed a brief in support of our position in that case (as outlined hereinafter). Therefore, instead of setting forth a detailed legal analysis herein, I will simply state our conclusions and will incorporate in the "Supplement" the relevant portions of our written argument in this Kings County case.

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3. Our interpretation of these "contract provisions" of SB 1106.

Our conclusions, based on a careful study of these provisions (in the light of clearly established principles and "canons" of statutory construction) may be summarized as follows:

First: No "water contracts" can be signed until SB 1106 first becomes a law (by approval of the People). This conclusion is based on elementary legal principles. These well settled principles of our jurisprudence clearly demonstrate, in our opinion, the illegality of the present efforts of Governor Brown and his staff to consummate the aforementioned vital water contract with Metropolitan.

Second: If Proposition One is approved by the People, the power to formulate the basic terms and conditions of these "water contracts" is a legislative function which resides in the Legislature, and not in the Department of Water Resources.

Third: If SB 1106 is to be construed as delegating this important legislative power to the Department, it is unconstitutional and void as an unlawful delegation of legislative power. It is further defective and vulnerable (constitutionally) because it is completely devoid of the requisite "controlling criteria" (i.e., "guidelines") to limit and control the discretion of the Executive officials.

No comments

- n/a -

competent lawyers will concede, I believe, that such declarations do not and cannot change the controlling legislation (SB 1106).* In brief, such pronouncements have no legal efficacy whatsoever. They are binding upon no one. Legally speaking, they are worthless.

Furthermore, they are patently ephemeral. In other words, insofar as having any 'permanency' they might as well be "written on ice". In this connection, it is also interesting to observe that the authors of most of these "policy statements" are soon to leave the service of the State. Director Banks and Deputy Director Brody have already tendered their resignations to the Governor. Their successors obviously will not be bound by any of these many "policy pronouncements" heretofore made by these gentlemen.

Incidentally, these "personnel facts" (which are but another of the frequent reminders of the rather rapid turnover of administrative officials) constitute, I respectfully submit, cogent confirmation of the wisdom of our "founding fathers" in establishing a "government of laws" and not a "government of men". SB 1106 will be with us for a long while (if approved by the People) whereas these evanescent "policy statements" have no durability whatsoever. In brief, they are no adequate substitute for law.

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* This was ably demonstrated to the San Francisco Board of Supervisors by Hon. Dion Holm (long-time City Attorney of San Francisco and an outstanding water lawyer). In his excellent formal "Opinion" (No. 1426) (under date of March 8, 1960) (re SB 1106) he clearly shows (by extensive citation of California authorities) the inefficacy and worthlessness (from a legal standpoint) of any such "ex post facto declarations" by the Governor (or others).

Incidentally, after reviewing a number of perplexing legal ambiguities in SB 1106, Mr. Holm concluded: "The courts would indeed be called upon to exercise extraordinary mental dexterity in construing the quoted language. Examples (1) to (4) above are not a complete listing of doubtful points in the bill."

No comments

- n/a -

CONCLUSION

Most legal experts who have studied SB 1106 believe that it is a badly drafted statute and that it is replete with material ambiguities which will breed much future litigation. *

In addition to these many ambiguities, SB 1106 contains basic legal defects which could endanger the future fiscal fate of all of California; as well as seriously involve and impair the presently "vested water rights" of Northern California; and also imperil the "area of origin reservations" which are the only substantial source of Northern California's additional water needs in the future.

One of the numerous adverse results of this defective legislation will be, in my sincere and firm opinion, a scourge of almost interminable water controversies; a litigation legacy which could plague California for decades to come.

Respectfully,

WALTER M. GLEASON

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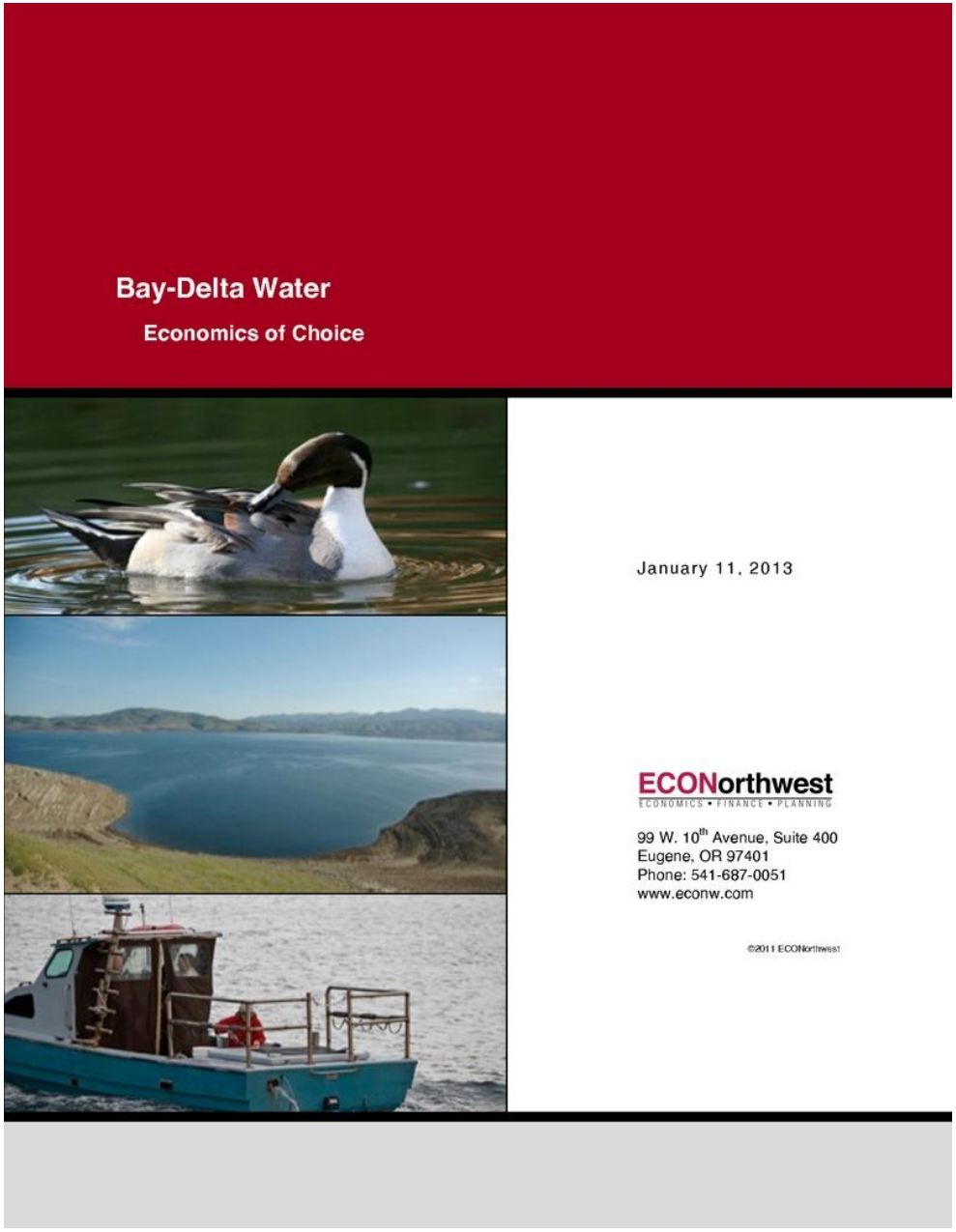
* Our 1960 Water Lawyers Committee of the San Francisco Bar Association (Dan Hadsell, Esq., Chairman) (of which the writer is a member) so concluded after an exhaustive analysis of SB 1106. The report of this Committee to the Board of Governors of the San Francisco Bar Association (under date of October 27, 1960) states:

> "With one thing members of the Committee are very much impressed. It is that SB 1106 is a badly drafted statute. If enacted it is bound to be productive of litigation which will very much impede administrative progress in implementation of the Act but which will be necessary to clarify meanings or effect of language or to settle many legal problems. True it is that any important new statute will generally provoke litigation over its meanings and effects; but such legal challenges are generally reduced to a minimum by good drafting. That is not so with this measure. Litigation under this Act will likely be excessive."

No comments

- n/a -



No comments

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No comments

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No comments

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No comments

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No comments

- n/a -

SECTION 1: CONTEXT AND ASSIGNMENT

Water flows from the Sierra Nevada into the Sacramento and San Joaquin Rivers, which in turn flow into the San Francisco Bay-Delta, and from the Delta Bay into the Pacific Ocean. In 2009, the California state legislature enacted the Delta Reform Act. As part of that legislation the California State Water Resources Control Board (State Water Board) was instructed to report to the Delta Stewardship Council (Council) the Board's view of what flows would be necessary to protect the Delta ecosystem. In its August 2010 report, *Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem* (*Flow Report*)[1], the State Water Board expressed its concerns about the Bay-Delta flows.[2] It concluded that the Bay-Delta flows are inadequate. They threaten native fish[3], and thereby violate California's obligations under the public-trust doctrine.[4] According to the *Flow Report*, changing flow conditions in ways that would support native fish species requires improving the Bay-Delta flows throughout the year.

If we understand the Council's role correctly, then to allocate the Bay-Delta flows well, the Council would seek to balance its obligations to protect public-trust use of the Bay-Delta flows with its obligations to support the dual coequal goals of i) habitat conservation and management, and ii) improving reliability of water supplies. This balancing task includes:

a. Developing alternatives to increase the efficiency and equity of allocating the Bay-Delta flows among the competing instream and consumptive demands[5]

b. Describing the economic, biophysical[6] and other effects of the alternatives

c. Selecting what it regards as the best of the alternatives and enforcing the efficient allocation of the imputed flow conditions.

Economics, at its core, is the science of choice[7] or, as it is defined frequently in introductory textbooks, the study of the allocation of scarce[8] resources among competing

---

[3] These species include Chinook Salmon, Delta Smelt, and Bay Shrimp. *Flow Report*, p. 5 and 8.

[4] *Flow Report*, p.1-7; *Flow Report*, p.12: "The purpose of the public trust is to protect commerce, navigation, fisheries, recreation, ecological values, and fish and wildlife habitat. Under the public trust doctrine, the State of California has sovereign authority to exercise continuous supervision and control over the navigable waters of the state and the lands underlying those waters. [citation omitted] A variant of the public trust doctrine also applies to activities that harm a fishery in non-navigable waters. [citation omitted]"

[5] Instream demands are water uses that can be carried out without removing the water from its source, such as in navigation and recreation. Consumptive demands are water uses which lessen the amount of water available for other uses, such as in manufacturing, agriculture, and food preparation. [U.S. Bureau of Reclammation. *Glossary*. January 5, 2011. Retrieved June 24, 2011, from http://www.usbr.gov/library/glossary/.]

[6] By 'biophysical,' we mean the biological effects (e.g., on plants and animals), ecological effects (e.g., on ecological systems), and physical effects, e.g., on water, land and air). We do not mean the interdisciplinary science of biophysics that, as Wikipedia tells us, 'uses the methods of physics and physical chemistry to study biological systems.' We apologize for any confusion, and plead only expedience for our lack of precision. [2011. *Biophysics*. May 16. Retrieved June 27, 2011, from en.wikipedia.org/wiki/Biophysical].

No comments

- n/a -

demands.[9] The State's balancing decision, whether good or bad, would include such an allocation among competing demands. Michael Jackson, an attorney working with Bay-Delta stakeholders, asked ECONorthwest to describe economic issues relevant to the State's balancing of competing demands for Bay-Delta flows. We at ECONorthwest recognize the diverse group of people interested in the Bay-Delta Flows, and have sought to write an accessible yet technically sound report rooted in established economic practices and theory. To that end, we have prepared this report.

[7] See, for example, <http://www.google.com/search?sclient=psy&hl=en&site=&source=hp&q=economics+science+choice&btnG=Search>

[8] By "scarcity," we mean situations in which the resources available for producing output are insufficient to satisfy wants. This is different to saying that they are insufficient to satisfy demand since demand relates to an expression of want backed by money. This concept of relative scarcity in relation to wants is widely held to define the central conflict of economics since, otherwise, there would be no need to think about the 'best' allocation of resources. [Pearce, D.W. 1992. *The MIT Dictionary of Economics*, 4th edition. Cambridge, MA: The MIT Press.]

[9] See, for example, <http://www.google.com/search?sclient=psy&hl=en&site=&source=hp&q=economics+allocation+scarce+resources+competing+demands&btnG=Search>; Field, B.C. 1997. *Environmental Economics*, Second Edition. San Francisco: McGraw-Hill Company, Inc.; Gramlich, E.M. 1990. *A Guide to Benefit-Cost Analysis*. Englewood Cliffs, New Jersey: Prentice Hall.; Harberger, A. and G. Jenkins, eds. 2002. *Cost-Benefit Analysis*. The International Library of Critical Writings in Economics: 152. Northampton, Massachusetts: Edward Elgar Publishers.; and U.S. Environmental Protection Agency. 2010. *Guidelines for Preparing Economic Analyses*. December.

No comments

- n/a -

SECTION 2: ECONOMICS AND THE CHOICES CALIFORNIA FACES

If the waters flowing from the Sierra Nevada to the San Francisco Bay-Delta had conditions of abundance, the State might not have felt compelled to prepare the *Flow Report*. But scarcity rules the waters and causes fierce competition. The consequences of the competition for these scarce waters lies at the heart of the State Water Board's *Flow Report*.[10]

Instream uses of the Bay-Delta flows compete with what the State Water Board describes as "other beneficial uses" of water.[11] These *other beneficial uses* include municipal, industrial, and agricultural uses.[12] If, once again, we understand the State role correctly, then in allocating the Bay-Delta flows the State would seek to balance its obligations to protect public-trust use of the Bay-Delta flows, with its obligations to support the "other uses" of the Bay-Delta flows.

To balance its obligations effectively, the State would, as we state in Section 1, seek to develop alternatives to improve the Bay-Delta flows, describe the economic, biophysical and other effects of these alternatives, and then select the best of the alternatives. To serve these ends, a necessary step for the State would be to describe how each alternative would affect economic well-being, power production, human health and welfare, the sustainability of natural resources, habitats and species, and possibly other factors.[13] Economists have developed tools for describing such effects.

Among the tools economics offers for comparing competing alternatives, the most widely known and frequently used in environmental and natural resource matters is benefit-cost analysis (BCA).[14] As applied in this case by the State, a properly conducted BCA would describe differences in net economic values—economic benefits minus economic costs—across the alternatives. In our experience, stakeholders and decision makers frequently care about other types of economic consequences besides changes in economic values. They want to know how policy alternatives will affect things like jobs and income, which economists describe as economic impacts, and the distribution of changes in economic values and impacts among stakeholders and households, which

[10] For a description and explanation of the economic consequences of a shift from abundance to scarcity in an ecological system, e.g., a watershed, see Courant, P., E. Niemi, and E. Whitelaw. 1997. *The Ecosystem-Economy Relationship: Insights from Six Forested LTER Sites*. Grant No. DEB-9416809. National Science Foundation. November.; Hulse, D., G. Gordon, and E. Niemi. 2001. *Establishing Correlations Between Upland Forest Management Practices and the Economic Consequences of Stream Turbidity in Municipal Supply Watersheds*. EPA Grant No. R825822. Environmental Protection Agency. September.

[11] In the rest of the report, we will italicize the phrase "other beneficial uses" to signal that these are not all other uses but only those specified by the State Water Board.

[12] *Flow Report*, p.1-7.

[13] *Flow Report*, p.2-3.

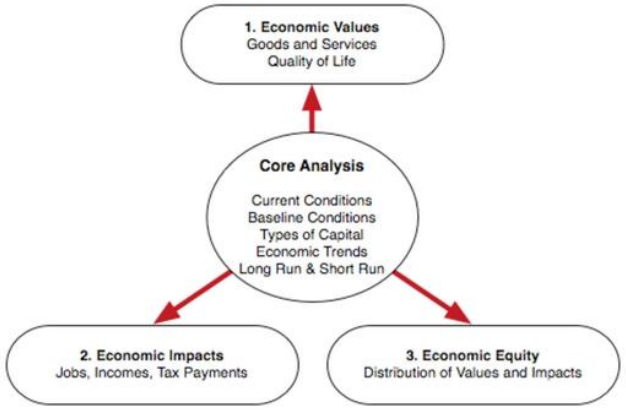
[14] Mishan, E.J. *Elements of Cost-Benefit Analysis*, 3rd Edition. 1972. p.11-13; Turner, R., D. Pearce, and I. Bateman. 1993. *Environmental Economics*, p.93-4; Teitenberg, T. and L. Lewis. *Environmental and Resource Economics*, 8th Edition. 2008. p.28.

No comments

- n/a -

economists generally address as economic equity. Thus, a comprehensive economic assessment from alternative Bay-Delta flows would describe economic consequences that include changes in economic values, changes in economic impacts, and the distributional outcomes for each alternative. Figure 1 shows the three categories of economic effects each alternative would cause.

Figure 1. Categories of Economic Effects



Source: ECONorthwest

The first category, Economic Values, represents *changes in the values of goods and services* available to Californians that result from the market and non-market activities associated with each alternative. Such effects include changes in economic benefits, costs or both, as well as changes in the quality of life. The second category, Economic Impacts, represents changes in jobs and incomes for workers, costs or revenues for private firms, and expenditures or tax revenues for governments. These impacts occur directly, as workers are employed on construction, deconstruction, and restoration, for example, and indirectly, as dollars are spent locally on goods and services, dollars which multiply through the local economy, supporting additional jobs and incomes. The third category, Economic Equity, represents the distribution of the other two categories of effects, Economic Values and Economic Impacts, across income brackets of households, across ethnicities, and across geographic areas. These changes are particularly challenging to describe and evaluate when, say, groups of households who enjoy the benefits, jobs, and incomes, differ from those who bear the costs.

The center of Figure 1—the Core Analysis—shows the analyses common to characterizing or calculating all three categories of economic effects.

No comments

- n/a -

1. By describing the Current Conditions and Baseline Conditions for each alternative, the analyst can describe the gap between the two. The larger the gap, the larger the problem.
2. By describing the four basic forms of capital (physical capital, human capital, social capital and natural capital)[15] under both Current and Baseline Conditions for each alternative, the analyst can, for example, measure the effects of the alternative on the stocks of economic assets and thereby on the flows of services from those assets.[16]
3. By taking economic trends into account, the analyst can apply a with-versus-without approach, which isolates the economic effects (values, impacts, equity) caused by the alternatives from changes that will likely occur unrelated to the alternatives.
4. By addressing both the short- and long-term effects, the analyst can avoid errors of omission and commission through confusing today and tomorrow. The literal differences in effects between today and tomorrow would be trivial. But since the relevant period of time may stretch to a century, the figurative differences would likely be huge.

In 1983, the California Supreme Court issued its opinion in the case of *National Audubon Society et al. v. The Superior Court of Alpine County, et al.*[17] That ruling, commonly called the "Mono Lake decision," (*Mono Lake*) clarified the extent of the State's public-trust obligation to protect water resources. In general, the Court ruled that protecting water resources takes precedence over consumptive water use. The Court's ruling relied in part on economic analyses of the competing demands for Mono Lake water.

The State's analysis of the economic effects of its balancing decision can benefit from applying the widely accepted professional standards applicable to economic analyses in this type of matter, and the precedents set by the *Mono Lake* decision. In this report we examine the relevant professional standards and the *Mono Lake* decision and describe their implications for the State as it seeks a balance.

In the next section, Section 3, we present an economic perspective of the Supreme Court's decision.

[15] These four types of capital affect local economic productivity, which in turn is the source of economic growth in, say, California. Examples of physical capital are private and public machines, buildings, roads, and water and sewage systems. Examples of natural capital are rivers and streams, mountains and valleys, and grasslands and forests. Examples of human capital are workers of all types and their knowledge and skills. Examples of social capital are social networks and the norms, laws, and judicial and political systems.

[16] O'Sullivan, A. 2008. *Urban Economics*, 7th Edition. p.90-91.

[17] Broussard, J. 1983. *National Audubon Society et al., Petitioners, v. The Superior Court of Alpine County, Respondent; Department of Water and Power of the City of Los Angeles et al., Real Parties in Interest*. 33 Cal.3d 419. S.F. No. 24368. Supreme Court of California. February 17.

No comments

- n/a -

SECTION 3: ECONOMICS AND THE STATE WATER BOARD'S BALANCING DECISION IN *MONO LAKE*

In *Mono Lake*, the State Water Board faced a classic public-policy choice, a choice resembling the choice it faces with Bay-Delta flows: allocating a scarce and valuable natural resource—Mono Lake—among competing demands. The State can therefore look to its own history for guidance on balancing its public-trust obligation to protect Bay-Delta flows with the demands from other beneficial uses, and the role that economic information can play in the deliberations. As it balanced competing interests and reached its decision in *Mono Lake*, the State Water Board described the biological significance of the water at issue, developed economic measures of the relevant costs and benefits of alternative water allocations, and considered measures that could mitigate negative economic outcomes.[18] It should take similar steps as it sets criteria for the Bay-Delta flows.

In *Mono Lake*, the State Water Board considered the consequences of the City of Los Angeles (City)— acting through the Los Angeles Department of Water and Power (LADWP)—exercising its right to draw water from Mono Lake for urban-consumption uses, and the resulting impacts on the lake's ecological habitats and affected species. The State Water Board began by considering the biophysical aspects of its decision. It first identified the ecological uses of trust resources at issue and their biological requirements, e.g., the species that depend on Mono Lake and their water requirements. Next, it studied the relationship between water flows out of Mono Lake and the impacts on ecological uses. It then compared the costs of the City acquiring water from sources other than Mono Lake with the economic benefits of protecting the ecological uses of the lake's affected public-trust resources.[19]

Dr. John Loomis, a natural-resource economist,[20] helped quantify the economic benefits in the State Water Board's analysis. Dr. Loomis surveyed California residents and calculated their willingness to pay to protect Mono Lake's habitats and affected species. Based on this information, Dr. Loomis calculated the economic benefits of protecting the ecological uses of the lake's water at $1.5 billion to $3.5 billion annually. This amount significantly exceeded the estimated cost, $26.5 million per year, of finding alternative sources of water for the City.[21]

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[18] Koehler, C.J. 1995. "Water Rights and the Public Trust Doctrine: Resolution of the Mono Lake Controversey." *Ecology Law Quarterly* 22: 451.; Casey, E. 1984. "Water Law—Public Trust Doctrine," *Natural Resources Journal* 24: 809-825.

[19] Koehler, 1995; Casey, 1984.

[20] Dr. Loomis conducted this research while at the Department of Agricultural Economics at the Davis campus of the University of California.

[21] Loomis, J. 1987. "Balancing Public Trust Resources of Mono Lake and Los Angeles' Water Right: An Economic Approach." *Water Resources Research* 23: 1449-1456. August; Loomis, J. 1997. Use of Non-Market Valuation Studies in Water Resource Management Assessments. Colorado State University; Duffield, J. 2010. *Valuing Ecosystem Services in River and Lake Systems: Methods and Western U.S. Case Studies*. Presentation, Salt Lake City, April 28.

No comments

- n/a -

Dr. Loomis conducted his analysis as independent research that was not part of the State Water Board's balancing decision. The State Water Board, however, took notice of Dr. Loomis' work and directed the consultant performing the economic portion of the Environmental Impact Statement for the balancing analysis to adopt and implement Dr. Loomis' approach. The consultant's assessment reached the same conclusion: the economic benefits of protecting the ecological uses of trust resources in Mono Lake significantly exceeded the cost of supplying the City with water from alternative sources. The State Water Board considered other factors along with these economic results and ultimately reduced by half the amount of water that the LADWP could divert from Mono Lake.[22]

The State Water Board's *Mono Lake* experience can help inform current deliberations on the relevant economic aspects of balancing competing uses of Bay-Delta flows. Analytical factors from the *Mono Lake* analysis that have relevance to the Delta Stewardship Council's planning decision include:

- *Conduct economic analyses in the context of the biophysical requirements of the ecological uses of public-trust resources.* The State Water Board identified the ecological uses of public-trust resources at issue in *Mono Lake* and the water requirements that support these uses *before* considering the costs and benefits of allocation scenarios. That is, the State Water Board acknowledged its obligation to protect the ecological uses of public-trust resources, and then considered reasonable methods of satisfying this obligation.[23]

- *Account for all relevant economic, legal, and other forces and trends.* The LADWP proposed that the State Water Board make its decision based on a worst-case scenario of future water supplies for the City. Such an approach ignored current trends in water policy at the local, state and federal level. For example, the worst-case approach ignored the fact that trends in state and federal water law at the time encouraged water transfers between and among entities. Such transfers meant that LADWP could tap sources other than Mono Lake for future demands. On this point the State Water Board noted, "[T]he LADWP analysis assumes that insufficient replacement water will be available thereby causing high water shortage costs to be imposed on water users in Los Angeles. This assumption does not appear to be realistic in light of the evidence…." The State Water Board took the current trends in water transfers into account when making its decision.[24]

- *Consider likely mitigating circumstances.* LADWP also asked that the State Water Board assume that the City would take no actions to mitigate the impacts of reduced flows from Mono Lake. That is, the LADWP asked that the State Water Board base its decision on a *static analysis* that assumed conditions would remain fixed over the foreseeable future. The State Water Board, instead, based its decision on a *dynamic analysis*, which assumed the City and others would take appropriate actions, such as

[22] Loomis, 1997; Duffield, 2010.

[23] Koehler, 1995; Casey, 1984.

[24] Koehler, 1995; Casey, 1984.

No comments

- n/a -

doing more to conserve water, to mitigate the initial effects of a reduction in water supplied from Mono Lake. More broadly, this dynamic analysis took into account relevant economic and other forces and trends, as noted above.

- *Account fully for both values reflected in market prices and values that are not.* In reaching its *Mono Lake* decision, the State Water Board considered estimates of the City's potential costs to acquire water from another source. These estimates derived from data on the prices at which water was bought and sold in the region. No such prices and data existed for the economic value of protecting the ecological uses of public-trust resources. The State Water Board recognized, however, that the absence of prices did not mean that protecting these uses had little or no value, but, instead, that market prices are not an appropriate tool for measuring the value. Hence, the State Water Board looked to the results of research that employed non-market techniques for estimating the value.[25] We address this point in more detail in the next section.

[25] Loomis, 1987; Loomis, 1997; Duffield, 2010.

No comments

- n/a -

SECTION 4: THE EVOLUTION OF THE ECOLOGICAL USES OF PUBLIC-TRUST RESOURCES AND ECONOMIC METHODS

Stakeholders in the *Mono Lake* case litigated to clarify the relationship between the City's water rights and the State's public-trust obligation to protect water resources. The Supreme Court of California ultimately ruled that, in general, the State's public-trust obligations have precedence over the City's water rights. This ruling helped inform the State Water Board's balancing decision in that case. The Supreme Court's decision emphasized that stakeholders and decision makers should consider public-trust obligations as dynamic and evolving over time, rather than fixed and based exclusively on historical conditions. What constitutes a protected use of public-trust resources can evolve along with changes in understanding of the natural environment and its relationship to the well being of human society.

Methods of describing the economic effects of public policies on ecological uses of water resources have also evolved. Markets do not exist for many of these uses and so economists calculate their economic significance using non-market valuation methods. Years ago, economists and public-policy analysts could reasonably debate the analytical veracity of these methods. Not so today. Analytical methods continue evolving, and areas of legitimate disagreement still exist, however, detailed descriptions of these analytical methods appear in economic textbooks, articles in academic journals, undergraduate and graduate economics courses, and reports by federal and state natural-resource agencies in the U.S. Economists in Europe, Asia and elsewhere also regularly use these methods.

In this section we describe the evolution of thinking on ecological uses of California's public-trust resources. We then summarize methods of describing the economic significance of ecological uses of trust resources, especially those that provide society with ecosystem-services for which markets do not exist. The information in this section provides a context for the sections that follow, in which we describe in more detail the analytical principles relevant to describing the economic effects of the State's balancing decision regarding the Bay-Delta flows.

A. Ecological Uses of Public-Trust Resources

Implementing the public-trust doctrine in California has evolved over time. Early in the state's history, the doctrine protected the public's access to, and use of, tidelands for navigation, commerce and fisheries. More recent court decisions recognized the changing nature of the use of trust resources and expanded the list of protected uses to include recreational uses and ecological uses that support habitats and species. Litigation related to the State Water Board's *Mono Lake* decision help clarify the responsibilities of the State as administrator of the public-trust resources. The Supreme Court of California ruled that the State Water Board must take impacts of allocation decisions on uses of trust resources into account when administering water rights.[26]

[26] Koehler, 1995; Casey, 1984.

No comments

- n/a -

The Court's ruling also emphasized a flexible definition of use, one that responds to changing public needs. The Court also identified ecological resources as one of "the most important" uses of trust resources.[27]

"[W]e stated that '[t]he public uses to which tidelands are subject are sufficiently flexible to encompass changing public needs. In administering the trust the state is not burdened with an outmoded classification favoring one mode of utilization over another. [citation omitted] There is a growing public recognition that one of the most important public uses of the tidelands—a use encompassed within the tidelands trust—is the preservation of those lands in their natural state, so that they may serve as ecological units for scientific study, as open space, and as environments which provide food and habitat for birds and marine life, and which favorable affect the scenery and climate of the area.'"[28]

Preservation of water-based natural resources "in their natural state" can affect a wide range of ecosystem services that trust resources provide. An illustrative, though incomplete, list of these ecosystem services includes flood mitigation and groundwater recharge, water filtration, sediment capture, nutrient cycling, gas regulation, provision of habitat for economically important fish and wildlife, and scenic and amenity values. While the natural resources at issue exist independent of human society, ecosystem services only exist insofar as there is human demand for their supply, at a particular place and time, and their value reflects the specific context within which the demand exists. Ecological uses of trust resources are not traded in markets, however, and so we must look to non-market valuation methods for measures of their values. We describe these methods in the next subsection.

B. Evolution of Economic Methods

Methods of measuring the economic effects of water allocation decisions on what the California Supreme Court described as one of the most important uses of public-trust resources—uses by aquatic resources that provide ecosystem services—have evolved over time. In the remainder of this section, we illustrate the evolution of these economic methods using reports by federal and California state agencies. We picked these sources because they help guide federal and state public policies, and because they often incorporate analytical principles or methods only after they have been subject to peer review and debate in academic and professional forums. We begin with federal guidelines.

1. Federal Guidelines

a. Principles and Guidelines

In 1983, the U.S. Water Resources Council published, *The Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* (*P&G*).

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[27] Broussard, J. 1983. *National Audubon Society et al., Petitioners, v. The Superior Court of Alpine County, Respondent; Department of Water and Power of the City of Los Angeles et al., Real Parties in Interest*. 33 Cal.3d 419. S.F. No. 24368. Supreme Court of California. February 17.

[28] Broussard, 1983.

No comments

- n/a -

This report helps federal agencies, including the Corps of Engineers and Bureau of Reclamation, plan water-related projects. The *P&G* have not been updated since they were introduced. Recently, the National Research Council (NRC) of the National Academies, reviewed proposed changes to the *P&G*. The NRC's review begins by describing some of the significant changes in water-resources planning since the publication of the *P&G* in 1983.

"Since the early 1980s there have been may changes in the national water resources planning landscape. For example, … [s]cientific understanding and appreciation of the natural functions of aquatic ecosystems have increased, and environmental protection and ecosystem restoration have become primary planning objectives for some projects ... Many national water planning challenges involve balancing decisions and resources among a greater number of water resource users and interests."[29]

"For the Corps of Engineers, new missions have been added … especially aquatic ecosystem restoration."[30]

"[Other water-planning issues] such as design of ecosystem restoration projects, reallocating water from traditional users to rapidly growing cities or ecosystem restoration purposes, and controlling nonpoint source pollution reflect more recent changes and needs. Many of today's key national water management issues lie largely outside the missions of the agencies for which the *P&G* was written."[31]

"In light of these developments, many groups—including committees of the National Research Council—have recommended that the P&G be reviewed and modernized.[32]

The NRC concluded, however, that the proposed changes did not adequately address the many deficiencies in the outdated *P&G*. The proposed revisions "lacked clarity and consistency,"[33] which precluded the NRC from offering specific suggested changes. The NRC did comment on a few areas for improvement.

"…[T]he 2007 Water Resources Development Act requires that the P&G revision ensure the use of best available economic principles and analytical techniques. However, the proposed revisions contain concepts, advice, and language that are carryovers from historical practices and documents and are not fully consistent with contemporary best practices in decision science and economics. This relates

[29] National Research Council of the National Academies. 2010. *A Review of the Proposed Revisions to the Federal Principles and Guidelines Water Resources Planning Document*. Committee on Improving Principles and Guidelines for Federal Water Resources Project Planning, Water Science and Technology Board, Division on Earth and Life Studies. p.1.

[30] National Research Council, 2010, p.5.

[31] National Research Council, 2010, p.6.

[32] National Research Council, 2010, p.1.

[33] National Research Council, 2010, p.2.

No comments

- n/a -

to both how analysis is conducted and the role that it plays informing decisions."[34]

For example, the NRC noted that limiting an economic analysis of an environmental policy to costs and benefits would not satisfy current professional standards. An adequate analysis will look beyond costs and benefits to describe all relevant impacts and tradeoffs that affect jobs, income, competitiveness, etc. The *P&G* also separated the analysis of economic effects of environmental changes, which are described qualitatively, from the analysis of economic-development changes, which are described quantitatively. The NRC characterized this approach as a "residue" from the 1983 *P&G* that is inconsistent with current best practices.[35]

The NRC described the *P&G* as outdated and not representative of current best economic practices. This is especially true for analyses of the economic effects of public policies on environmental resources and ecosystem services. Given the significance of public-trust resources that support ecological habitats and ecosystem services that the Bay-Delta flows support, and given the deficiencies in the *P&G*, this report can offer the State Water Board little useful guidance on economic aspects balancing Bay-Delta flows.

b. EPA Guidelines on Economic Analyses

In December of 2010, the Environmental Protection Agency (EPA) released *Guidelines for Preparing Economic Analyses (Guidelines)*. The 2010 edition of the *Guidelines* represents the third update since the first edition was released in 1983. Unlike the *P&G*, which remain unchanged since first introduced in 1983, EPA anticipated periodically revising the *Guidelines* to account for "new literature published since the last revision" and the "growth and development of economic tools and practices."[36] These revisions and updates help keep the *Guidelines* more consistent with current best economic practices than do the *P&G*.

The 2010 edition includes a number of updates that help make the document a useful planning tool in general, and specifically for the State's balancing decision in the Delta. These updates include:[37]

- More detailed recommendations on identifying and describing baseline conditions that would exist without a proposed policy revision or regulation.
- An expanded description of methods of defining and valuing ecological benefits of projects and policies that protect natural resources.

[34] National Research Council, 2010, p.12.

[35] National Research Council, 2010, p.11-12.

[36] National Center for Environmental Economics. 2010. *Guidelines for Preparing Economic Analyses. U.S. Environmental Protection Agency*. EPA 240-R-10-001. December. p.1-1.

[37] National Center for Environmental Economics, 2010, p.1-1.

No comments

- n/a -

- A revised and updated description of methods of discounting costs and benefits that occur at different times in the future.

- Directions on presenting the results of benefit-cost studies, including effects that cannot be quantified or expressed in dollar amounts.

c. EPA Guidelines on Valuing Ecological Services

EPA's Science Advisory Board (SAB) released a report titled, *Valuing the Protection of Ecological Systems and Services* in May of 2009. As the name implies, the report describes methods of identifying and describing the economic significance of natural resources and associated ecosystem services affected by policies or projects. The SAB noted the importance of valuing ecosystem services using up-to-date economic methods, and promoting collaboration among social scientists and biophysical scientists.[38]

"This report describes and illustrates how EPA can use an 'expanded and integrated approach' to ecological valuation. The proposed approach is 'expanded' in seeking to assess and quantify a broader range of values than EPA has historically addressed and through consideration of a larger suite of valuation methods. The proposed approach is 'integrated' in encouraging greater collaboration among a wide range of disciplines, including ecologists, economists, and other social and behavioral scientists, at each step of the valuation process."[39]

The report describes a number of recommendations that facilitate the "expanded and integrated approach." Many of the recommendations have relevance to assessing the economic effects of water allocations in the Delta. These include:[40]

- Identifying and describing the critical relationships between biophysical aspects of affected natural resources and ecosystem services, and analyses of the economic effects of policies that impact resources and services.

- Choosing appropriate valuation methods.

- Identifying and describing sources of uncertainty in analyses of the economic significance of ecosystem services.

2. Guidelines by the California Department of Water Resources

The California Department of Water Resources (Department) recently produced guidelines for economic analyses of public policies that affect water resources. We describe two of these works in this subsection. The first, a four-part study published in 2005, describes the importance of considering the full range of economic costs and

[38] Environmental Protectation Agency (EPA) Science Advisory Board. 2009. Valuing the Protection of Ecological Systems and Services. EPA-SAB-09-012. May. p.2.

[39] EPA, 2009, p.2.

[40] EPA, 2009, p.1-7.

No comments

- n/a -

benefits of public policies that affect aquatic resources. The Department refers to this as a "multi-objective approach" to floodplain management because it takes into account objectives besides flood mitigation (a single objective) to consider consequences on habitats, water quality, society, etc. The second is a guidebook on conducting economic analysis published by the Department in 2008.

a. Multi-Objective Approach to Floodplain Management

1. Ecosystem Valuation Methods

The first of the four reports in the multi-objective approach, *Ecosystem Valuation Methods* (*Methods*), describes a number of up-do-date methods of valuing aquatic-based ecosystem services.[41] The report summarizes ten analytical methods and their advantages and disadvantages. The floodplain focus and the up-to-date descriptions of analytical methods in this and the other three reports, have relevance to, and can help inform, the State's assessment of the economic significance of ecological uses of the Bay-Delta flows.

2. Natural Floodplain Functions and Societal Values

The second report, *Natural Floodplain Functions and Societal Values* (*Functions*), describes biophysical aspects of floodplain habitats and examples of economic values of the ecosystem services that floodplains provide.[42] The report provides background information on floodplain habitats and the biological and human services they provide, and the importance of considering this information when making decisions that affect floodplains. The report describes economic values of ecosystem services including managing flows, maintaining natural channel processes, water supply, water quality, soil quality, and plant and wildlife habitat. The staff conducting the study applied some of the analytical methods described in the *Methods* report.

3. Middle Creek Restoration Project Case Study: Benefit and Cost Analysis

The third report, *Middle Creek Flood Ecosystem Restoration Project Case Study: Benefit and Cost Analysis* (*Case Study*), describes the results of a case study of applying analytical methods and data described in the *Methods* and *Functions* reports to a floodplain restoration project.[43] The Middle Creek Ecosystem Restoration Project restored damaged floodplain structure, habitats and functions in the Clear Lake watershed.

The analysis compared the benefits and costs of a no-action alternative and four restoration alternatives. The five alternatives described land use scenarios including maintaining current agricultural and rural-residential uses and flood protection,

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[41] California Department of Water. 2005A. *Ecosystem Valuation Methods. Revised Draft*. Multi-Objective Approaches to Floodplain Management on a Watershed Basis. May.

[42] California Department of Water Resources. 2005B. *Natural Floodplain Functions and Societal Values Revised Draft*. Multi-Objective Approaches to Floodplain Management on a Watershed Basis. May.

[43] California Department of Water Resources. 2005C. *Middle Creek Flood Ecosystem Restoration Project Case Study: Benefit and Cost Analysis*. Multi-Objective Approaches to Floodplain Management on a Watershed Basis. May.

No comments

- n/a -

restoring portions of the floodplain, and providing increased flood protection for existing uses and enhanced agricultural production.

4. Floodplain Management Benefit and Cost Framework

The fourth report, *Floodplain Management Benefit and Cost Analysis Framework* (*Framework*), describes a framework for analyses of ecological, social and economic consequences of policy decisions that affect aquatic resources.[44] It emphasizes the importance of including information on ecological consequences in decision-making. The report cites sources that are somewhat dated, though more current than those referenced in the 1983 *P&G*. In spite of this drawback, the document describes analytical concepts relevant to the State's balancing decision on the Bay-Delta flows. These concepts include the following.

- Incorporate environmental and social consequences into management decisions.[45]
- Measure the economic effects of policies on ecosystem services that have value to humans using non-market valuation techniques. The report references the *Methods* report for information on valuation techniques.[46]
- Not all economic effects of management decisions will occur over the same geography and time. Take these differences into account.[47]
- Select the appropriate discount rate for economic effects that will occur in the future.[48]
- Account for analytical uncertainty and risk. The report describes four methods of doing so.[49]
- Consider ecological, social and economic effects of policy decisions on a broad watershed scale. Do not limit economic analyses to the geographic boundaries of an individual project.[50]

State water projects that have a federal nexus must conduct economic analyses using the 1983 *P&G*. The *Framework* notes some of the limitations of the *P&G* and describes analytical principles that will produce more comprehensive assessments of ecological, social and economic effects of management decisions.

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[44] California Department of Water Resources. 2005D. *Floodplain Management Benefits and Cost Analysis Framework. Revised Draft*. Multi-Objective Approaches to Floodplain Management on a Watershed Basis. June.

[45] California Department of Water, 2005D, p.2.

[46] California Department of Water, 2005D, p.11-12.

[47] California Department of Water, 2005D, p.12.

[48] California Department of Water, 2005D, p.14.

[49] California Department of Water, 2005D, p.15-17.

[50] California Department of Water, 2005D, p.22-24.

No comments

- n/a -

"Local agencies seeking federal cost-sharing assistance for multi-objective projects with the [Army] Corps [of Engineers] will still be subject to the [P&G] However, if the local agencies are able to perform an economic analysis following the framework presented [in this report], they will not only have generated the information necessary to do the Corp's analysis, but more importantly, they will also have developed the information necessary to make a more informed decision about proposed floodplain management projects."[51]

b. Economic Analysis Guidebook

Economic analyses conducted by the Department must conform to the Federal *P&G* because of the significant amount of interactions and partnerships between the Department and Federal agencies. The Department recognized, however, that the outdated *P&G* could not adequately address the complex nature of water-management challenges that the Department faces. Department staff, therefore, developed the *Economic Analysis Guidebook* (*Guidebook)* in 2008, to address deficiencies in the *P&G*, help Department economists conduct economic analyses using up-to-date methods, and describe economic concepts and analyses to non-economists Department staff.[52]

"It is … DWR [Department] policy to adopt, maintain, and periodically update its own *Economics Analysis Guidebook*, which is consistent with the *P&G* but can also incorporate innovative methods and tools when appropriate. This policy is necessary because (a) the *P&G* has not been updated for more than 20 years, (b) federal and State economic analyses sometimes have different regional analysis perspectives, and (c) water management projects and programs have become more complex."[53]

"Water resource projects are increasingly becoming more complex, requiring more difficult economic analyses. Projects now tend to have multiple purposes and affect many diverse stakeholders. … [T]raditional methods of performing economic analysis often do not provide reliable means for quantifying important categories of benefits that these projects may provide (such as, ecosystem restoration)."[54]

The *Guidebook* describes economics as "critical" to describing the environmental consequences, social effects, and costs and benefits of water-management alternatives. Environmental issues include the tradeoffs between "natural" and "human" demands on water resources and should take into account the economic effects of water uses that benefit the natural environment, even if this use adversely impacts agricultural and urban water users. Economics can also help describe effects on social equity or

[51] California Department of Water, 2005D, p.35-36.

[52] California Department of Water Resources (CDWR). 2008. *Economic Analysis Guidebook*. The State of California. January.

[53] CDWR (2008), p.vii.

[54] CDWR (2008), p.1.

No comments

- n/a -

environmental justice. Economic costs and benefits include monetary and non-monetary effects. [55]

Methods of economic analysis described in the *Guidebook* include cost-effectiveness, benefit-cost, and socioeconomic-impact analysis. As the name implies, cost-effectiveness analyses identify the least-cost option of achieving a given goal. A benefit-cost analysis compares changes in costs to society with changes in benefit and calculates the net change, or net benefits of a proposal or proposals. A socioeconomic-impact analysis describes how a policy change affects factors such as population, employment, income, etc.

[55] CDWR (2008), p.viii.

No comments

- n/a -

SECTION 5: THE PRINCIPLES OF BENEFIT-COST ANALYSIS

In Section 1 of this report, we summarize our understanding of the State's objective to find a balance between the public-trust use of the Bay-Delta flows and, namely, the other beneficial uses of the Bay-Delta flows. In Section 2, we identify benefit-cost analysis (BCA) as the most widely used tool for evaluating alternative approaches to such a balance. In this section, Section 5, we focus on the principles by which the State should calculate and report the benefits and costs of these alternative approaches.[56]

A. Identify the Alternatives

At its most basic level, BCA is simply a tool for comparing alternatives. Whether one is already using one of the alternatives—in which case that alternative serves as the gauge or standard—or not, applying the principles remains the same. One begins by identifying all the alternatives and describing all the elements of each alternative.[57]

Today, the State does not seem to suffer too few alternatives. Rather, its challenge lies in identifying and clarifying the elements of each alternative. That said, prudence dictates ensuring the list of alternatives avoids errors of omission, because the alternatives selected for the BCA could affect the outcome of the analysis. By the same token, elements omitted from the description of an alternative could affect its ranking among the alternatives State evaluates.

B. Identify the Relevant Scope

At the beginning of any BCA, the State should identify the relevant scope of the analysis. That is, the analyst should specify which benefits and costs matter, to whom, over what geography and over what period of time.

> "Before you conduct an economic analysis, it is necessary to define its scope (i.e., identify who and what should be included in the analysis and who and what should be excluded)."[58]

Once the State has identified the relevant scope, it then should maintain each of the scope's dimensions throughout the BCA.

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[56] For portions of this Section 5, we relied on material Ed Whitelaw and others at ECONorthwest prepared in a matter involving Methanex Corporation, Claimant/Investor, and the United States of America, Respondent/Party; *In the Arbitration Under Chapter 11 of the North American Free Trade Agreement and the UNCITRAL Arbitration Rules Between Methanex Corporation and United States of America*. The arbitration occurred in 2004.

[57] Field, B.C. 1997. *Environmental Economics*, 2nd Edition. San Francisco: McGraw-Hill Company, Inc. p.116-117; U.S. Environmental Protection Agency (EPA). 2010. *Guidelines for Preparing Economic Analyses*. Report No. EPA-240-R-10-001. December. p.A-8.

[58] U.S. Environmental Protection Agency (EPA). 1993. *Guide for Cost-Effectiveness and Cost-Benefit Analysis of State and Local Ground Water Protection Programs*. U.S. Environmental Protection Agency, Office of Water, and Office of Ground Water and Drinking Water. April. p.11.

No comments

- n/a -

C. Assemble Information and Account for Risk and Uncertainty

Given the relevant scope, the analyst should assemble information on the full range of costs and benefits. Even on topics for which extensive research exists, the published findings would still reflect different levels of understanding. Researchers have grouped these different levels into risk, uncertainty, and ignorance. Risk refers to conditions under which the range of possible outcomes and their probabilities are known. Uncertainty refers to conditions under which the range of possible outcomes is known, but their probabilities are not.[59] Ignorance applies when we do not know the possible outcomes.

The more that analysts differ on estimates or ranges of important categories of costs and benefits, the more the State should account for the uncertainty clearly and consistently.[60]

> "Estimates of costs, benefits and other economic impacts should be accompanied by indications of the most important sources of uncertainty embodied in the estimates, and, if possible, a quantitative assessment of their importance… Ideally, an economic analysis would present results in the form of probability distributions that reflect the cumulative impact of all underlying sources of uncertainty. When this is impossible, due to time or resource constraints, results should be qualified with descriptions of major sources of uncertainty."[61]

In interpreting the benefits and costs associated with those elements of the various alternatives that affect environmental assets and ecosystem services, the State should not assume Californians would perceive numerically equal upside and downside risks neutrally. That is, when it comes to environmental matters, individuals tend to exhibit risk aversion.

> "…it seems reasonable to advocate that environmental policymakers approach their decisions in a risk-averse manner."[62]

> "If people are risk averse, then we should expect them to give extra weight to measures that avoid environmental disasters … It seems sensible to many people to take measures today to avoid the possibility of catastrophe in the future, even if the worst-case scenario has a relatively low probability."[63]

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[59] Knight, F.H. 1921. *Risk, Uncertainty and Profit*. New York, NY: Sentry Press.; Integrated Risk Information System. 2011. *IRIS Glossary*. U.S. Environmental Protection Agency. May 16. Retrieved July 27, 2011, from http://www.epa.gov/risk_assessment/glossary.htm#u.; Camerer, C. and M. Weber. 1992. "Recent Developments in Modeling Preferences: Uncertainty and Ambiguity." *Journal of Risk and Uncertainty* 5: 325-370.

[60] U.S. Environmental Protection Agency (EPA). 2000. *Guidelines for Preparing Economic Analyses*. September. p.27.

[61] EPA, 2010, p.11-12.

[62] Lesser, J.A., D.E. Dodds, and R.O. Zerbe, Jr.. 1997. *Environmental Economics and Policy*. p.406.

[63] Goodstein, 1999. E.S. *Economics and the Environment*. p.150.

No comments

- n/a -

"There are many cases in environmental pollution control where risk-aversion is undoubtedly the best policy …"[64]

For the State to consider such risk aversion makes economic sense. It should request that in the displays of the usual ranges and probability distributions of the elements of the alternatives, the analysts present not only the expected values or, in the jargon, the central tendencies, but also the downside and upside risks.

"[An evaluation of benefits and costs should] reflect the full probability distribution of potential consequences. Where possible, present probability distributions of benefits and costs and include the upper and lower bound estimates as complements to central tendency and other estimates."[65]

Often, sufficient data simply are not available for fully quantifying certain categories of the costs and benefits of the alternatives. Accepted principles of benefit-cost analysis also prescribe that analysts take into account non-monetized costs and benefits.[66] In such cases, the analyst should identify the likely sign and size of the effect. For natural assets for which the professional literature offers no direct calculations of value, economics offers the benefit-transfer technique.[67] With benefit-transfer, the analyst, with appropriate adjustments, imputes to the subject asset values calculable for other assets.

If the information on which the calculation of costs and benefits depends is faulty, then, of course, the calculation itself is faulty. In the best cases, the academic and professional communities reach consensus on the direction and magnitude of a policy's impacts. In the worst cases, they do not, because the information available and the analyst's interpretations of it are faulty or still evolving. Under these conditions, high uncertainty persists. In such cases, the value of BCA is limited, and the analyst has an obligation to report this limitation prominently and the uncertainty causing it.

"When important benefits and costs cannot be expressed in monetary units, BCA is less useful, and it can even be misleading, because the calculation of net benefits in such cases does not provide a full evaluation of all relevant benefits and costs. You should exercise professional judgment in identifying the importance of non-quantified factors and assess as best you can how they might change the ranking of the alternatives based on your estimated net benefits. If the non-quantified benefits and costs are likely to be important, you should recommend which of the non-quantified factors are of sufficient importance to justify consideration in the regulatory decision. This discussion should also include a clear explanation that support[s] designating these non-quantified factors as important. In this case, you should also consider conducting a threshold analysis to help decision makers and

[64] Field, B.C. 1994. *Environmental Economics*. p.129.

[65] Office of Management and Budget (OMB). 2003. *Regulatory Analysis*. Circular No. A-4. October. p.18.

[66] See, Moore, J.L. 1995. *Cost-Benefit Analysis: Issues in Its Use in Regulation*. CRS Report for Congress 95-760 ENR. June 28. Retrieved July 22, 2011, from http://www.cnie.org/nle/crsreports/risk/rsk-4.cfm.; EPA, 2010, p.7-57.

[67] EPA, 2010. p.7-51.

No comments

- n/a -

other users of the analysis to understand the potential significance of these factors to the overall analysis."[68]

D. Best Practices for BCA

In preparing this Section 5 on the principles of BCA, we found we had accumulated various techniques or practices that, while perhaps not qualifying as general principles, have proved useful over the years. We view this list as illustrative, not exhaustive.

1. Compare conditions with the alternative to conditions without the alternative: A good BCA avoids comparing conditions before the alternative to conditions after the alternative.

   "Calculation of net present value should be based on incremental benefits and costs. Sunk costs and realized benefits should be ignored. Past experience is relevant only in helping to estimate what the value of future benefits and costs might be."[69]

   By comparing the conditions with each of the State's alternatives to the conditions without that alternative, the analyst can isolate the effects of the alternative alone and thereby increase the accuracy of the comparison among all the State Water Board's alternatives.

2. Report and Document Methods, Information, and Assumptions: A good BCA should rely on transparent assumptions and allow for straightforward replication by a third-party analyst.[70]

3. Apply Methods and Assumptions Consistently: the analyst should remain consistent throughout the analysis.[71] For example, the analyst should not account for the possibility of uncertainty in underlying assumptions in one aspect of the BCA and ignore it in another.

4. Economic Impacts and Economic Equity Are Complements to BCA: In Section 2, regarding Figure 1, we describe the three categories of economic effects each of the State's alternatives would cause, economic values (for which the primary tool of analysis is BCA), economic impacts and economic equity. The State should keep in mind that the second and third categories can serve as complements to BCA, but not as substitutes for it. Consider, for example, EPA's guidance.

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[68] Office of Management and Budget (OMB). 2003. *Informing Regulatory Decisions: 2003 Report to Congress on the Costs and Benfits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities*. Office of Information and Regulatory Affairs. February. p127

[69] Office of Management and Budget (OMB). 1992. *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs*. Circular A-94. October. p.6.

[70] OMB, *Informing Regulatory Decisions*, 2003, p.134.

[71] Rossi, P. and H. Freeman. 1982. *Economics*, 13th Edition. New York: McGraw-Hill Book Company. p.275.

No comments

- n/a -

"Counting the number of jobs lost (or gained) as a result of a regulation generally has no meaning in the context of benefit-cost analysis."[72]

Each of the three categories of economic effects plays a distinct role in a comprehensive economic description and evaluation of the alternatives for improving the Bay-Delta flows. These roles should remain distinct.

5. Address externalities explicitly: In a market transaction, consider the buyer as the first party and the seller as the second party. A good BCA accounts the effects of the transaction on third parties, i.e., those who did not agree to experience the costs or benefits of the transaction.

"Identify the expected undesirable side-effects and ancillary benefits of the proposed regulatory action and the alternatives. These should be added to the direct benefits and costs as appropriate[73]."

[72] EPA, 2010, p.8-8. See also, OMB, 1994, p.6-7.

[73] OMB, *Regulatory Analysis*, 2003, p.3.

No comments

- n/a -

SECTION 6: OBSERVATIONS ON THE BURGEONING LITERATURE ON BAY-DELTA FLOWS

In preparing this report, we reviewed roughly 100 studies that address the economic issues associated with managing Bay-Delta flows. There are plenty more studies out there and the number is increasing. In this Section 6, we have chosen to draw the State's attention to some of the salient points raised in or illustrated by 12 of the studies.

We do not claim that the studies we have not yet reviewed are any worse or better than the ones we managed to acquire and review. Furthermore, we do not claim that the 12 studies on which we have based our observations represent the entire 100 studies. We do claim, however, that our observations help illustrate, though not exhaust, the challenges the State will face as it seeks a balance between the public-trust uses and the *other beneficial uses* and must choose among the proffered alternative approaches to managing the Bay-Delta flows.

A. BCA without Adequate Data Would Suffer Fatal Flaws

A widespread lack of basic data on California's water resources constrains the extent to which scientists, stakeholders and decision makers can develop fact-based water plans. Specific to the Board's benefit-cost analysis, describing the economic consequences of changing Bay-Delta flows would be much more challenging without baseline data on the Bay-Delta flows. The less adequate the data, the greater the uncertainty of benefit-cost analyses of the management alternatives.

The Delta Stewardship Council staff (Council Staff) propose achieving the Delta Plan's coequal goals of improving the quantity and quality of the water resources using the best available science.

> "Coequal goals means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem."[74]

> "The Council is required by law to use the best available science … as the basis for the Delta Plan. The Delta Plan must include 'a science-based, transparent, and formal adaptive management strategy for ongoing ecosystem restoration and water management decisions.' [citation omitted]"[75]

The Council Staff acknowledge, however, that the body of scientific information on the Bay Delta lacks adequate data on water resources. Council Staff, and others, also acknowledge that this lack hampers water-planning efforts for the Bay Delta Plan.

[74] Delta Stewardship Council Staff (Council Staff). 2011. *Fourth Staff Draft Delta Plan*. Delta Stewardship Council. June 13. p.3.

[75] Council Staff, 2011, p.19.

No comments

- n/a -

"The Delta plan requires the development and submission of water use data and other data that are currently unavailable or inaccessible."[76]

The Public Policy Institute of California (PPIC) recently concluded the same.

"Beyond an almost entirely non-technical California Water Plan Update developed by the Department of Water Resources every five years or so, there is little to no statewide organization, prioritization, and synthesis of technical and scientific activity applied to water problems."[77]

"The state's fragmented water rights system has contributed to serious gaps in water measurement and accounting. Most groundwater users have not been required to report water use to the state. Although riparian and pre-1914 appropriative rights holders are required to report their diversions, there was no legal sanction for failure to file an annual statement of diversion and use until the legislature amended the Water Code in 2009 … Many did not report, and those who did tended to substantially overstate their diversions and use. These gaps have led to difficulties in tracking water use trends, and they impede more effective management of water resources for economic and environmental purposes [citation omitted]."

"As water becomes increasingly scarce, it will become ever more important to measure and keep track of physical stocks and flows and their uses."[78]

"California is almost unique among western states in not collecting information on such diversions. California also lacks water quality information on many of its aquifers and waterways."

"To aid analysis and enforcement, greater and more systematic state efforts are essential to assemble data from local, state, and federal agencies within a coherent framework."[79]

"[W]ithout better reporting, California's water accounting and water rights enforcement will remain approximate at best—an increasingly difficult handicap for policy discussions and water management in a water-scarce state."[80]

Other stakeholders in the Bay Delta agree. For example, the California Roundtable on Water and Food Supply recently reported,

"A clear picture of the factors affecting water distribution and use in California is important to decision-making at the policy and farm levels, but is currently lacking.

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[76] Council Staff, 2011, p.19.

[77] Hanak, E., et al. (PPIC). 2011. *Managing California's Water from Conflict to Reconciliation*. Public Policy Insistute of California. p.128.

[78] PPIC, 2011, p.330.

[79] PPIC, 2011, p.353-54.

[80] PPIC, 2011, p.87.

No comments

- n/a -

> There is a need for better data collection and demonstration of water supply and distribution at basin scale, and better baseline data on water use to guide decision-making."[81]

Developing science-based water-management plans in the Bay Delta without the missing data on water resources would be challenging. The recent review of the scientific support for the Draft Bay Delta Conservation Plan (BDCP) by the National Research Council of the National Academies (Research Council) illustrates this point. The Research Council criticized the Draft BDCP for lacking basic information on affected water volumes. The Research Council described this as a "major shortcoming" of the Draft BDCP.

> "The lack of clarity concerning the volumes of water to be diverted is a major shortcoming of the BDCP. In addition, the BDCP provides little or no information about the reliability of supply for such a diversion or the different reliabilities associated with diversions of different volumes. There is no indication of how the amount of water to be diverted and its associated reliability are to be determined. It is nearly impossible to evaluate the BDCP without a clear specification of the volume(s) of water to be diverted, whose negative impacts the BDCP is intended to mitigate."[82]

The missing information impedes well-informed planning and management decisions, and scientists and policy makers would have difficulty developing a science-based Delta Plan without the missing data. This lack of fundamental data on water resources would also likely increase the uncertainty of analytical results from benefit-cost analyses of water-management alternatives.

B. Assessing the Analytical Veracity of Past Studies of Conveyance Structures

The literature on economic analyses of management alternatives for the Bay Delta includes a number of assessments of conveyance structures, such as a peripheral canal or tunnel. Among the most widely cited works in this literature are those by the PPIC. This literature, however, does not include a full benefit-cost analysis of conveyance structures or their alternatives. Most studies focus on certain costs and do not include many of the relevant benefits. In spite of these conditions, these studies illustrate the challenge the Board would face should they conduct a benefit-cost analysis of conveyance structures. We give two examples.

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[81] The California Roundtable on Water and Food Supply. 2011. *Agricultural Water Stewardship: Recommendations to Optimize Outcomes for Specialty Crop Growers and the Public in California*. June. p.3.

[82] National Research Council of the National Academies (Research Council). 2011. *A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan*. The National. In the PPIC report, *Comparing Futures*, the authors concluded that a peripheral canal would be the least-cost option for maintaining water exports out of the Delta, and that ending exports would have the highest probability of saving threatened or endangered fish in the Bay Delta.[82] Academies Press: Washington, D.C. May 5, page 4.

No comments

- n/a -

In the PPIC report, *Comparing Futures*, the authors concluded that a peripheral canal would be the least-cost option for maintaining water exports from the Bay Delta, and that ending exports would have the highest probability of saving threatened and endangered fish.[83] They estimated that the peripheral canal had an average annual cost of between $0.25billion and $0.85billion. The three other alternatives—1) continuing through-Delta exports; 2) dual conveyance of peripheral canal and through-Delta exports; or, 3) no exports—all had higher economic costs. The no-export option had the highest likelihood of achieving viable populations of delta smelt and fall-run Chinook.[84]

Dr. Jeffrey Michael of the University of the Pacific, critiqued some of the major assumptions, data and conclusions described in *Comparing Futures*.[85]

- Regarding the use of discount rates, PPIC did not "… utilize the conventional, scientifically accepted present discounted value approach …"[86]
- PPIC ignored the market and non-market values of affected fishery species. (In a later report, the PPIC described the importance of including non-market values—or as they describe, the values of ecosystem benefits—in benefit-cost analyses.[87])
- PPIC relied on out-dated and second-best estimates of population growth, which overestimated population growth and water demand over the time of the analysis (through 2050).
- PPIC also overestimated the costs of water recycling and ignored recent trends in water conservation.
- PPIC did not conduct their analysis in the context of water scarcity. They assumed no advances in water-conservation or desalination technology over the next 40 years. That is, the PPIC assumed a static analysis of an economy with fixed technology rather than a dynamic analysis of an economy that responds to price signals.
- The PPIC results are highly sensitive to analytical assumptions, and thus are not robust.

In another critique, the Research Council had harsh criticism for the quality of the biophysical information in the Draft BDCP in support of a peripheral canal. The Research Council concluded that the analysis underlying the Draft BDCP relied on incomplete or unsupported data, unrealistic assumptions, ignored relevant trends, and, like the PPIC's analysis, the underlying analysis ignored the concept of water scarcity.

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[83] Lund, Jay, aet al. 2008 (PPIC 2008). *Comparing Futures for the Sacramento-San Joaquin Delta*. Public Policy Institute of California. Chapter 6 and p.ix.

[84] PPIC, 2008, Table S.1, p.ix.

[85] Michael, Jeffrey. 2011. *First Administrative Draft Economic Sustainability Plan for the Sacramento-San Joaquin Delta*. Submitted to the Delta Protection Commission. June 16; Michael, Jeffrey. 2008. *The Economics of Ending Delta Water Exports Versus the Peripheral Canal: Checking the Data of the PPIC*. University of the Pacific. December 15.

[86] Michael, 2011, p.65.

[87] Hanak, Ellen, et al. (PPIC). 2011. *Managing California's Water From Conflict to Reconciliation*. Public Policy Institute of California. Pages 99 and 207.

No comments

- n/a -

"The BDCP cannot be properly evaluated if is does not clearly specify the volume of water deliveries whose negative impacts are to be mitigated. The draft BDCP suggests that the water requirements are based on the amount of acreage and crops that contractors have grown, or on the maximum deliveries specified by the SWP [State Water Project] contracts … There is no mention that quantities diverted may be constrained by various provisions of California water law, by possible changes in the extent of irrigated agriculture south of the Delta, and by potential changes in cropping patterns fueled by globalizing forces of supply and demand for food. The draft BDCP also fails to identify and integrate demand management actions with other proposed mitigation actions. A conservation plan should address issues of water use efficiency and should account for future trends in other variables that drive the demand for agricultural and urban water supplied. … The BDCP's lack of attention to these issues constitutes a significant omission, given the intensifying scarcity of water in California."[88]

"The lack of an appropriate structure creates the impression that the entire effort is little more than a post-hoc rationalization of a previously selected group of facilities, including an isolated conveyance facility [peripheral canal] …"[89]

A peripheral canal or tunnel has proponents and detractors. Some of the critiques to date, however, raise serious concerns regarding the veracity of analyses that support a canal or tunnel as the preferred management alternative. Any new analyses of a conveyance structure's benefit and costs would likely be considered incomplete if they do not address the analytical deficiencies raised by these analyses.

C. Addressing Environmental Justice Consequences of Water-Management Alternatives

Past planning efforts in the Bay Delta have not effectively dealt with environmental justice (EJ) aspects of water use and distribution in California's Central Valley. The Delta Plan is an opportunity to change this. Informational resources exist that can help analysts address EJ issues in benefit-cost analyses in meaningful ways so that they go beyond the typically superficial treatment of EJ issues in past analyses.

The Bay Delta Conservation Plan describes EJ as,

"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, educational level, or income with respect to the development, implementation, and enforcement of environmental laws. EJ seeks to ensure that minority and low-income communities have access to public information relating to human health and environmental planning, regulations, and enforcement. EJ ensures that no population, especially the elderly and children, are forced to shoulder a disproportionate burden of the negative human health and environmental impacts of pollution or other environmental hazard."[90]

[88] Research Council, 2011, p.31-32.

[89] Research Council, 2011, p.43.

[90] California Natural Resources Agency. 2010. *Highlights of the Bay Delta Conservation Plan*. December. p.84.

No comments

- n/a -

As described by the California Natural Resources Agency, EJ communities in the Central Valley share a number of characteristics and conditions including:[91]

- Mostly minority and low-income households
- Excluded from environmental policy setting
- Subject to disproportionate impacts from environmental hazards
- Residents experience disparate implementation of environmental regulations, requirements, practices and attributes.

A study published in July of 2008, by OxFam America and the Rockefeller Foundation, reported that the 20th U.S. Congressional District, which encompasses Westlands and the southwestern side of the San Joaquin Valley, was the poorest congressional district in U.S.[92] EJ communities in the San Joaquin Valley face challenges including unsafe drinking water, poor air quality and high incidence of childhood asthma.[93] The *Fourth Staff Draft Delta Plan* reported that nitrates and other pollutants contaminate drinking water supplies from groundwater for many low-income communities in the San Joaquin Valley.

> "The high cost of accessing water from alternative sources, coupled with the low earnings of these households, often makes safe drinking water in these communities unaffordable [citation omitted]."[94]

A recent report by the Pacific Institute concluded the same.

> "Despite the acute health effects of nitrate contamination, some communities in the state have been waiting for more than a decade for measures to restore the safety of their drinking water. … These communities … tend to be low-income and have a high percentage of Latino households. Although costs to community water systems and the households they serve are significant and directly tied to nitrate contamination of groundwater, public policy and regulatory programs have to-date failed to incorporate those costs in their policy and regulatory programs."[95]

As described in the Pacific Institute report, the high costs of addressing nitrate contamination and limited available funds means a significant backlog of unfunded

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[91] California Natural Resources Agency. 2003. *Environmental Justice Policy*. www.resources.ca.gov/environmental_justice_policy_20031030.pdf.

[92] Burd-Sharps, S., K. Lewis, and E. Borgess Martins. 2008. *The Measure of America: American Human Development Report 2008-2009*. OxFam America and the Rockefeller Foundation.

[93] Pacific Institute. 2011. *The Human Costs of Nitrate-Contaminated Drinking Water in the San Joaquin Valley;* Carger, Lloyd. 2010. *Reaping Riches in a Wretched Region: Subsidized Industrial Farming and Its Link to Perpetual Poverty*, 3 Golden Gate U. Envtl L.J., http://digitalcommons.law.ggu.edu/cgi/viewcontent.cgi?article=1033$context=ggueli.

[94] Delta Stewardship Council Staff. 2011. *Fourth Staff Drat Delta Plan*. June 13. p.111.

[95] Moore, E. and E. Matalon. 2011. *The Human Costs of Nitrate-contaminated Drinking Water in the San Joaquin Valley*. Pacific Institute. March. p.7.

No comments

- n/a -

projects. The California Department of Public Health currently has a waiting list of 100 community water projects, with a total cost of $150 million.[96]

A number of benefit-cost experts describe methods of combining EJ objectives including equity considerations with the economic-efficiency objectives of a benefit-cost analysis.[97] Such an approach in the Bay Delta could help avoid negative EJ impacts of water-management decisions and promote more equitable distribution of environmental benefits to communities that currently suffer from inequitable distribution of contaminated water resources.

D. Describing the Relevant Economies as Dynamic, Not Static

Economies are dynamic. They grow, develop, change and react over time in response to local, regional, national and international forces and trends. Consumers, workers and business owners make decisions based on how these forces and trends affect them. For example, as gas prices increase, consumers change their driving habits, purchases more fuel-efficient cars, or take mass transit. As the price of apples increases, some consumers will switch to other, less expensive fruits.

The dynamic nature of economies is important to the State Water Board's benefit-cost analysis of their balancing decision for two reasons. The first is because the affected economies will change for reasons unrelated to the new management alternatives. Attributing economic consequences from outside forces to the Bay Delta management alternatives would yield inaccurate results and mask the true consequences of the alternatives.

Recent reports on the Bay Delta describe some of the relevant outside forces likely to affect the region's economy. The PPIC report, *Managing California's Water*, lists what the authors describe as "drivers of change," which will affect future water supply and demand. These drivers include environmental, economic and demographic changes.[98]

- Rising sea levels will cause seawater intrusions into coastal aquifers.
- Climate-change induced warming will reduce snowpacks, increase winter runoff, decrease spring and summer runoff, and increase stream temperatures.[99]
- New urban developments will likely use less water per capita than existing homes.
- Urbanization will increase discharges of urban runoff.[100]

[96] Moore and Matalon 2011, p.8.

[97] See for example, Banzhaf, H. S. 2010. *Regulatory Impact Analyses of Environmental Justice Effects*. National Center for Environmental Economics. Working Paper # 10-08. U.S. Environmental Protection Agency. August; Haveman, Robert. 1965. *Water Resources Investment and the Public Interest*. Nashville: Vanderbilt University Press; and Johansson-Stenman, Olof. 2005. "Distributional Weights in Cost-Benefit Analysis—Should we Forget About Them?," *Land Economics*, Vol. 81.

[98] PPIC, 2011, p.135-136.

[99] PPIC, 2011, p.135-136.

No comments

- n/a -

- Urbanization of agricultural lands will reduce agricultural water use.[101]
- Population growth has been, and is expected to continue as, the most important demographic driver of water demand.[102]
- Continued reduction in agriculture's share of the state's economy.[103]
- California's agricultural producers will continue shifting to more permanent and higher-valued tree and vine crops in response to global market forces.[104]

Anticipated changes in local and state regulations will also affect future water supply and demand. For example, a recent report by the California Department of Water Resources describes an upcoming change that will affect urban water use. Beginning in 2016, water suppliers must comply with water conservation requirements established by the Water Conservation Bill of 2009 to be eligible for State water grants or loans.[105]

One of the challenges of conducting a benefit-cost analysis of Bay Delta management alternatives will be controlling for the economic consequences attributed to the types of biophysical, economic and other forces and trends described above that are unrelated to the management alternatives.

The second reason why the dynamic nature of economies is important to a benefit-cost analysis of Bay-Delta alternatives is that the affected economies will likely respond to the management alternatives. That is, the analysts should not assume a static economy, frozen in time and technology. The management alternatives will affect different sectors of the state's economy differently. Some sectors may experience higher costs, others may have increased employment or revenues. Consumers, workers and business owners will respond to these first-round changes. For example, in response to an alternative that reduces irrigation flows, some growers may idle their land. Others, however, will likely continue producing by switching to less water-intensive crops, increasing irrigation efficiency, engaging in water trades, or all three.

Authors of a recent retrospective analysis of the economic impacts of reduced flows to the San Joaquin Valley describe such reactive behavior.[106] The analysis focused on the changes in agricultural production in response to reduced water supplies from the Bay Delta caused by drought and restrictions on pumping due to environmental concerns.

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[100] PPIC, 2011, p.164.

[101] PPIC, 2011, p.137.

[102] PPIC, 2011, p.164.

[103] PPIC, 2011, p.137.

[104] PPIC, 2011, p.166.

[105] Pezzetti, Tonianne. 2011. *Guidebook to Assist Urban Water Supplirs to Prepare A 2010 Urban Water Management Plan*. State of California, Natural Resources Agency, Department of Water Resources. March. p.xiii.

[106] Michael, J., et al. 2010. *A Retrospective Estimate of the Economic Impacts of Reduced Water Supplis to the San Joaquin Valley in 2009*. September 28. p.1-3.

No comments

- n/a -

The authors report that growers reacted to the water reductions by engaging in water trades and changing their growing practices.

> "[A] significant increase in the amount of water transfers was critically important to reducing the negative impacts of water scarcity. … Building on these successful transfers will be important in minimizing the losses from future water shortages."[107]

> "Across the entire San Joaquin Valley, virtually the entire decline in net harvested acreage was in lower-value field and seed crops as farmers rationally directed more of their scarce water resources to protecting high value fruit and nut orchards."[108]

Water scarcity in California is not a new phenomenon. Water users react to this scarcity by adjusting their use and adopting new technologies and practices. This trend is expected to continue. A benefit-cost analysis that assumes a static economy, frozen in time and fixed in technology would not reflect the reality of how local and regional economies in the Bay Delta function.

E. Describing the Complex Competition for Bay Delta Water Resources

Much of the debate over Bay-Delta water resources pits in-stream or habitat use against agricultural or municipal use. Some describe this as the "jobs vs. fish" argument. Implicit in this characterization is the assumption that consumptive use of water—water use that supports "jobs"—is more important or has greater economic value than in-stream use—water for "fish." As the PPIC describe in their recent report, *Myths of California Water – Implications and Reality*, the competition for Bay-Delta water resources is much more complex.[109]

> "Healthy ecosystems provide significant value to California's economy, partially and sometimes fully offsetting their costs to traditional economic sectors. Direct benefits include improvements in recreation, commercial fishing, and drinking and agricultural water quality, and indirect benefits include improvement in the quality of life in California."[110]

In most times and places there are insufficient resources to satisfy all the demands for all of the goods and services provided by Bay-Delta water resources. Hence, there is competition for the water and, when it is used to produce one set of goods and services, the demands for others go unmet. The characteristics of this competition provide useful insights into the economic consequences of current and future decision-making for Bay-Delta water resources.

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[107] Michael et al., 2010, p.1-2.

[108] Michael et al., 2010, p.3.

[109] Hanak, Ellen et al. 2010 (PPIC 2010). "Myths of California Water—Implications and Reality." *West-Northwest*, Vol. 16, No. 1, Winter. p.20-22.

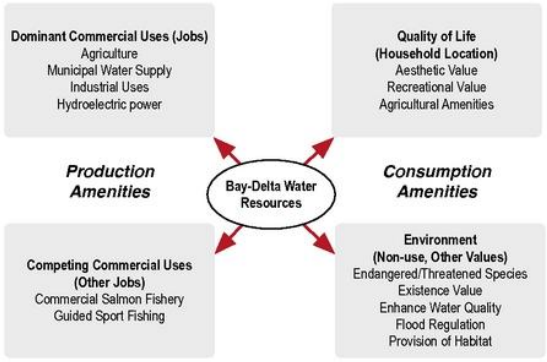
[110] PPIC, 2010, p.21.

No comments

- n/a -

One could categorize the competition any number of ways, but we employ a taxonomy that distinguishes among four types of demand, as illustrated in Figure 2. Two of these are called demands for production amenities, i.e., those goods and services that are, or could be, inputs to processes that produce other goods and services. The other two represent demands for consumption amenities, i.e., those goods and services that directly enhance the well being of consumers.

Figure 2. The Competing Demands for Bay-Delta Water Resources



Source: ECONorthwest

Competition for Production Amenities. Demand for Bay-Delta agricultural, municipal, industrial, and hydroelectric production, represented on the left side of Figure 2, comes from private and public enterprises, as well as households, that rely on water resources to conduct commercial activities. We separate the demands for production amenities into two groups—dominant and competing demands—to show that, sometimes, negative effects on other commercial sectors, which are represented in the bottom left of Figure 2, can offset the positive consequences arising from others. Using water for commercial production of crops may, for example, prevent it from being used to support guided sport fishing.

Competition Directly from Consumers. On the left side of Figure 2, water resources are economically important because they are inputs in the production of other things, notably crops and livestock, that consumers want to have. On the right side, the connection to consumers is more direct. Here, consumers consider Bay-Delta water resources economically important for how they directly contribute to their well-being. In economic parlance, these are known as consumption amenities.

Some ecosystem goods and services, such as recreational opportunities and scenic vistas, contribute directly to the well-being of people who have access to them. Their

No comments

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contribution to consumers' well-being makes them economically important in their own right, but they have additional economic importance when they also influence the location decisions of households and firms. We show the demands for consumption amenities that influence location decisions of households sensitive to spatial variation in the quality of life, in the upper right portion of Figure 2. In general, the nearer people live to amenities, the lower their cost of using them. Thus, consumers can increase their economic well-being by living in a place that offers recreational opportunities, pleasant scenery, wildlife viewing, and other amenities they consider important.

Quality-of-life values can be powerful. All else equal, if the Bay-Delta's consumption amenities improve, some people already here would tend to stay and additional people would tend to move in. Degradation would have the reverse impacts. One consequence is that the amenities lead to higher demand for housing and consumer-oriented commercial products. The higher demand raises land value for these uses higher than otherwise would exist.[111] Differences in quality of life also explain about half the interstate variation in job growth during periods of economic growth.[112] This relationship also has been found at sub-national perspectives.[113] Some in the Bay-Delta undoubtedly could enjoy higher earnings living elsewhere, but choose not to do so because their overall economic welfare—the sum of their earnings plus quality of life—is higher here. Some aspects of this quality of life—the strength of communities, schools, and churches, for example—are not directly related to water resources, but others are: scenic views, ways of life, and opportunities for fishing and boating, to mention a few.

The lower right portion of Figure 2 represents demands associated with economic values that do not necessarily entail a conscious, explicit use of ecosystem goods and services. We call these environmental values. There are two general categories: non-use values and values of goods and services that generally go unrecognized. Non-use values arise whenever people place a value on maintaining some aspect of the environment, even though they do not use it and have no intention to do so. Research has documented non-use values for maintaining salmon populations, for example, whose survival in the Bay-Delta depends on adequate water flows. Studies have shown that regardless of direct interaction with salmon populations, many Californians hold a positive willingness to pay to ensure the long-term survival of salmon.[114]

Environmental values also can be important when water resources provide valuable services that people generally consume without being aware of them. Some of these are part of the so-called web of life. Others, such as the ability of wetlands to purify water

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[111] Roback, J. 1982. "Wages, Rents, and the Quality of Life." *Journal of Political Economy* 90: 1257-1278; 1988. "Wages, Rents, and Amenities: Differences among Workers and Regions." *Economic Inquiry* 26: 23-41.

[112] Partridge, M. and D. Rickman. 2003. "The Waxing and Waning of Regional Economies: The Chicken-Egg Question of Jobs Versus People." *Journal of Urban Economics* 53: 76-97.

[113] For a more thorough discussion of relevant research, see, for example, Power, T.M. and R.N. Barrett. 2001. *Post-Cowboy Economics: Pay and Prosperity in the New American West*. Island Press, and Kim, K.-K., D.W. Marcouiller, and S.C. Deller. 2005. "Natural Amenities and Rural Development: Understanding Spatial and Distributional Attributes." *Growth and Change* 36 (2): 273-297.

[114] Loomis, J., T. Brown, and J. Bergstrom. 2007. "Defining, Valuing, and Providing Ecosystem Goods and Services," *Natural Resources Journal* 47: 329-376.

No comments

- n/a -

and mitigate flood damage, have a more direct link to the well-being of California's residents. For example, San Francisco, which receives its water from the pristine Hetch Hetchy watershed, saves tens of millions of dollars per year in avoided water treatment costs.[115] Some scientists and economists believe many services have great economic value, even though people generally are unaware of their importance.[116] Environmental values typically increase as people learn more about the environment, the services it provides, and environmental degradation.[117] Many people today, for example, consciously consider the economic values associated with the services produced by the global climate in ways that were unknown, even to scientists, just a few years ago.

The demands associated with the consumer amenities represented on the right side of Figure 2 are typically harder to measure, or even to observe, than the commercial demands shown on the left side of the diagram. This difficulty does not diminish their value or impact on jobs and incomes, however. Instead, it merely reflects the lack of tools for measuring them.

As described in the PPIC Report, one of the goals and challenges of the Board's benefit-cost analysis of its balancing decision will be identifying and describing the full range of benefits and costs of the competing demands for Bay-Delta water resources.

> "California must find ways to manage water jointly for environmental and commercial benefits. Better accounting of water use and its economic and environmental benefits and costs can help guide policies for watershed management."[118]

[115] Null, S. and J. R. Lund. 2006. "Re-assembling Hetch Hetchy: Water Supply Implications of Removing O'Shaughnessy Dam," *Journal of the American Water Resources Association* 42 (4): 395-408.

[116] Daily, G.C. (ed). 1997. *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington, D.C.: Island Press.

[117] Blomquist, G.C. and D.R. Johnson. 1998. "Resource Quality Information and Validity of Willingness to Pay in Contingent Valuation." *Resource and Energy Economics* 20:179-196.

[118] PPIC, 2010, p.21.

No comments

- n/a -

Dam Safety in California

General description about dam safety issue in California. Dam Safety Guideline Stakeholders, interests, and agencies Case Histories Problems and Promising Solutions Data and Sources

About Me

DONGSOON PARK
Graduate Student (Ph.D course) in UC Davis Senior Engineer and Researcher, Korea Water Resources Corporation
View my complete profile

SUNDAY, MAY 18, 2008

4.2.1 San Luis Dam

The San Luis Dam (now called the B.F. Sisk Dam) was completed in August 1967. It was built on the Los Banos Creek and is used primarily for agricultural storage for the South Valley farmers. In 1981, on September 4, workers noticed rocks sliding down the upstream face of the dam. The slide occurred in deep seated failure and the failure surface extended through the engineered zones and into the native slopewash material. Investigation of the slide led to the conclusion that the wrong strength parameters for the slopewash material were used for stability analyses.

The slopewash material is deposited primarily by rain dragging small clay particles downslope from the surrounding hills. The construction specifications for excavation to the foundation were that the soil had to be stronger than the fill to be placed over it. In California's Central Valley, the temperatures easily reach over 100 degrees for days at a time, causing significant evaporation losses in surface soils. In its desiccated state, the slopewash material exhibited strength characteristics that would seem

No comments

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desirable for a dam foundation. However, after extensive post failure laboratory testing on the slopewash material was performed, it was determined that the residual strength, and not the previously used "fully softened" strength should be used in stability analyses.

Fortunately, no one was hurt, and no water was lost the slide occurred. The engineering lesson to be learned from this event is that the engineer should have a good understanding of the behavior of the soil zones influenced by the dam under fully inundated conditions as well as the cyclic response of the soil mass due to drawdown.

Deep seated failure of San Luis Dam, Photo by Duncan

No comments

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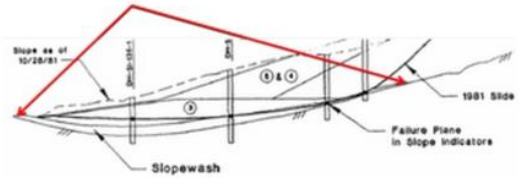

Slopewash: The action of water from rain or melted snow carrying (washing) soil down a slope.

Resource:
- Karl Schwartz, The 1981 Slide at the San Luis (Sisk) Dam, Dam Case History report, 2.06, 2008
- Boulanger, Ross, San Luis Dam Slide, http://cee.ucdavis.edu/faculty/boulanger/geo_photo_album/
- Duncan, J.M., & Stark, T.D. (1989), The Causes of the 1981 Slide in San Luis Dam, Raleigh, North Carolina: Dept. of Civil Engineering, Virginia Polytechnic Institute.

No comments

- n/a -

United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO:

OCT 18 2007

MP-241
PRJ-14.00

All Central Valley Project Water Contractors

Subject: Actions to Address Dam Safety Issues at B.F. Sisk Dam, Central Valley Project (CVP), California

Dear Ladies and Gentlemen:

Part of the Bureau of Reclamation's role in providing water and power is to assure the safety of the public potentially at risk due to dam failure. To accomplish this objective, Reclamation carries out dam safety activities to identify and evaluate potential risks to the public. When it becomes necessary to reduce risk, the Reclamation Safety of Dams Act provides authority to take action to protect the integrity of Reclamation dams and preserve water project benefits.

Through the Dam Safety Program, Reclamation has identified several conditions at B.F. Sisk Dam that require action to reduce risks.

- The dam is located in a seismically active area, very close to the Ortigalita Fault
- Studies and deformation analyses conducted during 2005 indicate that, during a major earthquake, crest settlement greater than freeboard, or cracking associated with embankment deformation, could occur and lead to dam failure
- Failure of the dam could inundate hundreds of square miles including the town of Santa Nella, about 7 miles of Interstate 5, and numerous farms and houses along the San Joaquin River including some areas of Stockton
- An independent consultant review board agreed with Reclamation that the calculated crest settlement is possible for the estimated peak ground accelerations associated with the Ortigalita Fault
- Reclamation has concluded that there is a need to initiate a Corrective Action Study to identify and evaluate risk reduction alternatives

There are several provisions of the Reclamation Safety of Dams Act of which you should be aware:

No comments

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- The Secretary of the Interior is responsible for determining the need for risk reduction actions and selection of the actions to be implemented
- Any modifications performed may not provide new or additional benefits to the project
- Modifications are not to address reasonable and normal maintenance
- The cost of the modifications must be reimbursed. If the need for modification is due to a change in hydrologic, seismic, or the state-of-the-art conditions, the Act currently limits reimbursement to 15 percent of the total cost
- Reclamation must notify the project water beneficiaries of the need for risk reduction and explain the administrative and legal requirements
- Reclamation must provide opportunities for project beneficiaries to participate in development of plans for risk reduction actions

The process for selecting and implementing risk reduction action is focused on the objective of determining the least total cost alternative for achieving the risk reduction. The process includes the following activities:

- Identifying alternatives for consideration
- Gathering necessary data to develop feasibility designs, cost estimates, and estimates of potential risk reduction
- Developing appraisal level designs for several proposed alternatives
- Evaluating risk reduction effectiveness of proposed alternatives
- Conducting an economic analysis to support repayment negotiations
- Conducting an environmental analysis and identifying mitigation activities associated with the proposed modification
- Preparing a modification report to Congress (where construction costs exceed the authority granted to the Secretary by the Reclamation Safety of Dams Act)
- Preparing final designs and estimates
- Awarding a contract to make the necessary modifications to the dam
- Completing design and construction documentation

No comments

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Proposed risk reduction actions will be subject to a number of administrative/legal processes including but not limited to the National Environmental Policy Act (NEPA) compliance, Endangered Species Act (ESA) consultation, cultural resources surveys, and repayment of project costs. Section 3 of the Reclamation Safety of Dams Act specifically prohibits the use of Safety of Dams funds for new or additional benefits. This potentially could include ESA mitigation activities required to obtain the permits necessary for the project. Any mitigation required as a result of ESA consultation will require a determination of the extent to which the mitigation is a direct result of the proposed risk reduction actions. While the provision in the Act does not relieve Reclamation of the responsibility to consult on ESA issues, it does limit Reclamation's authority to address such issues with Safety of Dams funding.

The Reclamation Safety of Dams Act requires repayment of certain reimbursable costs associated with the risk reduction. Reclamation will develop cost estimates as part of the preparation of a modification report. We will seek to enter into repayment negotiations with our water contractors to establish terms for repayment of the reimbursable portion of the costs in accordance with Reclamation law. If we are unable to sign a contract for reimbursement of costs, we will proceed with sending a bill upon a determination of substantial completion or consideration will be given to other alternatives for reducing the risk to the public.

During the process of developing and implementing a preferred risk reduction action, we invite you to participate in the process and share your thoughts and ideas for cost-effective means of achieving the required risk reduction. A Corrective Action Alternative Scoping (CAAS) meeting, which is a brain storming session to identify and evaluate corrective action alternatives, is planned for late 2007 or early 2008. If you have specific risk reduction alternatives that you would like to have considered in determining a preferred alternative we encourage you to submit these alternatives in writing for evaluation prior to the start of the CAAS meeting. We also will be inviting water user representatives to the CAAS meeting. If you are interested in participating in the CAAS meeting or if you would like to submit an alternative for consideration, please contact the project manager, Doug McElhinney, Bureau of Reclamation, MP-241, 2800 Cottage Way, Sacramento, CA 95825 (E-mail: dmcelhinney@mp.usbr.gov). Alternatives submitted prior to the CAAS meeting will be formally evaluated and displayed as alternatives in the modification report. Even if you do not have specific alternatives to be submitted, Reclamation will be providing you with periodic updates at key decision points to keep you informed of progress. We will also be providing you with periodic cost reports with information on safety of dams modification costs.

In an effort to better facilitate communication with the large number of CVP water contractors, Reclamation proposes that the following methods be used to disseminate information and receive feedback:

- Posting cost reports and project information at the Mid-Pacific Region Safety of Dams web page located at http://www.usbr.gov/mp/sod/. This web page should be functioning within the next month and would include technical information intended to be helpful in proposing alternatives

No comments

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- Providing periodic briefings to the Central Valley Project Water Association Financial Affairs Committee meetings

- Establishing a small group of water user officials to review and receive documents, to participate in project briefings, and to represent and make available documents to other CVP water users. Interested water contractor officials should contact the Project Manager listed in the preceding paragraph

During the process of identifying and implementing preferred risk reduction actions, you may have access to information that is considered procurement sensitive. Inappropriate sharing of this information could have a significant adverse effect on the cost of contracts and the project. Sharing of procurement sensitive information may also disqualify certain individuals or organizations from participation in contracts to implement the risk reduction action. To assure the protection of this information, we may ask your staff or representatives to sign non-disclosure statements. B.F. Sisk Dam was designed and constructed, and is owned by Reclamation, and operated and maintained by the California Department of Water Resources. Assuring the safety of B.F. Sisk Dam is a key element of assuring that Reclamation continues to deliver the authorized benefits of the project. We look forward to your involvement in identifying and implementing action to reduce the identified risks at the dam. If you have any questions concerning the administrative/legal requirements or the current status of the project, please contact Doug McElhinney at 916-978-5225.

Sincerely,

for John F. Davis
Acting Regional Director

cc: Central Valley Project Water Contractors

No comments

- n/a -

Robert Pyke, Consulting Engineer

July 12, 2012

The Honorable Edmund G. Brown Jr
Governor of California
State Capitol, First Floor
Sacramento CA 95814

The Truth About Delta Levees
Or
The Shaky Justification for the BDCP

Dear Governor Brown,

You must be aware that one of the principal reasons that is advanced for the need for an isolated conveyance as part of the Bay Delta Conservation Plan (BDCP) is that the Delta levees are in a pathetic condition and that there will be multiple failures in a major earthquake followed by saltwater intrusion that will curtail exports from the Delta by the State Water Project and the Central Valley Project for up to three years, forcing up to 25 million people to drink and bathe in whiskey for that period of time. While I think I understand your desire to announce a "preferred project" for the BDCP within the next month, you should not do this without understanding that this reason for constructing an isolated conveyance with intakes in the North Delta is based on a series of misrepresentations and falsehoods - in other words, that the supporters of the BDCP are lying. And they are deceiving themselves - the threat to reliable water supply, the Delta ecosystem and both recreational and commercial fishing posed by a six-year drought is much greater than any threat posed by earthquakes, yet the BDCP does not include storage and does little or nothing to address the drought issue.

The implication that 25 million people are solely dependent on water exported from the Delta is of course false, but that is a relatively minor issue. The two more important issues that I want to focus on in this letter are the repeated use of the doomsday scenario for Delta levees as a scare tactic and the contention that exports might be interrupted for as much as 3 years, both of which are false.

1310 Alma Avenue, No. 201, Walnut Creek, CA 94596
Telephone 925.323.7338 E-mail bobpyke@attglobal.net

No comments

- n/a -

Examples of Scare Tactics by BDCP Proponents

The July 8 editorial in the LA Times, "California's Way Forward on Water," concludes with the following sentence: "Engineers warn that in the event of a major earthquake, Clifton Court could fail and the aqueduct could run dry, leaving much of the state without that water for three years or more."

Another recent example reported by KMTS radio is from the Santa Clarita City Council meeting on June 26th: "The delta is in danger of collapse. If you've ever driven or flown over Northern California and looked at that thing. It's a little terrifying," said City Manager Ken Pulskamp. "It's a 100 year old man-made agricultural levy system that could explode very easily, particularly in an area that's prone to earthquakes, floods, and some of the rising sea levels that we've been seeing," said Pulskamp.

Yet, another example was contained in the letter to John Laird, Ken Salazar and Mike O'Connor dated May 24, 2012, by eighteen members of the California State Legislature "as each day passes, the threat of a major earthquake in the Delta region and the impact of weather changes threaten the water supply ..."

While threats to the Delta levees from floods, earthquakes and possible more rapid sea-level rise are real, statements like this greatly exaggerate their importance. At least, that is my opinion as a registered civil and geotechnical engineer with over 40 years of experience and national and international standing in earthquake geotechnical engineering. As far as I know, neither the editors of the LA Times, the City Manager of Santa Clarita nor the eighteen members of the legislature have any qualifications in these fields, so where do they get their information from? Some clue is provided by the next two examples.

One is a blog posted on the Southern California Water Committee (SCWC) web site http://socalwater.org/news/scwc-water-blog which reads in part: "The U.S. Geological Survey says there's a 63 percent chance of a magnitude 6.7 quake in the next 30 years in the Bay Area, home of the Delta—California's water supply hub. Those are some pretty high odds. So what would a seismic event of that size mean for the Delta and those who depend on its water? A 6.7 quake could create a Katrina-like collapse of the 100-year-old levees that channel Delta water, causing saltwater to flood in and contaminate the supply for 25 million people. Water deliveries from the Delta could be interrupted for as long as 1 ½ years. Until we make the needed investments to protect our infrastructure against this scenario, we are simply not prepared for this very real possibility."

The statement by USGS is correct but is being used inappropriately. The 63 percent chance of a magnitude 6.7 earthquake in the next 30 years in the Bay Area is in the right

No comments

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ballpark but it includes possible events on three main sources, the Peninsula San Andreas fault, the Hayward fault and the Rogers Creek fault. Only the Hayward fault is of much interest to the Delta and even the Hayward fault is 45 km from the western tip of Sherman Island. The Bay Area is not normally said to be "the home of the Delta". At least the SCWC is now talking about a supply interruption of only 1½ years, down from 3 years in some other articles, but the latest DWR studies suggest that even a very extreme 50 levee breaches, 20 flooded islands scenario would likely only disrupt water exports for several months and in the worst case for six months. And of course the impact is only on a relatively small fraction of the supply for 25 million people.

The second example of a possible source for these scary statements is a video entitled "Seismic Risk in the Sacramento San Joaquin Delta" that can be found on the website of the Metropolitan Water District of Southern California (MWD) http://mwdh2o.com/mwdh2o/pages/yourwater/supply/Delta/index.html the introduction to which says: "There are hundreds of miles of unengineered levees that are susceptible to major failures due to flood and seismic risk. This video demonstrates the catastrophic consequences to homes, businesses, farms and habitat in the Delta from a 6.7 magnitude earthquake and how Southern California's water supply could be cut off for up to two years." Note that the interruption is now back to two years in spite of the fact that MWD actually initiated the studies now being conducted by DWR and follows those studies closely.

A further example of exaggeration was given by Dr David Sunding in reporting his preliminary findings of the economic benefits of the BDCP at a public meeting on June 20th. Dr Sunding evaluated the economic impact of outages of six months, one year, two years and three years, even though the scope of work for his contract only specified that he would do this for outages of six months and one year. I will return later to the substance of his evaluation but where did these unrealistic durations of outage come from?

None of this is to say that the Delta levees are in perfect condition. They are not and they need more work, but let's get realistic about their current and likely future condition.

An Independent Assessment of the Condition of Delta Levees

The basis for many of the pessimistic assessments of the condition of Delta levees and their probabilities of failure come from the Delta Risk Management Strategy (DRMS) conducted by outside consultants but tightly managed by DWR. Although led by very competent principal investigators, the DRMS effort was always hampered by being schedule-driven rather than quality driven. The DRMS Phase One report was

No comments

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extensively reviewed, including a review by an independent review panel (IRP) assembled by the Cal-Fed Science Program. The reviews were generally critical of the study. After revisions had been made to the initial report, the IRP review concluded that "the revised DRMS Phase 1 report is now appropriate for use in DRMS Phase 2 and serves as a useful tool to inform policymakers and others concerning possible resource allocations and strategies for addressing risks in the Delta." But the IRP expressed concerns: "*This conclusion, however, is subject to some important caveats. First, the IRP cautions users of this revised DRMS Phase 1 report that future estimates of consequences must be viewed as projections that can provide relative indicators of directions of effects, not predictions to be interpreted literally ...*"

Although the DRMS developed a nice framework for assessing risks to the Delta levees, the effort had data gaps that were never filled, as acknowledged in the note on page 1-1 of the report. Gaps such of these in data and knowledge tend to drive the estimates of fragilities down, and the risks up. However, despite the warning from the IRP, the numerical results from the DRMS Phase 1 report are widely quoted and used in other studies, painting a more pessimistic picture of the Delta levee system than is warranted. In addition, there are on-going improvements to the levee system under the Delta levees subventions and special projects programs and these improvements are not reflected in the DRMS Phase 1 assessment which was based on 2005 conditions.

The first, and to date only, significant independent study of the condition of Delta levees is included in the Economic Sustainability Plan (ESP) of the Delta Protection Commission, completed in 2011. This study was conducted by the writer and Michael J. Conrad Jr., former commander of the Sacramento District of the Corps of Engineers. Col. Conrad and I had some familiarity with the Delta but our broad engineering experience had been largely accumulated outside the Delta. We conducted extensive interviews with DWR staff and consultants and with reclamation district engineers who work in the Delta. Because DWR at that time had no up-to-date maps of the Delta levee system, with the cooperation of DWR staff who made available various GIS data sets and the results of 2007 LiDAR surveys conducted for DWR, we developed our own map of the Delta levee system and made an assessment of the current condition of the Delta levees. Subsequent to the completion of the ESP, DWR has released the initial version of their own maps which are, not surprisingly because they are based on the same data, generally similar to the ESP map and assessment.

When we commenced our study, there were basically two schools of thought about Delta levees. One, that relied in part on DRMS, that said there were 1,100 miles of levees in poor condition that would fail in a large earthquake, and the other, advanced by engineers who work for reclamation districts, which said that since 1982 significant improvements had been made to many Delta levees and that they were now in

No comments

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reasonably good shape. Col. Conrad and I found, amongst other things, that there are in fact only about 1,000 miles of permanently maintained Delta levees, but our principal finding was that both schools of thought had some merit. We found that the reclamation district engineers were correct in claiming that the Delta levee system was now in reasonable condition overall, but that the "doomsday school" was also correct in asserting that the levee system was still not adequately designed to cope with more extreme flood events, large earthquakes or possible more rapid sea-level rise. The reclamation district engineers had never disputed this second conclusion and it turned out that the difference between the two schools was mostly one of emphasis.

In order to provide at least some detail about the current condition of the Delta levees it is necessary to refer to three different levee standards, the HMP "standard", the Delta-specific PL 84-99 standard, and a higher standard suggested in the ESP that has come to be referred to as the "fat levee" standard.

The HMP "standard" is not an engineering standard but is the minimum geometry specified in the "Short Term Mitigation Plan" as defined in "*State of California, FLOOD HAZARD MITIGATION PLAN, 180- Day Report Prepared in Accordance with Section 406 of Public Law 93-288, August 21, 1986*". The same report includes a "Long Term Mitigation Plan" based on DWR Bulletin 192-82 and the U. S. Army Corps of Engineers (USACE) companion document, "*Sacramento-San Joaquin Delta, California, Draft Feasibility Report and Draft Environmental Impact Statement, October 1982*". The Short Term HMP levee geometry was negotiated among FEMA, DWR, and the Delta reclamation districts following Delta disaster declarations resulting from the 1982-83 and 1986 floods. It was rationalized as an interim step with the objective of mitigating and rapidly improving Delta levees on islands (that were then in much worse shape than they are now) so they would be less likely to overtop, or be substantially damaged in the event of another federal disaster event. There was no pretention that the HMP geometry was an adequate long-term technical design standard. The HMP Criteria was solely for the purpose of meeting FEMA Public Assistance eligibility. Levees must protect against water flowing over the levee and water seeping through or below the levee. The HMP "standard" provides a measure of protection against water flowing over the levee but provides no safety requirements for seepage. While the State has been very slow in helping the local reclamation districts complete this interim step, thanks to funding authorized by Propositions 84 and 1E, this goal in now within reach. In fact DWR is currently in the process of administering a round of funding which is expected to bring all Delta levees up to this interim "standard".

The Bulletin 192-82 Long-Term Mitigation Plan evolved into the USACE Delta-specific guideline for non-project levees to qualify for Public Law 84-99 post-flood rehabilitation assistance that was issued in 1987. The PL 84-99 design criteria, which do constitute an

No comments

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engineering standard, are very similar to those in Bulletin 192-82. Under the multi-agency CALFED Bay-Delta Accord (1995 to 2000), the integrity of Delta levees was addressed as a major program area. Part of the resulting Levee System Integrity Program was improvement of all Delta levees to a "base level of protection." The final EIS/EIR stated this commitment as follows: "The CALFED Levee Program will institute a program that is cost-shared among the beneficial users, to reconstruct Delta levees to the Corps' PL 84-99 Delta Specific Standard." This commitment was then reflected in the Record of Decision (ROD) in August, 2000 and was to be implemented through a Memorandum of Understanding between the Corps and DWR executed in July, 2001. While CALFED fizzled out, funds that were generally adequate to cover the State share of improving all Delta levees were included in Propositions 84 and 1E, approved by the voters in 2006. Disbursement of that funding has been delayed for various reasons, including the State's fiscal crisis, but much progress has been made. Details of the expenditures on Delta levees through 2011 are included in the ESP but total spending since 1982 is approaching $700 million. After current projects are completed, only about 350 miles of levees will remain that need to be brought up to the PL 84-99 standard. The funds remaining from Propositions 84 and 1E, together with funds from the USACE Levee Stability Program, an outgrowth of CALFED, should be sufficient to upgrade most Delta levees to the PL 84-99 standard, finally achieving a goal that was first set by the State and federal governments thirty years ago.

However, the PL 84-99 standard does not explicitly address seismically-resistant design, or design for greater than 100-year water surface elevations and makes no accommodation for possible sea-level rise. The 1983 Delta Levees Investigation did suggest that Delta levees should be designed for 300-year water surface elevations but that suggestion has not been included in subsequent standards or revisions. Likely, adoption of the new requirement for urban levees of three feet of freeboard over the 100-year water surface elevation coupled with superior flood-fighting would effectively provide 500-year flood protection. Building to this standard and increasing the crown width to a minimum of 22 feet would increase the cost only marginally over the cost of complying with the Delta-specific PL 84-99 standard and this "PL 84-99 plus" standard may be sufficient for many Delta levees long-term. If the levee in question does not contain or is not underlain by loose sands that are susceptible to liquefaction, these "PL 84-99 plus" levees should be considered to be seismically robust. However, in order to more fully address earthquake loadings, possible sea-level rise and to provide the option for adding vegetation on the water side of levees, a higher Delta levees standard is required. This standard should particularly be applied to most of the lowland levees which face the biggest hazard due to possible sea-level rise and are also the most critical to salinity intrusion, but it might be selectively applied to other Delta levees.

As an example of a levee with increased seismic resistance that also meets other

No comments

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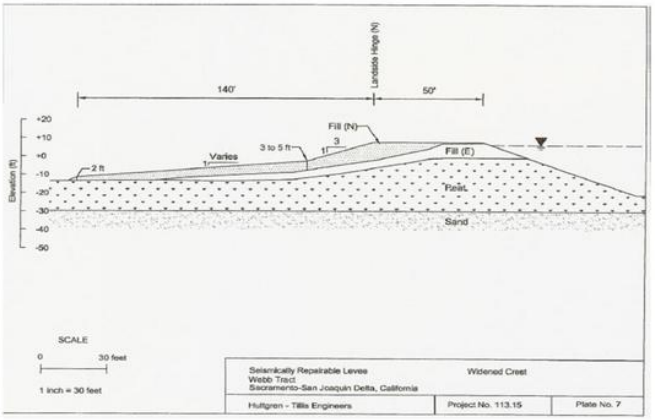
objectives, the cross-section of a proposed seismically-resistant levee taken from a report by Hultgren-Tillis Engineers (HTE) for Reclamation District 2026 (Webb Tract) is shown in Figure 1.

Figure 1 - Example "Fat Levee" Cross Section



Even when assuming that some liquefaction might occur both in the embankment and the foundation, this study indicated that deformations would be limited by the addition of a landslide buttress, as shown in the figure. A key feature of the design shown in Figure 1 is the wide crest. Wider crests not only provide a more robust levee, but also allow for more efficient emergency levee patrol and response when it includes an all-weather traffic surface. The fact that the levee section is overbuilt also means that material could be borrowed from the toe as necessary to quickly rebuild the crests of any levees that actually deform during an earthquake. Levees with wider crests are also the most economical way to provide for possible sea-level rise. While it is the policy of the state to plan for 55 inches of sea-level rise by the year 2100, the probability of that magnitude of sea-level rise is actually very small. While it is not cost-effective or rational to construct levees to those elevations today, the provision of a wider crest with an all-weather traffic surface today has at least three benefits: providing a more robust levee immediately; allowing more room and accessibility for patrol, flood-fighting or emergency response following earthquakes; and allowing a choice of methods for raising the crest elevation in the event of need in flood events and in the long term case of actual sea-level rise. In addition, the provision of a wider crest also allows for retaining or

No comments

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planting of appropriate vegetation on the waterside of the levee. Such planting, creating shaded riverine habitat, should be an essential component of any comprehensive plan to repair the Delta ecosystem.

HTE estimated that this design would cost approximately $2 million per mile in 2009. HTE also looked at more elaborate designs which included either or both of a slurry trench wall or an internal drain. Those designs added up to $5 million per mile to the incremental cost but I believe that the additional features are not generally required and that an average cost of $2-3 million per mile is a reasonable estimate at this time.
If it is assumed that anywhere from 300-600 miles of levees need to be upgraded to this standard, the basic engineering and construction cost would be in the order of $1-2 billion although the overall program cost might well be higher and the ESP suggested an overall program budget of $4 billion.

This higher Delta-specific levee standard might be referred to as a "seismically repairable levee" or a "seismically-robust levee" but because it also addresses other issues it has come to be known by the popular name of "fat levee". The first "fat levees" addressing these multiple issues were constructed on Upper Jones Tract in 2011 as a result of outstanding cooperation between the local reclamation district, the East Bay Municipal Utility District, DWR and the Department of Fish and Game.

Figure 2 – "Fat Levee" on Upper Jones Tract

No comments

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While the cost of further improving Delta levees to this "fat levee" standard is non-trivial, as explained in the ESP, that cost can easily be justified because of the value of the infrastructure that the levee system protects and because of the multiple benefits of improved levees. Not only would such a program generate jobs more quickly than the BDCP, but it would reduce the risk to life and property throughout the Delta, protect and enhance the Delta as a place, contribute to ecosystem restoration, and reduce the risk to many kinds of energy and transportation infrastructure in addition to water conveyance.

Are Delta Levees Really Vulnerable to Earthquakes?

The short answer is yes, but not very vulnerable. The two reasons that are normally given for questioning the performance of Delta levees under earthquake shaking are: (1) that they are founded on peat which is a poor foundation material; and (2) that they are founded on or composed of loose sands that are susceptible to the phenomenon of liquefaction.

The first of these assertions is completely wrong. Peat is very compressible under static loads but under cyclic loads peats generate even less excess pore pressures than clays and thus show little or no loss of strength and stiffness. In fact, to the extent that the Delta levees are largely composed of peat, they may be expected to perform better than levees in general under earthquake loadings. Not only is peat expected not to lose strength under earthquake loadings, but, because it is relatively soft, it also might be expected to attenuate ground motions with peak accelerations in the order of 0.2g or more. The relatively good performance of peat under even large amplitude cyclic loadings was demonstrated by a recent test carried out on Sherman Island by researchers from UCLA with funding from the National Science Foundation's NEES program.

Liquefaction might be a problem if loose sands were pervasive in either the foundations or the constructed portion of the Delta levees, but they are not. There are three different situations where loose sands that may be susceptible to liquefaction are found in and under the Delta levees. One possible source of loose sands is the natural levees that underlie some of the present-day levees. The extent of this condition is believed to be limited because few of the present day levees overlie historic natural levees. The second possible source of sands that may be susceptible to liquefaction is hydraulically placed clean sand that has been dredged from the main river channels and placed in adjacent levees without compaction. The actual extent of these materials is unclear and it may be that these materials are sufficiently well drained that most of the excess pore pressures that are generated by earthquake shaking would quickly dissipate so that any deformations would be limited. The third source is the topmost sand layer that underlies the peat. From a geotechnical engineering point of view, the sands that underlie the

No comments

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Delta can, with the possible exception of the top 10 feet, be characterized as dense to very dense, and actually constitute a good foundation. Meticulous work by Drexler and others at the USGS indicates that the oldest peat deposits are in the order of 7,000 years old so that the underlying sands are at least this old. That age, when combined with the penetration resistances cited by Hultgren-Tillis Engineers in their report on Webb Tract, suggest that even the surficial sands are not particularly susceptible to liquefaction. Even under the 500-year return period ground motions estimated in DRMS, which range from 0.2 to 0.4g in firm soils, significant or widespread deformations from any of these three kinds of sands should not be expected. The repeated citing of levee deformations that were sustained in the Kobe and Christchurch earthquakes, which had higher ground motions and where levees were founded on very loose and recent alluvial soils, is not particularly helpful. However, although these case histories are not directly applicable to the Delta, they do illustrate that levees do not necessarily breach and release water, even when they are quite badly deformed.

Thus, a fair summary would be that the risk of failure of Delta levees due to earthquake shaking cannot be completely dismissed, but that more detailed studies are required to determine whether it even rises to significant levels. What is clear, even without further study, is that the argument that a peripheral canal is needed because of the threat to Delta levees posed by earthquakes, rests on a very shaky foundation.

The Economic Impact of Conveyance Outages

The economic impact of possible conveyances outages caused by earthquakes has been discussed in a recent report by Dr. Jeffrey Micheal of the University of the Pacific and in the presentation by Dr David Sunding at the public meeting on the BDCP on June 20th.

It is unfortunate that Dr. Sunding's presentation had an alarmist focus on a worse than worst case scenario, and just talked about water supply and ignored the bigger picture that must be discussed in any Delta earthquake discussion. For example, Dr. Sunding was trying to sound reasonable in saying that an earthquake wouldn't result in a "refugee" situation due to water shortages. However, the low-probability catastrophic quake and flood he is discussing would result in widespread homelessness and loss of life in the Delta itself, not to mention interruptions of energy and transportation. There would, in fact, be refugees and the water conveyance tunnels would do nothing to prevent it. "Fat" levees are the only viable proposal that truly protects the lives and the economy from a major seismic catastrophe in the Delta.

However, as acknowledged by Dr. Sunding in his verbal comments, for the more realistic periods of outage there is little difference between his estimates and Dr.

No comments

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Michael's estimates. Limiting the discussion to the more realistic but still conservative outages of 6 to 12 months, Dr. Sunding presented an expected present value of $722 million to $2,093 million for these outage durations. This can be converted to an expected annual value that can be compared to Dr. Michael's annual estimate of $50 million. If the effect of discounting is eliminated, the expected values for 6 and 12 month outage increase to $970 million and $2,812 million. For an expected annual value, this would be multiplied by an annual probability of such a seismic event and failure occurring. According to DRMS Phase 1, the annual probability of 10+ islands failing from earthquake is about 3%, and the annual probability of 30 or more islands failing is about 1%. These failure probabilities are far too high, but I use them to make a point. The expected annual values if you apply a probability range of 1-3% to the expected costs of a 6-12 month outage are as follows:

Annual Probability	6 Month Outage	12 Month Outage
.03	$29.1 million	$84.4 million
.02	$19.4 million	$56.3 million
.01	$9.7 million	$28.1 million

These values are very comparable to the $50 million annual earthquake risk reduction benefit Dr. Michael included in his June 14 report – in fact the median value in the table is only about $30 million. So that even if you use conservative estimates of the likely length of any outage and very conservative estimates of the probability of those outages, the economic impact of an earthquake-induced outage is less than one-twentieth of the estimated annual financing and operating costs of the BDCP, which is over a billion dollars. This goes beyond shaky. It is ludicrous that it is put forth as a principal argument for the BDCP.

Conclusion

There is a real need for an improved system to convey any surplus water from the Sacramento River to users in the San Joaquin Valley and Southern California, but it is not the BDCP as presently planned. If the BDCP as presently planned was justified, it would not be necessary to resort to phony arguments such as there will be widespread failure of Delta levees in a major earthquake and supply will be interrupted for up to three years. Even using very conservative values for the expected duration of outages and the probability of those outages, the economic impact of those outages is trivial when compared with the cost of financing and operating the BDCP.

Furthermore, since the probability of these outages given the current and expected future condition of the Delta levee system is likely characterized by a return period of

No comments

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something greater than 1000 years, why are the lobbyists and flacks for the San Joaquin /Southern California Water Lobby more concerned about earthquakes than they are about a six-year drought which has a return period in the order of 100 years. A six-year drought would decimate farmers and fishermen alike, and force very tight rationing for urban water users, but the BDCP includes no storage and makes no provision for a six-year drought.

I am a professional engineer rather than a politician, but even if I do not fully understand California politics, it seems to me that you are not getting the best possible advice on this important issue and I would urge you seek input from a wider circle of advisors so that you can make a decision about the BDCP based on facts rather than misinformation.

Let's get California working again!

Sincerely.

Robert Pyke Ph.D., G.E.

No comments

- n/a -

ROR004 CVCWA

Central Valley Clean Water Association
Representing Over Fifty Wastewater Agencies

MICHAEL RIDDELL– CHAIR, CITY OF RIVERBANK
JEFF WILLETT – SECRETARY, CITY OF STOCKTON
TERRIE MITCHELL – SACRAMENTO REGIONAL CSD
ED CROUSE – TREASURER, RANCHO MURIETA CSD

January 14, 2013

Sent via electronic mail to: recirculateddpeircomments@deltacouncil.ca.gov

Phil Isenberg, Chairman and Council Members
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

SUBJECT: Comments on the Recirculated Draft Delta Plan Program Environmental Impact Report, Volume 3, November 2012, SCH No. 2010122028

Dear Mr. Isenberg:

The Central Valley Clean Water Association (CVCWA) appreciates the opportunity to provide comments on the Delta Stewardship Council's Recirculated Draft Delta Plan Program Environmental Impact Report (RDPEIR). CVCWA is a nonprofit association of Publicly Owned Treatment Works (POTWs) throughout the Central Valley whose primary mission is to represent wastewater agencies in regulatory matters while balancing environmental and economic interests. CVCWA members have a deep commitment to the protection of beneficial uses in the waters of the Central Valley, and have a special interest in the recovery of the Delta ecosystem. Many of CVCWA's members will be directly impacted by the Delta Plan and have a significant interest in its development and implementation. — ROR004-1

In general, CVCWA is concerned regarding inadequacies of the November 2012 RDPEIR and the November 2012 Final Draft Delta Plan upon which the RDPEIR is based. CVCWA has provided previous comments on the Draft EIR and on different versions of the Delta Plan.

CVCWA has consolidated the most recent versions of those comments into this comment letter to facilitate the development of responses to comments.

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Response to comment ROR004-1

Comment noted.

A. Comments on the RDPEIR

I. The Project Description in the RDPEIR Is Inadequate and the Environmental Impacts of the Proposed Project are not Fully Articulated

As a preliminary matter, CVCWA finds the project description in the RDPEIR to be incomplete and insufficient to comply with the mandates of the California Environmental Quality Act (CEQA). Specifically, the RDPEIR fails to provide CVCWA, and others, with an adequate understanding of the consequences of implementing the Final Draft Delta Plan. Without an accurate and complete project description and portrayal of its effects, stakeholders and those affected by the Revised Project are unable to adequately evaluate the actual impact of the policies and recommendations in the Delta Plan on the environment. On the one hand, the RDPEIR asserts that the Final Draft Delta Plan is a plan for "creating a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem". (RDPEIR, p. 2-2, lines 2-6.) However, the RDPEIR also characterizes the Delta Plan as being comprised of a suite of "regulatory policies" that have the force of law and "non-binding recommendations," that "...work to encourage other public agencies to take certain actions..." or to "...provide standards with which other agencies actions must be consistent." (RDPEIR, p. ES-2, lines 6-8) Further, the RDPEIR states that the "Delta Plan does not "approve or mandate the construction of any specific physical projects." (RDPEIR, p. ES-2, lines 5 and 6.) Accordingly, the RDPEIR appears to indicate that the Delta Plan, in and of itself, will not mandate any physical changes in the environment. If that is true, then it is uncertain how the Delta Plan will actually achieve its co-equal goals. This lack of information regarding how the Delta Plan will affirmatively achieve the project objectives prevents CVCWA and others from being able to fully analyze the positive and negative environmental impacts of the Revised Project. In addition, if the policies and recommendations in the Delta Plan are merely speculative and will not necessarily result in any physical actions, it is unclear how the Revised Project will achieve any more quantifiable benefits than the No Project Alternative. — ROR004-2

Regarding the distinction between the policies and recommendations contained in the Revised Project (the Final Draft Delta Plan), the RDPEIR fails to acknowledge the probability that recommendations to regulatory agencies, despite qualifications to the contrary, will be the basis for future regulatory requirements that will lead to environmental impacts. In essence, the RDPEIR seems to imply that "recommendations" have low probability of causing regulatory responses and associated impacts. In fact, it is probable that such recommendations, while not directly enforceable, could have a high (90 percent plus) probability of being treated as regulatory mandates. The RDPEIR must address the full range of possibilities regarding the impact of Final Draft Delta Plan recommendations. — ROR004-3

The Revised Project's general concept that stressor "reduction," at any level, will produce net positive outcomes is also problematic, as projects required on the basis of "stressor reduction" may, in fact, provide little benefit to beneficial uses. On the other hand, the adverse — ROR004-4

Response to comment ROR004-2

Please see response to commenter's prior letter, OR103.

Response to comment ROR004-3

Please refer to Master Responses 1 and 2. The project analyzed in the EIR consists of the entire draft Delta Plan, not just the policies and recommendations. The Final Draft Delta Plan policies and recommendations are reproduced, for convenience, in Appendix C of the RDEIR. To the extent known, projects that may be encouraged by the Delta Plan are named in the EIR. In addition, types of projects that may be encouraged by the Delta Plan are identified. The potential environmental effects of these projects, which would be indirect effects of the Delta Plan, are disclosed in the EIR.

Response to comment ROR004-4

Please see response to commenter's prior letter, OR103. See also Master Response 2.

environmental impacts of construction and operation of facilities by municipalities and other parties to achieve "stressor reduction" are tangible. The RDPEIR states that "the Delta Plan involves an environmental tradeoff between short-term impacts resulting from construction and long-term reductions in pre-existing adverse effects related to water reliability, water quality, flood risk and ecosystem health." (RDPEIR, p. ES-3, lines 32-35.) This statement presupposes that all of the projects proposed in the Delta Plan will, with certainty, accomplish the long-term impact reductions, that such reductions have been clearly defined, and that the improvement is a measurable net positive. At least with regard to water quality and ecosystem health, such certainty does not exist and the foundation for such belief is not contained in the RDPEIR. The RDPEIR's failure to include an adequate project description and full disclosure of the effects of the Revised Project prevents an adequate analysis of the environmental impacts of the Revised Project, which is implementation of the Final Draft Delta Plan.

ROR004-4

II. The RDPEIR Fails to Establish the Environmental Benefits of Increased Wastewater Treatment, and Also Fails to Account for Potential Adverse Environmental Impacts of Such Actions

The RDPEIR presumes that the Revised Project (Delta Plan implementation) will create long-term ecosystem benefits, as a matter of course. One stated component of the Revised Project is to encourage and influence more restrictive requirements on various source categories, including wastewater treatment facilities. Specifically, the RDPEIR states that "[t]he Revised Project Delta Plan... seeks to improve water quality by encouraging various actions which, if taken, could lead to construction and/or operation of projects that could improve water quality". Such project could include...wastewater treatment plants..." (RDPEIR, p. 2-18, lines 10-17) However, the RDPEIR fails to quantify or establish the asserted benefits of increased wastewater treatment beyond the currently permitted levels or how those actions would contribute to the achievement of the dual goals, and fails to provide a complete analysis of the adverse operational impacts of those projects The benefits of "stressor reduction", as a general concept, are implied, but not articulated or specifically defended. These issues need to be adequately addressed in the RDPEIR. Instead, issues identified in the DPEIR are unresolved in the RDPEIR.

ROR004-5

As one example, the DPEIR infers that installation of state-of-the-art reverse osmosis (membrane) treatment at wastewater treatment facilities is a plausible/desired outcome of the Delta Plan. (DPEIR, pg. 2A-44; pg. 4-74) However, the DPEIR fails to address the well-understood and significant adverse environmental impacts of membrane treatment, which include dramatically increased energy use and greenhouse gas impacts, as well as the long-term commitment of finite local community resources required by such treatment. The DPEIR also states that recycled wastewater projects encouraged by the Delta Plan may include modification of existing wastewater treatment plants to add filtration, membrane filtration, reverse osmosis, and/or disinfection. (DPEIR, p. 2A-22; DPEIR p. 2A-44.) Membrane treatment and reverse

Response to comment ROR004-5

Please see response to commenter's prior letter, OR103.

osmosis are not commonly applied in recycled water projects because of the exorbitant capital and energy costs associated with such levels of treatment. Thus, the RDPEIR and DPEIR are incomplete and inaccurate in their assessment of the net environmental impact (i.e. undefined and uncertain intended benefits versus certain adverse environmental impacts) of specific actions such as membrane treatment. The Delta Plan must identify the significant environmental impacts and energy requirements of such extreme levels of treatment to avoid reckless encouragement of these wastewater treatment options. Without performing such an analysis, the RDPEIR fails to accurately characterize the true environmental tradeoffs between the benefits that are asserted to be achieved by the Revised Project and the impacts of the individual projects that are presumed to create those benefits.

Moreover, the DPEIR improperly implies that inadequate wastewater treatment is causing contamination of surface water and/or ground water in many areas of the Central Valley (DPEIR, p. 2A-44.) As a general statement, this implication is both unsupported and inaccurate. The DPEIR also states that wastewater treatment "could improve drinking water and environmental quality", though this generalized statement is not supported by findings of fact in the DPEIR. In fact, reports prepared for the Drinking Water Policy Work Group and posted on the Central Valley Regional Water Quality Control Board website contain information that contradicts this statement. A technical report prepared for the Drinking Water Policy Work Group (West Yost, 2011) provides a current assessment of loadings from existing and planned wastewater treatment plants in the Central Valley, and shows that future combined municipal wastewater treatment plant and urban runoff loadings of organic carbon and nitrogen compounds will be *less* than current loadings, despite population growth. This report is highly relevant, contradicts the statements highlighted above, and should be reviewed and cited in the RDPEIR. In addition, a report prepared for the Drinking Water Policy Work Group by Malcolm Pirnie in 2011 indicates that Delta drinking water uses are not adversely impacted by current ambient organic carbon or pathogen levels in the Delta. Finally, the Work Group Synthesis report dated February, 2012 reaffirms that "organic carbon concentrations at drinking water intakes will not likely increase in the future and may even decrease slightly ...due to anticipated land use transitions and regulation of point and nonpoint sources."[pg. 45] and "...*Cryptosporidium* levels are sufficiently low so additional treatment is not required."[pg. 47] ROR004-5

III. The Evaluation of the No Project Alternative in the RDPEIR is Internally Inconsistent and Not Supported by Substantial Evidence

The RDPEIR's discussion of the No Project Alternative is internally inconsistent and contradicted by evidence in the RDPEIR itself. For example, the RDPEIR states that: "The No Project Alternative would do nothing to stem the increasing and compounding environmental impacts in the Delta" [Page ES-9, lines 1-2]. The RDPEIR also states that "Under the No Project Alternative, conditions related to...water quality... would continue to degrade"(RDPEIR, p. ES-5) However, the RDPEIR does not contain any specific support for this assessment that water ROR004-6

Response to comment ROR004-6

Please see response to commenter's prior letter, OR103.

quality is deteriorating, and should provide citations to the ambient data analysis that was used as the basis for this statement. This should also include references to specific water quality parameters and associated data analysis. Without such additional information, the DEIR's assertion that water quality will "continue to degrade" is inappropriate and should be modified or eliminated.

In fact, these statements are directly contradicted by information in the RDPEIR and DPEIR. Specifically, the DPEIR cites the ongoing efforts of the State and Regional Water Quality Control Boards to develop more stringent and comprehensive water quality objectives. (RDPEIR, p. 2A-40 – 2A-43.) These ongoing efforts are recognized in the numerous sections of the RDPEIR and the Final Draft Delta Plan. These statements also are in conflict with available information that should be considered in the RDPEIR, including information that many wastewater treatment facilities that discharge into the Delta are already in the process of planning for or constructing upgraded treatment facilities (West Yost 2011). Thus to assert for the No Project Alternative, as the RDPEIR and DPEIR do, that drinking water will "continue to be impaired" and water treatment facility upgrades and construction would not be expected to occur in the absence of the Revised Project, is contrary to the weight of evidence before the Council [see www.swrcb.ca.gov/centralvalley/water_issues/drinking_water_policy/index.shtml/]. ROR004-6

IV. The RDPEIR Fails to Adequately Discuss and Evaluate the Alternatives

The RDPEIR provides an overview of Alternatives 1A and 1B in the executive summary, but unfortunately, Alternatives 1A and 1B do not achieve the co-equal goal of ecosystem protection since they would result in an increase in Delta exports from the system over current levels. As noted in the August 2010 SWRCB Delta flow criteria report, the Delta ecosystem will be better sustained by an increase in flow through the Delta, which implies a decrease in Delta export volumes as compared to current levels. Alternatives such as 1A and 1B, which increase exports from the system, should be not be considered to be valid alternatives, in that they fail to achieve the co-equal goal of ecosystem protection. Moreover, there are sub-alternatives to Alternative 2 that may be more feasible/ reasonable than the other described alternatives. For instance, the specific means to address habitat or flood control measures can be disconnected from measures to decrease Delta exports, as each measure can be undertaken separately. (See RDPEIR, p. 25-4, lines 35-36.) The RDPEIR analysis of this alternative should de-couple these elements in order to reflect this reality. ROR004-7

In addition, many of the statements regarding Alternative 2 are incorrect and not supported by substantial evidence. Specifically, the RDPEIR states that Alternative 2 is "slightly environmentally inferior" to the Revised Project because "of its impacts on water supply reliability." (RDPEIR, p. 25-17 and 25-18ES-8.) However, water supply uncertainty is not an "environmental impact" and should not be treated as such in the RDPEIR. In elevating these ROR004-8

Response to comment ROR004-7

Please see response to commenter's prior letter, OR103. See also Master Response 3.

Response to comment ROR004-8

Please see response to commenter's prior letter, OR103. See also Master Response 3.

impacts above actual impacts to the Delta ecosystem, the RDPEIR fails to account for the environmental benefits to the Delta ecosystem resulting from reduced exports. ROR004-8

V. The RDPEIR Contains Numerous Misstatements With Respect to Other State Policies and Guidelines

In addition to its failings to comply with the principles of CEQA, the RDPEIR fails to correct problems in the DPEIR, which makes incorrect or misleading references to other state policies and guidelines. For example, the DPEIR states that "[t]he types of projects to reduce stressors can best be seen by looking at the recommendations in the Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento-San Joaquin Valley Regions." (DPEIR, p. 2A-36.) The word "draft" was left off this statement, and the DEIR fails to properly identify that this is still a draft document. The Department of Fish & Game (DFG) is still in the process of reviewing comments and making changes to the final document; as such, the Delta Plan should not rely on its content. ROR004-9

In another example, the DPEIR incorrectly states that current Central Valley Regional Water Quality Control Board (Central Valley Water Board) policies and plans "do not include strategies to effectively protect drinking water." (DPEIR, p. 2A-41.) In fact, the results of the technical investigations by the Drinking Water Quality Work Group indicate that drinking water uses are being effectively protected in the Delta based on an assessment of current and future ambient levels of organic carbon and pathogens. The DPEIR also incorrectly identifies the date of initiation of the Drinking Water Quality Work Group process as 2008. In fact, the process began in 2002. Finally, the 2010 Central Valley Water Board resolution referenced in the RDPEIR was not describing a new process; it referred to actions and deadlines to develop a Drinking Water Policy that were associated with the Work Group process initiated in 2002. ROR004-10

The RDPEIR and revised project do not adequately state that the Sacramento River water is currently the highest quality water supply for a large portion of California, including local and Southern California users. In fact, this is a primary justification for BDCP proposed diversion projects. Through extensive technical analysis, including modeling, the Central Valley Drinking Water Policy Workgroup, a stakeholder group that includes water exporters, found that existing Sacramento River and Delta water quality is of sufficiently high quality to protect drinking water uses. Furthermore the Work Group has determined that future urbanization through 2030 is not expected to degrade conditions sufficiently to require additional water treatment. These results are reported in the Workgroup's Synthesis Report[1], which examined a range of control options and future urban growth in the Delta Watershed. The Work Group has concluded that drinking water supply quality appears to be well protected under current regulatory programs and additional control measures are not necessary beyond these existing programs to protect this ROR004-11

[1] http://www.waterboards.ca.gov/rwqcb5/water_issues/drinking_water_policy/dwp_wrkgrp_synthesis_rpt.pdf

Response to comment ROR004-9

Please see response to commenter's prior letter, OR103.

Response to comment ROR004-10

Please see response to commenter's prior letter, OR103.

Response to comment ROR004-11

Comment noted. Please refer to Master Response 3 regarding declining conditions in the Delta.

ROR004-11

beneficial use. Acknowledgement of this finding can better focus potential projects in the Revised Project and their environmental impact to support flow requirements and aquatic life beneficial uses.

VI. The RDPEIR and DPEIR Fail to Adequately Discuss the Impact of Diversions on the Delta Ecosystem and Fails to Acknowledge the Impact of Known Stressors on the Effectiveness of Proposed Actions

The section of the DPEIR addressing biological resources (Chapter 4) contains accurate statements regarding impacts to the Delta ecosystem from invasive species and diversions, though there is insufficient analysis of a number of the issues raised, and in some instances failure to acknowledge how existing impacts affect the viability of proposed actions. For instance, the DPEIR correctly states that two clam species from Asia currently dominate the benthos of Suisun Marsh and the Delta and alter habitat suitability, consume vast volumes of primary and secondary producers, and alter species composition and the food web structure. (DPEIR, p. 4-7, citing Lund et al. 2007, p. 71).) However, neither the RDPEIR nor the DPEIR properly articulates or addresses the larger consequences of these effects. The RDPEIR should acknowledge that these observed significant impacts in Suisun Bay may greatly moderate the effect that ammonium, nutrients or other water quality stressors may have in the Delta.

ROR004-12

As another example, the DPEIR states that "net flows in the southern Delta have strong north-to-south directionality (toward the CVP and [SWP] South Delta export pumps)..." (DPEIR, p. 4-7) and also that "current flow conditions favor resident freshwater invasive organisms such as largemouth bass and Brazilian waterweed."(DPEIR, p. 4-7, citing Moyle et al. 2010b, p. 14.) However, neither the RDPEIR nor the DPEIR indicates whether and how the Final Draft Delta Plan will address or mitigate these impacts. The RDPEIR should acknowledge whether the Final Draft Delta Plan will remedy these effects, which may significantly impact the realization of the co-equal goal of ecosystem protection.

ROR004-13

The DPEIR also acknowledges that significant entrainment and export of vital biological materials will continue to occur as a result of the Final Draft Delta Plan, but does not contain an analysis or evaluation of the significance of these impacts. Specifically, the DPEIR states that "...large numbers of fish are lost to the CVP and SWP water export facilities located in the South Delta..." as a result of the "...entrainment effects caused by the Banks and Jones pumping plants." (DPEIR, p. 4-8.) The DPEIR also notes that the 110 million fish that were "salvaged" over a 15-year period "...greatly underestimates the actual number of fish entrained" and that "diversions may also create conditions that increase the risk of predation by trapping fish in diversion forebays." (DPEIR, p. 4-8.) However, the DPEIR should also reference the findings of studies by Grimaldo (2009) and Kimmerer (2011) and others which confirm that pre-screen predation greatly outweighs the fish lost at the screening facilities and in the salvage operations. The DPEIR states that the CVP and SWP water export facilities and other diversions export

ROR004-14

Response to comment ROR004-12

Please see response to commenter's prior letter, OR103.

Response to comment ROR004-13

Please see response to commenter's prior letter, OR103.

Response to comment ROR004-14

Please see response to commenter's prior letter, OR103.

phytoplankton, zooplankton, nutrients and organic material that would otherwise support the base of the food web in the Delta (DPEIR, p. 4-8, citing Jassby and Cloern, 2000, p. 348.). However, neither the RDPEIR nor the DPEIR sufficiently evaluates the impact of these diversions. The RDPEIR must evaluate the significance of these effects, since these indirect effects on the Delta ecosystem food web that result from continued CVP and SWP diversions will persist under the Final Draft Delta Plan. ROR004-14

The DPEIR makes the generalized statement that contaminants have been identified as "an important driver of declines in ecosystem function in the current Delta and Suisun Marsh." (DPEIR, p. 4-9.) However, there is no citation or supporting analysis for this statement, and no acknowledgement that contaminants are but one potential driver (of unknown importance) of declines in ecosystem function. This statement should be modified to clarify that contaminants have been identified as but one of a number of stressors that may be impacting the Delta ecosystem, but that the importance to ecosystem function has not been established. In addition, in the listing of "primary" threats to delta smelt, the DPEIR does not differentiate between stressors with known impacts (habitat loss, entrainment in South Delta export facilities) and stressors with potential impacts (toxic chemicals). (DPEIR, p. 4-16.) In other words, the RDPEIR fails to distinguish between observed and potential impacts. This is an important distinction that should be clarified in the RDPEIR. ROR004-15

The DPEIR also describes numerous actions and projects that "could improve water quality", which may include "implementation of plans/programs that lead to reduced constituents from agricultural runoff and wastewater treatment plants." (DPEIR, p. 4-72.) However, the reduction in constituent loadings (over and above current permitted loadings) will not necessarily result in (a) significant changes in ambient water quality, (b) improved protection of ecosystem health, (c) improved protection of beneficial uses, or (d) net environmental benefit, when the adverse environmental impacts of implementing new or increased treatment is considered in comparison to the benefit of a reduction in loadings. The RDPEIR fails to acknowledge these facts in its analysis of the environmental impacts of the various actions and projects that the Final Draft Delta Plan seeks to "encourage". The RDPEIR does acknowledge that the projects encouraged by the Revised Project (e.g. construction of new wastewater treatment plants) could result in substantial adverse effects that are considered to be significant. (RDPEIR, p. 4-24.) However, the RDPEIR fails to describe mitigation to be performed by the proponents of the Revised Project to offset these significant impacts. Such mitigation must be described in the RDPEIR. Finally, the RDPEIR states that operation of facilities intended to improve water quality such as discharges from wastewater treatment plants or the discharge of brine waste are not expected to produce significant impacts, since such discharges will be regulated by the State and Regional Water Boards. (RDPEIR, p. 4-24.) However, the RDPEIR fails to address the significant operational impacts associated with greenhouse gas emissions, power use, and chemical use associated with the use of membrane treatment in Central Valley wastewater treatment plants. These impacts must be addressed in the RDPEIR in order to ROR004-16

Response to comment ROR004-15

Please see response to commenter's prior letter, OR103.

Response to comment ROR004-16

Please see response to commenter's prior letter, OR103. In addition, please see Master Response 2 for response to comments related to environmental analysis. Please see Master Response 4 for response to comments related to mitigation measures.

provide an accurate and complete picture of how the operation of such facilities will ultimately impact the environment. ROR004-16

The RDPEIR states that projects encouraged by the Revised Project would be addressed in future site-specific environmental analyses conducted at the time such projects are proposed by lead agencies (RDPEIR, p. 4-24 and 20-6). This statement appears to seek to transfer responsibility for any projects "encouraged" by the Revised Project to local communities, including the mitigation of adverse impacts and the burden of demonstrating that such projects are reasonable, cost-effective, or otherwise create a net environmental benefit. This apparent transfer of the responsibility for mitigation of the adverse environmental impacts of membrane treatment and other projects to local communities, rather than the Council taking responsibility for such mitigation as the project proponent, is inconsistent with CEQA requirements. ROR004-17

VII. The RDPEIR Fails To Identify Appropriate Mitigation Measures for Continued Use of South Delta Export Pumps

According to the DPEIR, in order to meet the co-equal goals, continued use of the South Delta pumps into the future will need to occur. However, the RDPEIR fails to identify mitigation measures for the continued use of the existing South Delta pumping facilities. Such continued use will occur under any of the alternatives considered, and is recognized to have caused significant long-term impacts (losses far exceeding the 110 million fish that were "salvaged" in the Delta pump fish screening facilities in a fifteen year period). As described previously, significant losses above the "salvage" number occur due to entrainment, pre-screen predation and salvage operations) during the operation of the State and federal water project pumps. Implementation of a north Delta intake under the Bay Delta Conservation Plan (BDCP) is not sufficient mitigation for the significant loss of fish that will continue to occur in the South Delta, since exports from the South Delta are projected to continue representing the majority of water exported by the State and federal projects. Moreover, mitigation in the RDPEIR for the continued operation of the South Delta pumps must also address the indirect effects of South Delta exports, including food web effects, altered flow regime, modified salinity regime, increased residence time that increase the suitability of the Delta to invasive species and adversely impact the Delta food web. ROR004-18

VIII. The RDPEIR Contains an Insufficient Discussion of How the Bay Delta Conservation Plan (BDCP) Will Impact Implementation of the Delta Plan

There is an important interplay between the implementation of Delta Plan and requirements of the BDCP, if ultimately adopted and incorporated into the Delta Plan. Unfortunately, the RDPEIR does not clearly articulate how the incorporation of the BDCP into the Delta Plan will change the scope and regulatory effect of the Delta Plan, and contains no discussion of the resultant environmental impacts. The absence of any significant discussion of ROR004-19

Response to comment ROR004-17

Please see response to commenter's prior letter, OR103. See also Master Response 4.

Response to comment ROR004-18

Please see response to commenter's prior letter, OR103.

Response to comment ROR004-19

Please see response to commenter's prior letter, OR103. See also Master Response 1.

the BDCP impacts on the Revised Project makes it unclear to CVCWA and other affected entities how the regulatory effect of the BDCP will change if it is incorporated into the Delta Plan, and more specifically, whether provisions of the BDCP would be considered "policies" of the Delta Plan and thus subject to consistency determinations. The DPEIR indicates that this would be the case, noting that "[i]f BDCP is incorporated into the Delta Plan, it will become part of the Delta Plan and, therefore, part of the basis for future consistency determinations." (DPEIR, p. 2A-24.) However, if this occurs, then the BDCP's incorporation into the Delta Plan would dramatically expand the scope of both Plans, converting what was intended to be voluntary participation in a Habitat Conservation Plan (HCP) into a mandatory regulatory program affecting a much wider range of actions within the Delta. The RDPEIR's brief discussion of the BDCP in Section 23 fails to discuss how the BDCP will be used for future consistency determinations, and what the environmental impacts associated with that circumstance will be.

CEQA requires that an EIR evaluate the whole of the action that will be approved, including the reasonably foreseeable indirect physical changes to the environment that will occur from the project. The BDCP, to the extent that is must be incorporated into the Delta Plan, should be treated as a reasonably foreseeable future element of the Project. The RDPEIR does not treat it as such. The RDPEIR should provide a full and complete discussion of the BDCP and its effects on the Delta Plan in the project description, and should evaluate the impacts of the BDCP as part of the project and all alternatives. Without such a description and evaluation, the RDPEIR fails to adequately describe the actual scope of the Revised Project and cannot provide an adequate discussion of its environmental impacts. The lack of information in the RDPEIR regarding the regulatory and environmental consequences of incorporating the BDCP into the Final Draft Delta Plan makes it impossible for the public to evaluate and understand the environmental consequences of adoption of the Final Draft Delta Plan. The RDPEIR must be revised so that both the project description and impacts analysis clearly and thoroughly explain the scope of the Plan with respect to the BDCP and evaluate the resulting environmental impacts. The RDPEIR must be revised to fully explain the BDCP's role in the Delta Plan and the type and significance of environmental effects that will occur if all covered actions are required to comply with the BDCP. In addition, the RDPEIR needs to clarify, through direct statements, that the certification of an EIR for the Delta Plan will in no way override, negate, or otherwise influence the process for review and approval for the BDCP or the BDCP EIR. — ROR004-19

IX. The RDPEIR and DPEIR Indicate that Projects Undertaken to Implement Regulatory Actions of Other State Agencies May Not be Exempt From Consistency Determinations

The DPEIR contains a statement indicating that the Revised Project will involve the regulation (under the Delta Plan) of certain actions taken as a result of regulatory actions of other state agencies, a situation that may result in unnecessary delay in the implementation of projects that would likely have a positive impact on the environment. While the Final Draft Delta — ROR004-20

Response to comment ROR004-20

This is a comment on the project, not on the EIR.

Plan excludes certain activities from the definition of a covered action, including regulatory actions by other state agencies, the DPEIR states that the underlying actions regulated by those agencies would not be exempt (DPEIR, p. 2A-2 – 2A-4). This apparent failure to exempt projects undertaken to implement regulatory requirements, such as wastewater treatment plant upgrades necessitated by a NPDES permit issued by the Central Valley Water Board, may have significant adverse consequences for these projects. Entities implementing regulatory requirements of other state agencies will be required to prepare detailed findings of consistency with the Delta Plan, and environmentally beneficial projects will inevitably be delayed. Such delays are unreasonable, counterproductive, and will have adverse environmental impacts that are not discussed in the RDPEIR. Instead of subjecting such actions to consistency determinations that will result in additional cost and unreasonable delay, the Delta Plan should do everything possible to facilitate and encourage projects that implement regulatory requirements. The Final Draft Delta Plan should be revised to clearly exempt projects that implement NPDES permits and similar regulatory requirements adopted for the protection of the environment, and, at a minimum, acknowledge and discuss the adverse environmental impacts that would result from not granting such an exemption. ROR004-20

XI. Information About the Financing of Delta Plan Projects Is Necessary to Understand the Feasibility of the Revised Project in Relation to RDPEIR Alternatives

The RDPEIR and DPEIR fails to address the Finance Plan within the Final Draft Delta Plan, noting only that "[t]he Finance Plan Framework relies upon other agencies to authorize or to establish mechanisms for the development of funding and/or collection of funds, steps which would not result in changes in physical conditions in the environment in addition to those that are already discussed and analyzed in this EIR." (DPEIR, p. 2-56.) While the Finance Plan itself may not directly impact the physical environment, information regarding the Finance Plan is critical to understanding the feasibility of the Final Draft Delta Plan, particularly as it relates to the alternatives in the RDPEIR. The assumption built into the Finance Plan and only superficially referenced in the DPEIR is that entities identified as "stressors" will be successful in procuring funding for Plan projects. Given the realities of Proposition 218 and the existing scarcity of local, state or federal funds for such projects, such an assumption is highly questionable. The RDPEIR should disclose the important elements of the Finance Plan, discuss the likelihood that funding will be available for such projects, and address the timing of any such funding. Without this information, the public cannot understand the relative feasibility, and thus merits, of the Revised Project and its alternatives. ROR004-21

Response to comment ROR004-21

Please see response to commenter's prior letter, OR103. See also Master Response 2.

XII. There Are No Adopted Water Quality Objectives for Methylmercury in the Delta

Footnote f in Table D-1 of Appendix D of the DPEIR (which is retained intact in the RDPEIR) implies that a water column concentration of 0.06 ng/L MeHg has been adopted as an enforceable water quality objective in the Delta Mercury TMDL Basin Plan amendment. This statement is inaccurate and the table should be modified in the RDPEIR to clarify that this value is not an adopted water quality objective. — ROR004-22

XIII. The Recommendation to Provide Special Water Quality Protection Status in Areas of the Delta Is Unsupported and Not Properly Assessed in Terms of Environmental Impacts

Revised Project WQ R3 recommends that the SWRCB or regional water quality control board evaluate and, if appropriate, propose special water quality protections for priority habitat restoration areas...or other areas of the Delta where new or increased discharges of pollutants could adversely impact beneficial uses. Enacting ambiguous water quality protections may have unintended adverse impacts and may not produce offsetting positive impacts on beneficial uses. In some cases specific controls and regulations can have unintended impacts such as increases in other pollutants, or increased energy consumption and greenhouse gases. The RDPEIR should clarify the specific nature of the proposed "protections", the rationale for the establishment of such protections, the special authority to be granted to regulatory agencies, and the potential environmental impacts resulting from this new designation status. — ROR004-23

Conclusions regarding RDPEIR and DPEIR

CVCWA appreciates the work of the Delta Stewardship Council and staff in assembling this RDPEIR in support of the Final Draft Delta Plan. CVCWA members are communities with a strong track record of environmental protection in the Central Valley and in the Delta. We are supportive of a Delta Plan that is strategic and effective in resolving the major problems that are impairing the Delta ecosystem. However, we remain concerned that the RDPEIR contains deficiencies that prevent members of the public from adequately understanding the true environmental impacts of the proposed project, and believe that a number of the statements contained in the RDPEIR are misleading and are not supported by substantial evidence. The RDPEIR contains an incomplete project description, an inaccurately characterized no project alternative, and an inadequate discussion of the remaining alternatives. Moreover, the RDPEIR fails to account for major changes in scope that may be brought about by incorporation of the BDCP into the Delta Plan, and fails to acknowledge or analyze the environmental tradeoffs between the perceived benefits to be achieved by the Revised Project and the adverse environmental impacts of individual projects (e.g. state-of-the-art wastewater treatment facilities) that are suggested as a means to create those benefits. These issues need to be thoroughly addressed before the RDPEIR can be considered adequate under CEQA. — ROR004-24

Response to comment ROR004-22

Please see response to commenter's prior letter, OR103.

Response to comment ROR004-23

This is a comment on the project, not on the EIR.

Response to comment ROR004-24

Please see response to commenter's prior letter, OR103. In addition, please see Master Response 1 regarding the project description, no project alternative, and BDCP. Please see Master Response 3 regarding alternatives.

B. Comments on the Final Draft Delta Plan that should be answered in the Response to Comments on the RDPEIR

To the extent that CVCWA's comments on the previous drafts of the Delta Plan, including the most recent comments regarding the Fifth Staff Draft Delta Plan, have not been incorporated into the Final Draft Plan, we reiterate our concerns stated therein and incorporate them by reference. Specifically, there are still a number of problems with provisions contained in several previously identified chapters, including most notably *Chapter 6: Improve Water Quality to Protect Human Health and the Environment* (Chapter 6), which have not been addressed. However, in addition to the concerns highlighted in previous comments, there have been several notable changes to the Final Draft Plan that also pose significant concerns for CVCWA and its members. CVCWA's comments with respect to the Recommendations contained in Chapter 6 are provided here.

WQ R1: The statement that water quality should be maintained at a level that, among other things, "enhances" beneficial uses may not be a feasible or reasonable recommendation. It is requested that the word "enhance" be eliminated or qualified to reflect the notion that enhancement may only be possible in limited circumstances. Further, the Porter-Cologne Water Quality Control Act (Porter-Cologne) requires "reasonable" protection of beneficial uses. To the extent that enhancing beneficial uses would not reasonable, this recommendation is inconsistent with Porter-Cologne.

WQ R3: This recommendation suggests that State and Regional Water Boards should evaluate and propose special water quality protections in undefined areas of the Delta. CVCWA is very concerned with the open-ended nature of this statement. Any "special water quality protections" may only be adopted in accordance with Porter-Cologne by amending applicable water quality control plans. To ensure that the proper process is understood, CVCWA's recommends that the statement in question be modified to clarify that a public-process pursuant to Porter-Cologne will be followed in the event a shift in water quality management or regulation from adopted approaches is proposed. — ROR004-25

Additionally, no information is referenced in the Delta Plan to support the need for this recommendation for "special" or "extraordinary" water quality protections, above and beyond the "normal" levels of protection that are provided in the Water Code. Such designations open the door to the application of unknown and unanticipated regulatory discretion, unstated levels of regulatory conservatism, and a host of unspecified precautionary policies and decisions.

WQ R6: CVCWA previously objected to the Fifth Staff Draft Plan's recommendation (former WQ R3), which specified that the State Water Resources Control Board (State Water Board) and/or the Central Valley Water Board should complete development of a Strategic Workplan for protection of groundwater beneficial uses, including groundwater use for drinking water, by December 31, 2012. This recommendation is still generally contained in the Final Draft Plan,

Response to comment ROR004-25

This is a comment on the project, not on the EIR.

identified as WQ R6. However, the recommendation has been modified to remove reference to the Central Valley Water Board. By removing the reference to the Central Valley Water Board, the Delta Plan appears to be making a recommendation for a new policy that would apply statewide. While CVCWA does not know if such an action is necessary for other regions of the state, to the extent this revised recommendation would apply in the Central Valley, CVCWA reiterates that this recommendation is unnecessary, contains an unrealistic timeline for development, and duplicates efforts already undertaken by the Central Valley Water Board and valley stakeholders. The statement should be revised to acknowledge the Central Valley Water Board's current ongoing efforts, including the CV-SALTS effort, and should recommend a coordinated effort to achieve specified goals within a reasonable time frame, consistent with the CV-SALTS program schedule referenced in WQ R7.

WQ R8: This recommendation in fact includes several different recommendations associated with various regulatory processes currently under way by either the State Water Board or the Central Valley Water Board. With respect to nutrient policy development for inland surface waters by the State Water Board, the proposed timeline of completion by January 1, 2014 is overly aggressive. The Nutrient Policy for Inland Surface Waters is a complicated undertaking by the State Water Board that will need extensive work to arrive at a sound policy. It is requested that the recommended date for completion of this effort be changed to 2018 to be consistent with the nutrient criteria development efforts in the Bay and Delta.

WQ R9: CVCWA supports the development of a Delta Regional Monitoring program and is an active participant in the process to try and make this happen. With respect to this recommendation, CVCWA recommends that language be added to emphasize that the Delta Regional Monitoring Program should be coordinated with efforts to develop and implement ecosystem modeling tools for the Delta. Additionally it is requested that the Delta Science Program provide financial support for this tool development and coordination with regional monitoring efforts.

ROR004-25

WQ R10: CVCWA previously objected to the Fifth Staff Draft Plan's recommendation (former WQ R8) specifying that that the Central Valley Water Board should require responsible entities that discharge wastewater treatment plant effluent or urban runoff to Delta waters to evaluate whether all or a portion of the discharge can be recycled, otherwise used, or treated in order to reduce contaminant loads to the Delta by January 1, 2014. This recommendation is still contained in the Final Draft Plan, identified as WQ R10. As noted previously, the addition of this recommendation suggests that such discharges, which are subject to state and federal permitting laws, should be evaluated outside of the normal permitting process, and be subject to requirements that may not be consistent with determining compliance with adopted water quality standards. It also suggests that the Central Valley Water Board needs to consider application of water rights law in its NPDES permitting determinations. Although we are supportive of recycled water projects where they make local and economic sense, CVCWA continues to object to this recommendation for several reasons. First, compliance with water

No comments

- n/a -

quality standards is an essential function as part of the NPDES permitting process, which is implemented continuously, with renewals every five years for NPDES dischargers. It is not necessary to arbitrarily re-evaluate NPDES permits outside of their normal five-year renewal process. Second, the Central Valley Water Board does not have the authority to require "treatment." The Central Valley Water Board must adopt permit limits to ensure compliance with water quality standards. It is then up to the permittee to determine the best mode of compliance. For some, this may include treatment, for others it may be more effective to implement source control methods, recycling or alternative methods of disposal. It is inappropriate to suggest that the Central Valley Water Board should evaluate treatment options as part of the permit renewal process. Third, the Central Valley Water Board has no authority with respect to "water rights laws." Based on these reasons, WQ 10 needs to either be removed in its entirety, or be revised to be consistent with existing NPDES permitting processes.

Funding Principles to Support the Co-equal Goals: As noted in CVCWA's previous comments, the "stressor fee" concept and funding structure contained within the Fifth Staff Draft Plan, previous drafts of the Delta Plan, and included as part of the Final Draft Plan continue to be a major concern for CVCWA and its members. (See Final Draft Plan at p. 308, lines 32-40.) CVCWA has commented extensively on the underlying flaws in the "stressor fees" approach in its comments to each draft of the Delta Plan in the past, and need not reiterate those comments in full here. However, we would like to again point out the following fundamental flaws in the stressor fee approach: (1) the fee proposal is not inclusive of all stressors; (2) the stressor fee concept fails to account for numerous fees already paid by dischargers; and (3) no credit is given to stressors who spend funds to reduce impacts in the Delta. As it relates to the financing provisions, however, we appreciate that the Final Draft Plan has seemingly eliminated the previous proposal to procure ten years of up-front funding for the Council and Conservancy, an issue CVCWA had previously noted was virtually unprecedented and inappropriate. — ROR004-25

Performance Measures: It is requested that the second Output Performance Measure on page 248 (lines 9-10) be modified to state "Progress toward reducing concentrations of inorganic nutrients…in Delta Waters over the next decade, to the degree such reductions are determined to be necessary to improve the health of the Delta ecosystem through studies that meet the scientific standards established in the Delta Plan and which consider the balance between a healthy food web and unacceptable eutrophication effects."

Other Comments

Page 247, line 1: It is requested that the words "Sources and" be deleted from the bullet pertaining to pathogens to make it consistent with all of the other bullets on this page.

Page 247, line 2: It is requested that the bullet pertaining to water quality models be expanded to include the development of integrated models for the ecosystem, covering hydrodynamics, water quality, food web, nutrient cycling and other ecosystem processes.

No comments

- n/a -

Finally, as described in CVCWA's previous comments, the Final Draft Plan fails to address the significant role of exports, non-native species, and entrainment on the deterioration of the Delta ecosystem, and does not strike the appropriate balance between identifying contaminants and discharges as "stressors" and discussing the role of exports as a stressor in the Delta. The overall approach contained in the Final Draft Plan seems to overemphasize contaminants and discharges as a "stressor" to the Delta ecosystem and simultaneously fails to adequately discuss the significant role of exports and entrainment on that same ecosystem. ROR004-25

We look forward to working with the Council and staff in the future to assist in the resolution of issues raised in this comment letter. Please feel free to contact me if you have additional questions or concerns. ROR004-26

Sincerely,

Debbie Webster

Debbie Webster
Executive Officer, CVCWA

dyw

Response to comment ROR004-26

Comment noted.

ROR005 Delta Caucus

DELTA CAUCUS

CONTRA COSTA - SACRAMENTO - SAN JOAQUIN - SOLANO - YOLO

Chairman Phil Isenberg
c/o Ms. Cindy Messer
Delta Plan Program Manager
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Sent Via Email: recirculateddpeircomments@deltacouncil.ca.gov

RE: Delta Caucus DPEIR recirculation comments & Draft Plan

Dear Chairman Isenberg and Delta Stewardship Council Members:

The Delta Caucus (Contra Costa, Sacramento, San Joaquin, Solano and Yolo County Farm Bureaus) appreciates the opportunity to comment on the Delta Plan Draft Program EIR. As you know, the Delta Caucus has been extensively involved in the Delta Plan review process and has submitted detailed comments on the many previous versions of the draft Delta Plan. For the sake of space and brevity, we will not restate all of our previous comments or objections here. — ROR005-1

Instead, the Delta Caucus submits this letter to jointly address the recirculated draft Environmental Impact Report (Draft EIR) and the November 30th version of the draft Delta Stewardship Council Plan (Draft Plan). For ease of reading the first portion of this letter addresses policy concerns arising from the Draft Plan. The second portion of this letter addresses shortcomings in the Draft EIR.

This letter focuses comments on deficiencies of the Draft EIR and on unwise or the absence of effective policies and recommendations within the Draft Plan. The Delta Caucus, however, reaffirms its previous comments and objections and incorporates them herein by reference and in particular the previous letter written to the Council concerning the deficiencies in the EIR. With — ROR005-2
respect to the comments to the draft EIR, it is the Delta Caucus's opinion that the Council did not seriously take into account the comments presented in our comment letter and, further, the Council failed to make good faith reasoned responses to our comments, a separate and independent basis for concluding — ROR005-3
the EIR is legally deficient. Hence we attach our earlier comment letter to this letter as though present in full here. The Delta Caucus objects to the Delta Stewardship Council certifying the EIR.

Response to comment ROR005-1

Comment noted.

Response to comment ROR005-2

Please see response to commenter's prior letter, OR105.

Response to comment ROR005-3

Please see response to comment ROR005-2 above.

Members of the Delta Caucus are the very farmers the Draft Plan extols and expressly intends to protect and assist. For instance, the Draft Plan acknowledges agriculture is the Delta's "primary land use…a key economic sector, and a way of life." Draft Plan at 179. The Draft Plan adds: "The Delta Stewardship Council envisions a future where…[a]griculture will continue to thrive on Delta's rural lands…" (Draft Plan at 178) and indentifies "proposals to protect, enhance and sustain…agriculture" as a major strategy of the Draft Plan (*Id.*), including "increased investment in agriculture". Delta Plan at 179.

Quantifying farming's economic importance to the region and the state, the Draft Report discloses that, "the total economic impact of Delta agriculture is 13,179 jobs, $1.059 billion in value added, and nearly $5,372 billion in economic output." Draft Plan at 191. The report notes agriculture "define(s) the Delta as a place." Draft Report at 192.

However, after evidencing agriculture's economic importance by presenting impressive economic numbers, the Draft Report substantially misses the mark concerning agricultural policies and strategies. As explained subsequently, the Draft Report either omits meaningful agriculture policies, suggesting the authors do not understand either agricultural operations or policy, or alternatively offer largely meaningless policies about "wildlife-friendly agriculture" or agritourism which are either irrelevant to functioning agricultural operations or on balance harmful to long term agricultural interest in the Delta region.

Thus the Draft Report provides the Delta Caucus with substantial frustration. As explained below the proposed policy offers little or nothing to the agricultural industry and suggests to us the Council staff does not understand the threats and opportunities facing agriculture. ROR005-4

The Caucus's offer to meet with the Council staff and work collaboratively about meaningful agricultural policies has been essentially rebuffed. Instead each Council report contains the same empty or adverse policies, the Caucus continues to express opposition to the Draft Plan and the Council staff makes no effort to understand and reconcile legitimate policy questions and concerns presented by the Caucus. We again express our belief that meaningful meetings with the Council staff should be held. This chain of events does not produce appropriate and useful public policies.

With this overview in mind, the Delta Caucus emphasizes major agricultural policy issues that have been omitted or mishandled in the Draft Report. In the interest of time and space and since these issues have been ventilated in greater detail in earlier comments offered to the DSC, we have opted to emphasize the following issues to illustrate the Draft Plan's shortcoming

Response to comment ROR005-4

This is a comment on the Delta Plan, not on the EIR.

regarding agriculture. But these illustrative problems do not exhaust all of the problems we perceive are found in the Draft Plan.

1. The Draft Plan offers a distorted, unrealistic and potentially adverse emphasis on "wildlife-friendly" agricultural practices and a future expansion of agritourism.

Without offering any empirical economic data or economic analysis, the Draft Plan baldly asserts that practices to "maximize habitat values" support Delta agriculture. (Draft Plan at 197.) To put a finer point on it, this pivotal statement lacks a scintilla of supporting evidence. Undeterred by this lack of evidence, the Draft Report proceeds to argue Delta farmers must "implement 'wildlife-friendly' management practices to maximize habitat values." (Draft Plan at 206.) The Draft Report then reduces this wobbly and highly questionable concept into a recommendation for state agencies to use their regulatory power to "encourage habitat enhancement and 'wildlife-friendly' farming systems." (Draft Report at 207.)

To start with, this entire analysis, policy discussion and recommendation has virtually nothing to do with sustaining and promoting the agricultural industry and virtually everything about burdening the agricultural industry with the disproportionate cost and expense of a largely societal benefit, preserving land for selected bird and animal species. Thus the proposed policy directly encourages other public agencies to exercise regulatory power in a manner requiring farm operations to measurably change farming operations to accommodate unrelated wildlife considerations. Plus the unstated but clear threat to the agricultural industry is that the DSC will exercise its considerable regulatory power under the guise of reviewing Covered Actions to exact changes to agricultural operations as conditions precedent to upholding a local government action concerning the farming operation. ROR005-4

Imposing unrelated conditions to advance larger social benefits in exchange for a permit is a common practice by California regulatory authorities. See, for example, *Nollan v. California Coastal Commission* (1987) 107 S.Ct. 3141; *Bright Development v. City of Tracy* (1993) 20 Cal.App.4th 783; *Bixel Associates v City of Los Angeles* (1989)216 Cal.App.3d 1208. The Draft Plan's analysis and recommendation encourages the DSC and other regulatory agencies to treat the agricultural community as having a special and distinct obligation to provide habitat that is greater than the obligation held by the general public, even though the general public benefits by expanding the amount of habitat and open space land. Imposing this special significant financial burden on the agricultural community rather than the public at large represents a significant and major threat and the Draft Plan should be revised to avoid this unintended consequence.

No comments

- n/a -

Simply stated, our members worry about regulatory agencies seeking to support the co-equal goals by intruding into organic economic issues such as cropping patterns or crop decisions. The Delta Caucus does not question whether creating or enhancing land for special species habitat is salutary. It is. However, the Draft Plan emphatically and dangerously shifts a significant portion of the burden of accomplishing this general public goal from the general public to the agricultural community. This dramatic shift in responsibility raises serious Constitutional and policy questions.

2. Defining normal agricultural practices as Covered Actions will impede or impair customary agricultural decisions and operations.

Presently some types of agricultural actions within the Delta area require discretionary land use approvals from local agencies. These actions constitute Covered Actions. Many of the representative counties surrounding the Delta have adopted land use regulations requiring discretionary land use permits for certain identified farming practices and operations. For purposes of illustration only, one of the counties, San Joaquin County, requires discretionary land use permits for the following uses in lands designated agriculture on the general plan and classified agriculture in the zoning ordinance:

ROR005-4

1. Farm related aerial services
2. Agricultural processing preparation services
3. Agricultural processing food manufacturing
4. Feed and grain sales
5. Agricultural warehouses
6. Raising exotic animals
7. Raising hogs
8. Training small animals
9 Educational animal projects
10. Small breeding kennels
11. Communication services
12. Custom agricultural manufacturing
13. Farm services
14. Wholesale nursery
15. Petroleum and gas extraction
16. Farm produce stands
17. Essential public services
18. Nature preserves
19. Minor utility services
20. Small boutique winery

San Joaquin County Development Code Table 9-605.2 (pp. 403-414).

No comments

- n/a -

What overarching public policy purpose is served by local government decision to allow "raising exotic animals" or operating small fruit stands or training small animals or constructing agricultural warehouses (barns) to fall within the definition of "Covered Actions" and thereby be subject to DSC jurisdiction?

The cost and delay to agriculture by treating such activities as Covered Actions substantially chills the vitality and growth of the agricultural industry and diminish the economic importance of agriculture within the region and state.

Furthermore, certain California counties are considering whether to increase their land use regulatory power over agricultural activities, including the type and time for cultivating crops. These decisions clearly fall within the present definition of Covered Actions. What prevents either the local government or the DSC during the appeal process to require a farmer to incorporate "wildlife-friendly" practices or adopt "agritourism" in order to advance the co-equal goals and therefore receive the local government permit or survive an appeal to the DSC?

As explained previously, adding "wild-life friendly" or "agritourism" conditions before approving local land use decisions about farming activities and practices raises serious Constitutional, policy and other legal issues. Thus, the proposed Draft Plan has the unintended consequence of requiring one industry, agriculture, to assume a substantially disproportionate burden in developing "wildlife-friendly" land use patterns or promoting agritourism. This burden, exacted in exchange for developing or expanding farming operations, represents as serious a taking of the farmer's real property as a direct physical invasion of that property by a government agency. ROR005-4

3. <u>The vagueness contained in the present definition of "Covered Actions" allows the definition to be expansive and ambulatory with unintended consequences. This raises Due Process concerns and policy questions.</u>

In the future, at least some Delta counties may require use permits for cropping patterns or changing in cropping activity. Although no Delta county presently does so, such land use permits are required in places like Monterey County. If any Delta county enacts an ordinance requiring such local discretionary land use permits, this local government action constitutes a "Covered Actions" within the present meaning of the Delta Plan. This automatically and without any formal action by the DSC after a noticed public hearing expands the Council's jurisdiction over Delta farming activities. This automatic expansion of Council jurisdiction occurs without accommodating due process consideration and without any chance for affected public to comment on the unwarranted expansion of state regulation or for an intelligent discussion of the relative public policy merits to this expansion.

No comments

- n/a -

ROR005-4

Moreover, because the local approval itself would not technically be valid until the Council determined the action was consistent with the plan (assuming there was an appeal of the consistency determination), farmers could potentially miss entire crop seasons if caught in a prolonged appeal process. Because none of these impacts have been disclosed or discussed in the Draft Plan or the Draft EIR, both the Draft Plan and Draft EIR should comprehensively evaluate the indirect physical effects associated with the Council's potentially *ad* hoc expansive jurisdiction.

ROR005-5

In addition, the Delta Caucus is particularly interested in the Delta Stewardship Council ("Council") discharging its public duty to satisfy the requirements of the California Environmental Quality Act ("CEQA"). Generally speaking, the Draft EIR is legally deficient and does not fulfill its duty as an informational document. Rather than certify the Draft EIR, the Council is requested to conduct a sufficient evaluation of the potential environmental effects and thereafter provide a new public review comment period.

These comments are founded on the principle that an EIR acts as an informational document identifying potentially significant impacts of a project, as well as alternatives and mitigation measures necessary for informed decision-making (Pub.Res.C. §21002.1), and that an EIR's findings and conclusions must be supported by substantial evidence. *Laurel Heights Improvement Ass'n v. Regents of the University of California* (1988) 47 Cal.3d 376. An adequate EIR "must be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences" and "must include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." *Id.* The Draft EIR does not meet this threshold. Accordingly, the Draft EIR is not adequate for certification, and the Project cannot be approved at this time.

ROR005-6

Specifics concerning the legal deficiencies about the EIR are presented in the attached document. In the interest of time and space these comments are not repeated in the body of the letter but in our opinion remain legitimate and serious criticisms of the draft EIR.

Response to comment ROR005-5

Please see Master Responses 1 and 2.

Response to comment ROR005-6

Please see Master Response 2. Please also see response to commenter's prior letter, OR105.

We remain willing to meet with the DSC to discuss appropriate and strong public policy based recommendations and policies for Delta agriculture. We urge the DSC to accept this offer to meet and discuss these vital public issues. ROR005-7

Sincerely yours,

Russell E. van Löben Sels
Chairman, Delta Caucus

Wayne Reeves
President, Contra Costa County Farm Bureau

Kevin Steward
President, Sacramento County Farm Bureau

Bruce Fry
President, San Joaquin Farm Bureau Federation

Bruce Fry on Behalf of: Derrick Lum
President, Solano County Farm Bureau

Chuck Dudley
President, Yolo County Farm Bureau

Response to comment ROR005-7

Comment noted.

ROR006 Earth Law Center

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tel (510) 490-1690
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January 10, 2012

Cindy Messer
Delta Plan Program Manager
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: Comments on Final Draft Delta Plan (deltaplancomment@deltacouncil.ca.gov) and Recirculated Draft Programmatic Environmental Impact Report (recirculateddpeircomments@deltacouncil.ca.gov)

Dear Ms. Messer:

Earth Law Center works to advance legal rights for ecosystems and species to exist, thrive and evolve. On behalf of Earth Law Center, we welcome the opportunity to comment on both the Delta Stewardship Council's Final Draft Delta Plan and Recirculated Draft Programmatic Environmental Impact Report. We incorporate by reference our February 2012 comments on the Draft Environmental Impact Report (included below), as well as the February 2012 Environmental Water Caucus (EWC) DEIR comments. We further incorporate by reference the "Scoping Comments on Draft Environmental Impact Report for the Delta Plan" submitted by California Coastkeeper Alliance on January 28, 2011, and the Scoping Comments on the DEIR submitted by the EWC on January 25, 2011. ROR006-1 ROR006-2

Our current comments on the Final Draft Delta Plan and Recirculated Draft PEIR reiterate the point – yet unaddressed – of our February 2012 DEIR comments, a point also emphasized in the comments incorporated by reference above. That is: the Delta Plan, which affects much of the state and extends outward with a fifty-year time horizon, must include a process for establishing, in law, water rights for waterways to the clean flows needed for the Delta ecosystem to be healthy. The law currently allocates water rights only for diversions for human uses. Waterways' flows are "protected" only tangentially, through conditions on permits and various statutes that do not equate to actual water rights. If the Council intends to achieve the adopted "co-equal" goals of water supply and environmental integrity of the Delta ecosystem, it must address this fundamental imbalance in the law, which makes one goal far more equal in practice than the other.[1] ROR006-3

[1] As noted in our February 2012 comments, we disagree that a "co-equal goals" approach will achieve the desired results of reliable water supply and healthy ecosystems. Only by recognizing our dependence on a healthy Delta, and the importance for us to live within its constraints, can we ensure that we have a reliable supply of water for our needs. A "co-equal goals" approach perpetuates the fiction that we can have both results without meaningfully adjusting our current relationship with water. This fiction borne out in fact by the Draft Final Plan's and Draft PEIR's failure to take up the law's granting of water rights for human diversions over the (still unrecognized) rights of waterways.

Response to comment ROR006-1

Comment noted.

Response to comment ROR006-2

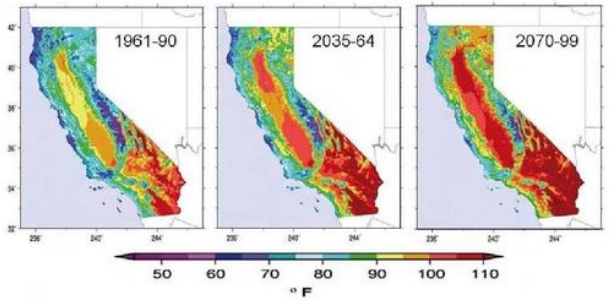
Please see response to commenter's prior letter, OR96.

Response to comment ROR006-3

Please see response to commenter's prior letter, OR96. In addition, this is a comment on the Delta Plan, not on the EIR.

This ongoing failure to address the law's clear preference for human water use over environmental needs will continue to drive over-diversion, the impacts of which will escalate as climate change raises temperatures and increases evapo-transpiration, desiccating soils and further pressuring waterways to give up more water than they can spare. This not only impacts the Delta ecosystem – it also impacts the tens of millions of Californians dependent on water flowing through this system. ROR006-4

Figure 1. California Historical & Projected July Temperature Increase 1961-2099



Cayan, Dan, *et al.*, *Climate Change Scenarios and Sea Level Rise Estimates for the California 2008 Climate Change Scenarios Assessment*, PIER Research Report, CEC-500-2009-014 (Sacramento, CA: California Energy Commission) (2009).

Given the decades-long time frame of the Delta Plan and the looming threat of climate change, among other stressors, California cannot wait to address this legal imbalance. We urge the Council to revise the Delta Plan and PEIR to include a clear process for establishing and implementing, in law, water rights for waterways. Waterways must be granted water rights to the instream flows and water quality needed to ensure waterway and system health. The Delta Plan and its accompanying environmental review documents must include analysis and recommendations advancing "water rights for waterways" to ensure their compliance with CEQA and their ultimate success. ROR006-5

We look forward to working with the Council to safeguard California's Delta and connected ecosystems, on which we all depend. Thank you. ROR006-6

Regards,

Linda Sheehan
Executive Director
Earth Law Center
lsheehan@earthlaw.org

attachment

Response to comment ROR006-4

This is a comment on the Delta Plan, not on the EIR. All potential environmental impacts associated with implementation of the Delta Plan are addressed in the EIR.

Response to comment ROR006-5

Please see response to comment ROR006-3 above.

Response to comment ROR006-6

Comment noted.

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February 2, 2012

Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814
Attn: Terry Macaulay

VIA ELECTRONIC MAIL: RulemakingProcessComment@deltacouncil.ca.gov

RE: Comments on "Draft Delta Plan Program Environmental Impact Report" (Nov. 2011), available at: http://deltacouncil.ca.gov/delta-plan-draft-eir

Dear Ms. Macaulay:

Earth Law Center works to advance legal rights for ecosystems and species to exist, thrive and evolve. On behalf of Earth Law Center, we welcome the opportunity to comment on the Delta Stewardship Council's Draft Environmental Impact Report (DEIR). We incorporate by reference the February 2012 joint DEIR comments submitted to the Delta Stewardship Council (Council) on behalf of the Environmental Water Caucus (EWC DEIR Comments). We also incorporate by reference the "Scoping Comments on Draft Environmental Impact Report for the Delta Plan" submitted by California Coastkeeper Alliance on January 28, 2011, and the Scoping Comments on the DEIR submitted by the EWC on January 25, 2011.

In brief, as articulated in the EWC DEIR Comments, we call on the Delta Stewardship Council to revise the DEIR to meet CEQA requirements and ensure a legally enforceable Delta Plan that protects the health of the Delta ecosystems. By failing (among other lapses) to ensure necessary reductions in water exports as recommended by the State Water Board in their adopted flow criteria for the Bay-Delta Estuary, the DEIR and proposed Delta Plan will not achieve even the legislatively mandated "co-equal goals." More broadly, the DEIR and proposed Delta Plan fail to ensure the necessary review of strategies to advance water supply reliability consistent with the better standard of achieving an *overarching* goal of environmental sustainability. Given its decades-long time frame, the revised DEIR must assess all reasonable alternatives that will advance environmental sustainability over the long-term, a goal essential to protecting current and future interests in water sustainability.

Specifically, we ask that the DEIR be revised to ensure the adequacy of its alternatives analysis by adding to Alternative 2 the necessary strategy, recommended in both sets of Scoping Comments referenced above, of establishing water rights for waterways. This legal tool would give the Delta's waterways the equivalent legal standing needed to effectively enforce the flows that science has shown the waterways need in order to survive. Finally, the revised DEIR should be re-circulated for public review and comment before adoption, so that the public and

No comments

- n/a -

decisionmakers may fully exercise their stewardship responsibilities over the Delta and connected ecosystems.

THE DEIR MUST ANALYZE A REASONABLE RANGE OF ALTERNATIVES

Under CEQA, an EIR must analyze a reasonable range of alternatives to the project, or to the location of the project, that would feasibly attain most of the basic objectives while avoiding or substantially lessening the project's significant impacts.[2] A public agency must consider a "reasonable range" of alternatives, which is determined by a "rule of reason."[3] While there is no set number that constitutes a "reasonable range," the range should be sufficient to permit a reasonable choice of potentially feasible alternatives that present possible environmental advantages.[4] The rule of reason requires that the environmental documents set forth the alternatives necessary to permit this reasoned choice. The key issue is whether the selection and discussion of alternatives fosters informed decision-making, as well as informed public participation.[5]

In addition to the flaws described in the EWC DEIR Comments (incorporated by reference), the DEIR fails to comply with CEQA's "range of alternatives" requirement by failing to also examine the establishment of water rights for waterways as a critical legal tool for managing our use of the Delta. The Delta Plan is characterized as a statewide plan with *at least* a 50-year horizon.[6] In light of this time frame and the need for strong, effective action on behalf of the Delta's health, the issue of whether water rights for waterways may be an available management tool in the near term is not dispositive to the decision on whether this tool should be included in the alternatives for analysis. By law, the alternatives must foster informed decision-making and informed public opinion. As discussed further below, development and implementation of water rights for waterways is necessary to ensure Delta health and water supply reliability, and so it must be examined in the DEIR alternatives analysis to ensure the DEIR's adequacy under CEQA.

THE DEIR ALTERNATIVES ANALYSIS MUST INCLUDE ASSESSMENT OF "WATER RIGHTS FOR WATERWAYS" AS A CORE DELTA MANAGEMENT TOOL

Despite the Legislature's call for a "co-equal goals" approach to water management, the current water rights allocation system effectively places the environment's access to water on a second tier status, below essentially all human uses. Water rights are now allocated only to human uses; a waterway currently has no equivalent statutory right to keep necessary water in its system. This governance system conflicts with ecological science, which demonstrates that the water needs of Californians and our environment must be considered together. If water rights are to be the accounting system by which water is allocated, then the law must reflect the science:

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[2] *See* Pub. Res. Code § 21100(b)(4); 14 Cal. Code Regs. § 15126.6(a); *Citizens for Quality Growth v. City of Mount Shasta*, 198 Cal.App.3d 433, 443-45 (1988).
[3] 14 Cal. Code Regs. § 15126.6(a); *Village Laguna of Laguna Beach, Inc. v. Board of Supervisors* 134 Cal. App.3d 1022, 1028 (1982); *Foundation for San Francisco's Architectural Heritage v. City & County of San Francisco,* 106 Cal.App.3d 893, 910 (1980).
[4] *San Bernardino Valley Audubon Soc'y v. County of San Bernardino*, 155 Cal.App.3d 738, 750 (1984).
[5] *Mann v. Cmty. Redevelopment Agency*, 233 Cal. App. 3d 1143, 1150 (1991).
[6] DEIR, p. 2A-57.

No comments

- n/a -

legal water rights must be developed, allocated and enforced to support water needs for healthy aquatic ecosystems and a healthy California.

Our water governance system currently addresses ecosystem water needs only indirectly, through such methods as conditions in permits, mandates (currently unimplemented) to prevent "waste and unreasonable use," Water Code Section 1707 water transfers, the public trust doctrine, and application of the Endangered Species Act (ESA). None of these otherwise important tools are actual water *rights*, however, at a level equivalent to currently-allocated water rights for human uses. The result to date has been that ecosystem water needs are consistently relegated to a tangential role in state water planning, until the ecosystems and/or their non-human inhabitants are at the brink of collapse. That is when the ESA hammer falls – abruptly, with little foresight, controversially, and often too late.

Unless California is willing to write off fish and Delta-dependent wildlife for our children and grandchildren,[7] California needs a legal system that allows the state to plan effectively for the water needs for *both* Californians and California's ecosystems. The dangerously well-trod path of "use, overuse, environmental decline, then hasty and unplanned reaction" can begin to be broken by granting ecosystems the right to be at the planning table from the beginning, at a level truly "co-equal" to human water uses – rather than at the end when the damage is done. Again, if the state is committed to "co-equal" goals, and if water rights are to be the legal measure by which water is allocated for human uses in the state, then ecosystems also must be granted equivalent water rights.

The process for developing and allocating necessary water rights for waterways can be accomplished well within the time frame of the Delta Plan. The process could begin immediately with collection of the data needed to assess the amount and timing of water needed by Delta waterways to maintain their health. The State Water Resources Control Board's flow criteria, adopted to protect Delta ecosystems,[8] are the key starting point. Significant additional research has been done over the years in assessing overall fish and ecosystem needs in the Delta and connected systems elsewhere in the state;[9] this too could be compiled. At the same time, statutory changes to clarify the rights of waterways to the water that science demonstrates they need can begin to be debated and eventually adopted. Along with this discussion should be a process for enforcing these ecosystem water rights; for instance, the rights can be held and enforced by independent legal guardians or trusts. The state should also develop a process for selecting and funding (*e.g.*, through fees on water diversion and use) such independent guardians and meeting program costs overall.

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[7] *See, e.g.*, NOAA/NMFS, "NMFS Biological and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project" (June 4, 2009), available at http://swr.nmfs.noaa.gov/ocap.htm. NMFS' final Opinion concludes that the CVPISWP operations are, among other things, likely to jeopardize the continued existence of federally listed endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead, and even federally listed Southern Resident killer whales.

[8] SWRCB, "Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem," (Aug. 3, 2010), at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/deltaflow/docs/final_rpt080310.pdf.

[9] *See, e.g.*, Ocean Protection Council instream flow analyses at: http://www.opc.ca.gov/category/projectsbytopic/, and DFG instream flow reports at: http://www.dfg.ca.gov/water/instream_flow_docs.html.

No comments

- n/a -

This process also must include pairing the above-identified legal water rights for ecosystems with identified water sources. Water rights that implement scientifically identified water needs could be accounted for through such strategies as: reviewing unexercised rights, making "waste and unreasonable use" determinations, conducting adjudications, working with the federal government regarding effective allocation of federal water rights, assessing rights and sources associated with "new" water, raising fees on diversions to encourage voluntary release of unneeded rights, as well as other approaches. Given the significant over-allocation of water rights in the state on paper, and the unknown amount of water diverted under riparian and pre-1914 rights, this task may be complex and take some time. It is not, however, insurmountable in light of the numerous existing legal tools that the state could use if it chooses to plan wisely, rather than continue to react to the courts as the effective arbiters of the state's water policies. Further, the time frame of the Delta Plan is more than sufficient to allow this necessary exercise to begin, complete, and achieve positive results in protecting the health of the Delta through the force of law.

In summary, formalizing and effectuating water rights for ecosystems will ensure that waterway needs are considered up front, that planning is effective and certain, that implementation and enforcement is clear, and that water is shared in a way that ensures that the needs of the state and its ecosystems are met. The DEIR's failure to include any discussion of this essential legal balancing effort, which is necessary to meet the state's minimum co-equal goals mandate, renders the DEIR inadequate. Accordingly, we ask that the DEIR be revised to add to Alternative 2 the establishment of water rights for waterways as a tool to advance the well-being of the Delta, and the current and future Californians who depend on it. This strategy should be analyzed in a revised document, which should then be recirculated for further public comment.

* * *

The Delta Plan is a *de facto* statewide plan with at least a 50-year time frame. It accordingly must reflect a statewide vision and commit to a necessary suite of actions whose time frames are commensurate with the sweep and importance of this Plan. "Water rights for waterways" is one such action that must be included in the Plan and its DEIR to ensure the DEIR's compliance with CEQA, and the effectiveness of this critical initiative.

We look forward to working with the Council to safeguard California's Delta and connected ecosystems and to ensure clean, abundant waters for the benefit of California's people and natural world, now and in the future. Thank you.

Regards,

Linda Sheehan
Executive Director
Earth Law Center
lsheehan@earthlaw.org

No comments

- n/a -

ROR007 EWC

No comments

- n/a -

ENVIRONMENTAL WATER CAUCUS RESPONSE LETTER
TO THE FINAL DELTA PLAN, RECIRCULATED DRAFT PEIR,
AND RULEMAKING PACKAGE
JANUARY 14, 2013

CA Save Our Streams Council

Santa Clarita Organization for Planning and the Environment (SCOPE)

Tuolumne River Trust

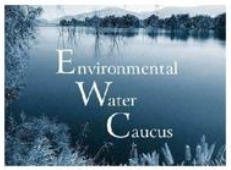
SIERRA NEVADA ALLIANCE

No comments

- n/a -

No comments

- n/a -



Via email to: recirculateddpeircomments@deltacouncil.ca.gov
RulemakingProcessComment@deltacouncil.ca.gov

Via USPS and personal delivery to: Cindy Messer, Delta Plan Program Manager

From: Environmental Water Caucus

Subject: Comments on Final Draft Delta Plan, Recirculated Draft Program EIR, and Rulemaking Process

January 14, 2013

The Environmental Water Caucus and its affiliated organizations have provided comments to each of the iterations of the Delta Plan since the original scoping comments January 2011 and we are pleased to continue; however, since so many of the comments discussed in our responses to the previous Draft Delta Plans and the Delta Plan DEIR are not considered with this Final Delta Plan, we include them again by reference in this set of comments to this Final Draft Delta Plan.

This comments letter is organized into three sections, as follows, and in keeping with the Delta Stewardship Council (DSC) document organization:

Section 1. Final Draft Delta Plan Comments
Section 2. Recirculated DPEIR Comments (RDPEIR)
Section 3. Rulemaking Package Comments

ROR007-1

As you will see, we object to approval of this Final Draft Delta Plan, Recirculated DPEIR, and Rulemaking Package because the Council has not addressed the root cause of Delta water "unreliability" and the "Delta crisis," which is the unwillingness of public agencies to examine realistic California water supply availability. The current contracts are not consistent with what the environment can provide and the contracts should be reduced in line with what is available, thus reducing the continuous demands for more water. The Final Draft Delta Plan sidesteps this critical issue and fails to address these current over-promises embedded in state water rights and SWP and CVP contracts. Failure to address these undeliverable demands will result in exceptionally high costs to ratepayers and the environment.

ROR007-2

The benefits and costs of the Delta Plan are not analyzed. A proper Cost-Benefit analysis of the Plan and its regulations should not be confused with the so-called "Cost Analysis" accompanying the Proposed Regulation, which provides only general narrative, and omits a

ROR007-3

Response to comment ROR007-1

Comment noted.

Response to comment ROR007-2

This is a comment on the project, not on the EIR.

Response to comment ROR007-3

This is a comment on the project, not on the EIR. CEQA does not require a cost-benefit analysis. Social and economic impacts are not effects on the environment under CEQA, and are not analyzed in the EIR (CEQA Guidelines §§ 15064(e) and 15131). Please see Master Response 2.

discussion of benefits. Without this information, decision makers cannot make informed decisions. A Cost-Benefit Analysis is an accepted method for financially evaluating proposed projects. If a Cost/Benefit analysis will be prepared for a proposal, NEPA provides guidelines to accomplish it. (See 40 CFR Sec. 1502.23) A fair and accurate Cost-Benefit Analysis provides assurances to agencies and the public that the expenditure of funds will in fact provide benefits that make the project a worthwhile undertaking, and a full consideration of the co-equal goals demands it. A valid consistency determination that weighs future habitat and conveyance projects cannot be made without a Cost-Benefit Analysis. In addition to performing this analysis on the Plan itself, the Delta Stewardship Council, through the Proposed Plan and Regulation, must require a Cost-Benefit Analysis for all major projects submitted for consistency determinations under the Delta Plan. Without such an analysis, the Delta Stewardship Council cannot make an informed decision as required by CEQA. ROR007-3

The Public Trust Doctrine is an affirmation of the duty of the state to protect the people's common heritage in streams, lakes, marshlands, and tidelands. The application of the Public Trust Doctrine requires an economic and sociological analysis of the public trust values of competing alternatives, as was directed by the State Water Board in the Mono Lake Case. Its applicability to alternatives for the Delta, where species recovery, ecosystem restoration, recreation and navigation are being pitted against damage from water exports, is exactly the kind of situation suited to a Public Trust analysis, which should be required by the Delta Plan. The Council clearly has trustee responsibilities in balancing the public trust. The final document fails in meeting this responsibility with gratuitous mention of the public trust in the Final Draft Delta Plan but with no analysis and dubious policies and regulations on this critical subject. ROR007-4

These three types of analyses should be accomplished for the Final Delta Plan as well as subsequent covered actions that become part of the Delta Plan. We recommend that these three analyses and the SWP and CVP contract revisions discussed above be incorporated into Delta Plan Policies.

The failure to adequately define and quantify "water supply reliability" renders this document legally insufficient. CEQA requires that an EIR inform the public and decision-makers about the adverse consequences of a project. Absent an accurate definition of the project – water supply reliability – one cannot know what such consequences might be because the document fails to accurately define the project or provide an accurate baseline for measuring either water supply reliability or the other project goal – ecosystem restoration. Relying on "theoretical water rights or water contracts" renders this document useless to the public or decision-makers; without an accurate definition they cannot make an informed decision. The document fails to translate this theory into quantifiable, actual water available for human consumption or ecosystem restoration and mitigation as required by law. Of course, such a quantity determination must be developed by the State Water Board as a component of its Delta flow determination, but the Council should require that water supply reliability be tied to meeting the numeric limits set by the anticipated Board actions. For example, a land use planner relying on this document could not determine the impacts from the failure to provide water supply because it is not defined. Failure to define and quantify an accurate real water supply and instead relying on theoretical or paper water, merely creates a fog or an illusion of water supply that is not only unreliable, but also does not exist. ROR007-5

Response to comment ROR007-4

This is a comment on the project, not on the EIR. Compliance with the public trust doctrine is required by the Delta Reform Act, as recognized in Water Code sections 85022(c)(3) and 85032(h). Please see DEIR Sections 2A, 2B, and 3. The Final Staff Draft Delta Plan discusses the public trust doctrine throughout, particularly at pages 81 through 83. Recommendation WR R3 addresses compliance with reasonable and beneficial use. The EIR analyzes the Delta Plan's impacts on all relevant public trust resources, including water resources (Section 3), fisheries (Section 4), recreation (Section 18), and navigation (Section 24).

Response to comment ROR007-5

This is a comment on the project, not on the EIR. The EIR describes existing conditions in Sections 3 through 21 of the DEIR including declining conditions in the Delta, such as deteriorating water quality in Section 4.3.2.1, Factors Affecting the Delta Ecosystem. Over-appropriation of water is a legal matter and not a physical issue. Chapter 3 of the Final Draft Delta Plan, which was analyzed in the Recirculated Draft PEIR, discusses the meaning of a reliable water supply for California. Please see Master Response 3.

It is critical that any plan adopted by the DSC has clear enforcement mechanisms and actions to ensure that any plans or activities approved by the Council do not degrade the waters of the state and nation, do not violate existing water quality laws and regulations, and ensure that these standards are not eroded through cumulative actions that will degrade the Sacramento-San Joaquin-San Francisco Bay Delta Estuary. ROR007-6

The EWC has presented clear alternatives for achieving water supply reliability and Delta ecosystem restoration (Alternative 2 in the Final Draft Delta Plan). The EWC Reduced Exports Plan contains numerous actions that compensate for reduced exports. This reasonable alternative has not been fully or fairly evaluated in the Final Draft Delta Plan or in the Recirculated DPEIR; the plan is misinterpreted, as discussed in our specific comments. The EWC alternative has relied on strict enforcement of water quality laws, adoption of the State Water Resources Control Board and Fish and Game flow recommendations, shoring up of existing levees, ceasing the unreasonable use of water to irrigate toxic soils that return pollution to the estuary, while also providing for exports and water supply along with statewide water conservation and efficiency measures to ensure existing supplies are extended to meet demand. ROR007-7

We object to the Delta Stewardship Council strategy of not responding to the 5th and 6th Draft Delta Plan comments and apparently not giving consideration to the contents or being influenced by any of the constructive comments from many responders. Since the Council's plan is to respond to those previous comments and these Final Draft comments only with the release of the Final PEIR, it is clear that the Council's actions and directions are and have been pre-decisional and clearly violate the intent of the CEQA process, which makes a mockery of the Council's promises of transparency. ROR007-8

David Nesmith
Co-Facilitator
Environmental Water Caucus

Rick DeCroce
Co-Facilitator
Environmental Water Caucus

Response to comment ROR007-6

This is a comment on the project, not on the EIR. Policies in the Delta Plan will become enforceable state regulations after adoption by the Delta Stewardship Council and approval by the state's Office of Administrative Law. Please refer to Master Response 1 regarding covered actions. As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR.

Response to comment ROR007-7

Alternative 2 was informed by comments to the Delta Stewardship Council from several environmental groups and does not represent one specific proposal. Alternative 2 includes the assumption that water users located in the area outside of the Delta that use Delta water would replace the loss of Delta exports with water use efficiency and conservation actions, water transfers, and development of local and regional water supplies including recycled water, groundwater treatment, ocean desalination, and/or local storage facilities. Alternative 2 would reduce reliance on Delta water supplies as compared to the Delta Plan. However, reduced reliance on Delta water supplies could increase the need for implementation of new and/or expanded local and regional water supplies to serve agricultural and municipal and industrial water users in the San Joaquin Valley, San Francisco Bay Area, Central Coast, and Southern California areas. Alternative 2 would place more emphasis than the Delta Plan on development of water quality objectives and Total Maximum Daily Loads, which could result in an increased level of construction of facilities to meet the developed water quality objectives. Alternative 2 could result in less levee construction due to floodplain expansion than the Delta Plan, but more construction activities in the Delta to relocate structures from the floodplain. Please refer to Master Response 3.

Response to comment ROR007-8

Responses to comments on the DEIR and on the RDEIR are provided in Section 3 of this FEIR, consistent with CEQA Guidelines Section 15088. The changes in the proposed Delta Plan from the August 2011 Fifth Staff Draft to the November 2012 Final Draft Delta Plan, which were influenced by the comments on the DEIR, are described in Section 2 of RDEIR. The Final Draft Delta Plan policies and recommendations are reproduced in Appendix C of the RDEIR, and changes from the policies and recommendations in the Fifth Staff Draft Delta Plan are shown by underlining and strikeout.

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No comments

- n/a -

SECTION 1. FINAL DRAFT DELTA PLAN COMMENTS.

EXECUTIVE SUMMARY.

As indicated in this section: "The Delta Plan seeks first to arrest declining water reliability and environmental conditions." As also indicated in our comments to the Sixth Delta Plan: "The Delta Stewardship (Council) has been given a golden opportunity, through the Delta Reform Act of 2009, to provide a progressive and forward looking plan for California's water future; during all the iterations of the Delta Plan during 2010 and 2011, the EWC has looked forward to that kind of plan." We feel that the current Final Draft Delta Plan has failed to seize that opportunity; it provides institutionalized thinking and solutions and it continues a status quo which refuses to recognize the root causes of the "water supply reliability" problem so often discussed.

CHAPTER 1. INTRODUCTION. THE DELTA PROBLEM.

As we indicated in our comments to the Fifth Delta Plan, California's water system is seriously oversubscribed, operating in deficit, and incapable of meeting competing demands on the system. The Council's charge should be to resolve this imbalance which is a major contributor to water supply *unreliability*. In the near term, it's largely a zero sum game. More water to protect public trust values translates to less water for consumption values. Over the longer term, redefining the CVP and SWP contracts to reflect legally available water supplies and align water rights with available water supplies can significantly alleviate but likely not completely eliminate water shortages. Since our Fifth Delta Plan comments, multiple EWC organizations have presented information to the State Water Resources Control Board (State Board) which shows that water rights in the Delta watershed exceed unimpaired flow by a factor of more than five times the available water. The State Water Board cannot continue to tolerate these over appropriated water rights in the state; the CVP and SWP cannot continue to tolerate contract amounts that do not reflect a realistic and reliable yield. And the Delta Stewardship Council cannot evade the recognition of this imbalance, both in water rights and water contracts, and must call out those agencies whose actions have created these imbalances, and specify what they can do to create a better balance and a more "reliable water supply." Although the issue of CVP and SWP contract amounts is recognized in Chapter 3 of the Final Draft Delta Plan, the magnitude of the problem and the development of solutions are not addressed. By not recommending the difficult actions that must be taken to solve our "water supply reliability" issues, the Delta Stewardship Council is evading its responsibilities and thereby continuing the status quo. *The Delta Plan's Policies and Recommendations are the appropriate venue to reflect these needed changes*.

ROR007-9

Instead of facing these kinds of root causes of unreliability and developing Policies and Recommendations that address those causes, the Final Draft Delta Plan hides behind the legislated co-equal goals of water supply reliability and Delta ecosystem restoration, which are inherently contradictory goals, so long as water supply "reliability" is undefined and assumed by water agencies and the Delta Stewardship Council to mean more water supply from the Delta. The Delta cannot be recovered while more water is exported from the Delta. This fundamental conclusion, which the Delta Stewardship Council has not faced, is this: more water for export

Response to comment ROR007-9

This is a primarily a comment on the project, not on the EIR.

Regarding the comment on a potential scenario of a shift in growth induced by the BDCP, the proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1. The Delta Plan's potential contribution to greenhouse gas emissions and climate change anticipated from the implementation of the Delta Plan are presented in Section 21, Climate Change and Green House Gas Emissions.

Regarding the comment on EWC's proposed alternative, Alternative 2 in the EIR was informed by comments to the Delta Stewardship Council from several environmental groups although it does not represent one specific proposal. Alternative 2 included the assumption that water users located in the area outside of the Delta that use Delta water would replace the loss of Delta exports with water use efficiency and conservation actions, water transfers, and development of local and regional water supplies including recycled water, groundwater treatment, ocean desalination, and/or local storage facilities. Alternative 2 reduces reliance on Delta water supplies compared to the proposed Delta Plan. However, reduced reliance on Delta water supplies could increase the need for implementation of new and/or expanded local and regional water supplies to serve agricultural and municipal and industrial water users in the San Joaquin Valley, San Francisco Bay Area, Central Coast, and Southern California areas. Alternative 2 would place more emphasis than the Delta Plan on development of water quality objectives and Total Maximum Daily Loads, which could result in an increased level of construction of facilities to meet the new water quality objectives. Alternative 2 could result in less levee construction due to floodplain expansion than the Delta Plan, but more construction activities in the Delta to relocate structures from the floodplain. Please refer to Master Response 3.

will continue the degradation of the Delta ecosystems and is the leading reason why the Delta Plan will maintain the status quo of a declining Delta. The predictions contained in the section entitled "What the Delta Plan Will Achieve by 2100," which seeks to "arrest declining water reliability and environmental conditions related to the Delta ecosystem, and ultimately to improve them," cannot be achieved with this Final Draft Delta Plan.

CHAPTER 2. THE DELTA PLAN

Since the Delta Plan is expected to incorporate the BDCP should state and federal wildlife agencies certify it, we recommend that the Council provide specific, consistent, and regular guidance to the BDCP on what would be required for BDCP to be consistent with the mandates from the legislature in the Delta Plan. An example of the current inconsistency is: The Delta Plan mandates the state water board to establish Delta flows and major tributary flows by 2014 and 2018, respectively. It is stated that this is key to the achievement of the co-equal goals. Yet, there is no such policy in BDCP, since petitioning partners in the BDCP are opposed to establishing these flow standards. If the BDCP does not incorporate or use these flow standards in the plan, it would then NOT meet the co-equal goals required by the Delta Plan. It is hard to understand how the BDCP could be incorporated with this current inconsistency, and if it were, the Delta Plan would likely be challenged in court.

The Delta Plan continues to assume that a permitable BDCP is on its way and will be incorporated into the Delta Plan. It makes no allowance for the damming science reviews presented by the National Academy of Science[1] or the "Red Flag" documents[2] produced by the fishery agencies or the critical report produced by the Bay Institute[3], which make the case for misleading and "cherry picked" science. We have seen no indication that the BDCP is responding meaningfully to these criticisms. These referenced reports show that BDCP, as presently constituted, is clearly not a permitable project, and does not have the appropriate science to proceed on the present path. The numerous mentions within the Delta Plan of being "informed by best available science" sound hollow in view of the current condition or presumed acceptance of BDCP "science." ROR007-9

The current BDCP project kicks the science down a fifteen year cycle and is based on a currently undefined "Decision Tree" concept – which appears to be the heart of BDCP's Adaptive Management Plan. The current BDCP is attempting to move toward permitting a project without defined biological goals and objectives, without operating criteria for the new conveyance, without a well- defined range of exports that will permit recovery, and has little of the necessary framework which would include an adaptive management plan, a financing plan, and best available science-based actions, nor meet the consistency policies described in the Delta Plan. After five years of study and analysis, the BDCP project has not yet produced a CEQA-legal plan, and it is unlikely to do so in the foreseeable future.

[1] Ibid., The National Academies Press.
[2] http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Effects_Analysis_-_Bureau_of_Reclamation_Red_Flag_Comments_and_Responses_5-31-12.sflb.ashx
[3] The BDCP Effects Analysis: A Briefing Paper. February 2012. http://www.bay.org/assets/BDCP%20EA%20Briefing%20Paper%2022912.pdf

The Delta Reform legislation of 2009, which created the Delta Stewardship Council, also legislated an obligation to comment on upcoming plans prior to being accepted by the Delta Stewardship Council. The Council is woefully negligent in not living up to that responsibility related to BDCP. We understand the political difficulty of preemptive criticism of BDCP plans; however, without any action on the part of the Council, both the Council and BDCP will be participating in a charade of huge proportions and with damaging consequences for the state of California.

- As an example of a pertinent challenge to the tunnel alternative which would protect against flood, sea level rise, and earthquake risk, the recommendation in the Economic Sustainability Plan to reinforce Delta levees above the PL84-99 standard at far less than the $15 billion tunnel cost is being ignored. The Delta Stewardship Council would be wise to raise the question why this isn't a better alternative than new conveyance to accomplish these same ends.

- Another example is that the Delta Reform Act requires that the Delta Independent Science Board "shall provide oversight of the scientific research, monitoring, and assessment programs that support adaptive management of the Delta." The independence of the science and adaptive management component is crucial to a project of the magnitude of the Delta Plan. However, current proposals of BDCP would circumvent the authority of the Delta Stewardship Council in this regard, and should not be tolerated by the Council.

GOVERNANCE — ROR007-9

The entire document, while professing to espouse an understanding of the Delta cannot be complete without recognition that as a cultural area the first people of the state are not included or discussed in the document and that the water rights of the California Indians are still to be mitigated at this late date. Tribal uses of water must be considered in order to begin to embrace the failure of agencies to acknowledge tribal water rights as well as cultural rights guaranteed under treaty to access and use water ways and estuaries for tribal existence. California water law has refused to include the mitigation of tribal water rights as senior to all other, as well as the non-abrogation of water rights under treaty, despite the continued inference of the government to the Winters decision.[4]

The Delta Plan must include actual consultation and planning that includes California tribal nations, federally and non-federally recognized, in order to include tribal needs and concerns for the uses of the waters into and out of the delta and how the transfer and use of these waters affects tribes and the inherent, non-abrogated rights of the tribes to these waters.

While the Delta Reform Act provides broad narrative goals for the Delta Plan, it does not provide clear, specific, and measurable objectives as called for in this Chapter. The Delta Plan must not defer this next necessary step of Adaptive Management. The Plan must begin to establish clear and measurable goals, objectives, and performance measures; it must quantify goals and provide specific accomplishment dates; it must model linkages between objectives and

[4] http://www.focuswest.org/law/winters.cfm. Winters vs. United States (2008)

proposed actions; it must select and evaluate actions for implementation; it must design implementation actions with appropriate monitoring; and it must be peer reviewed. If the plan cannot be enforced, it is illegal.

SCIENCE

(Page 44). The EWC agrees that science must guide the process for ecosystem restoration and water management decisions. Since this is a 50 year plan, and the Independent Science Board (ISB) will be the over-seeing entity on how well science is being used within Plan actions, we would recommend including a 5 year audit process on science. By this we mean having an independent and credible outside science group, like the National Science Foundation, review and evaluate actions that have been taken, and to make some recommendations to the ISB that could be helpful in better implementing how science is being used within the Plan. The focus here should be on balancing the ecosystem, species recovery and developing science based actions that assist ecosystem adaptation to known stressors and changing environmental conditions, be they drought, climate change, or others yet unknown. (Lines 1-2) The completion date of December 31, 2013 from G R1 should be included as part of this statement.

(Page 45) We recommend that the Delta Plan discussion include Performance measures as a key part of the work the Delta Science Program will be responsible for implementing. Relative to ecosystem recovery, these performance measures should be described as biological objectives, or in some cases population goals as described in the CVPIA AFRP salmon doubling goals.

(Page 47, Lines 27-30) Consistency with the Central Valley Project Improvement Act needs to be added to this statement. — ROR007-9

(Page 47, Line 32) Under *"Incorporation of BDCP into the Delta Plan," change 'improvements' to 'changes'* We have no way of knowing now if the changes in diversion and other infrastructure will be improvements or not.

(Page 47, Line 33) The statement says that BDCP "must" be incorporated into the Delta Plan if it meets certain statutory requirements. We recommend changing this line to say, "BDCP will be incorporated into the Delta Plan if it meets the requirements described in the Delta Reform Act, and meets any legal or other challenges in the appeals process within the Delta Plan, or other legal challenges specific to the BDCP independent of the Delta Plan."

(Page 52) We recommend that the Council focus attention on the 'California Statewide Groundwater Elevation Monitoring'. To date, the state does not have a groundwater management program, only monitoring, which has no level of legal authority to require change in any groundwater program. Since groundwater has been, and continues to be, a mismanaged resource for water, the Council can act as a credible source of policy recommendations. We would hope that the Council will initiate a process to help the legislature establish a groundwater management plan in the future.

(Page 52-53) In the process of a 5 year review, it is the appropriate time to require the scientific audit discussed previously in these comments. Again, for credibility reasons, an independent

science audit of both actions and proposed future work is appropriate. Everyone engaged in the Delta and state water management should want the best outcomes based on science, and all scientists who are continually working on this process need an "outside" evaluation periodically. Currently, there is no mention of any "outside" review of actions or science based recommendations. This needs to be changed to include an outside review at least every 5 years.

(Page 53) In this section, outside review of 'Performance Measures' is discussed, but this should not be confused with what we are asking for as an independent outside review of actions and future recommendations. We agree that reviewing success or failure on Performance Measures is important, but so is an independent look at the work and actions taken, how they were done, and the results achieved. We see this 5-year independent review as more comprehensive than just reviewing performance measures.

COMMENTS ON POLICIES AND RECOMMENDATIONS

As mentioned in the cover letter to these comments, the Delta Plan must include a Water Supply Analysis for each certified project in order to insure the availability of adequate water for the restoration of Delta; it should require a detailed Cost-Benefit Analysis in order to assure the financial viability of a covered project, and; it must include a Public Trust Analysis as indicated in the Delta Reform Act which cites the Public Trust as the foundation of California water policy. We therefore recommend that an additional regulatory policy be created for the Delta Plan which requires these three actions be accomplished prior to the certification of consistency for any major Delta Plan project. Alternatively, three separate new policies could be created within the applicable chapters specific to each of these actions (Chapter 1 for the Public Trust Analysis, Chapter 3 for the Water Supply Analysis, and Chapter 8 for the Cost-Benefit Analysis). — ROR007-9

(Pages 59-62) G P1. Detailed Findings to Establish Consistency with the Delta Plan Section (b), first item, page 60. We recommend that the type of covered action described (that which does not meet "full consistency" obligations) should ALWAYS be reviewed by the Council. Because this is a complex and conflicting type of covered action, the Council should always do a review, and not have to go through the appeal process. These types of actions may not be reviewed by Council members, and as such, never be appealed. Hence, this type of action, which has conflicts in meeting "all relevant policies", could slip by without any Council review, which we feel would be a mistake.

(Page 61) G R1. Development of a Delta Science Plan. Because this process will result in the over-arching science program for many years to come, we feel it appropriate that the "final product" not only pass the Independent Science Board, but be sent out to another credible science group, like the National Science Foundation, to review this plan. Of huge importance is the need to all interested parties to have confidence in the science plan, and to agree that it meets the requirements to achieve both protections of the Delta's fish and wildlife, as well as recovery for listed species. Public credibility is very important for the over-all Delta Plan, and the most important part of that credibility is based on the strength of the science program, and its ability to achieve stated goals. We feel that December 31, 2013 is a good target date for completion of the Science Plan.

(Page 62). Timeline for Implementing Policies and Recommendations.
Development of a Delta Science Plan (G R1). This should be consistent with the stated target date of December 31, 2013. A variable date of 2012 - 2017 is not consistent, nor acceptable.

(Page 50, line 18 & 19). Establish Delta Plan Interagency Implementation Committee. We feel strongly, as we did with the development of the science plan, that a variable timeframe of 5 years is much too long for this committee. We would recommend that the same date used for the science plan be used with the interagency implementation committee – no later than December 31, 2013. Interagency coordination is critical to success, and the process to coordinate it is necessary sooner than later.

CHAPTER 3 – A MORE RELIABLE WATER SUPPLY

We view an aggressive statewide water efficiency and conservation program as a primary requisite toward reducing reliance on the Delta, as prescribed in the legislative mandate. A program that reduces overall water consumption throughout the state, especially in the intensive farming areas and major population centers relying on the Delta, makes possible the achievement of this critical mandate of reduced Delta reliance. The mandate likely will not be met without this cost effective water supply program.

One of the best – and unrecognized – opportunities for reducing reliance on the Delta is by accomplishing a thorough economic analysis of Public Trust values, since this would require the examination of the alternatives to exported water. The alternatives to a continued high level of Delta exports are many, and they are contained in the efficiency and water use reduction solutions that are recommended in the EWC report: *California Water Solutions Now,* which is one of the alternatives being examined by the Council. ROR007-9

The Delta Flows Criteria promulgated by the State Water Resources Control Board clearly indicates that the state has reached – and exceeded – the amount of water that can responsibly be diverted from the Bay Delta. As a result, the Council should anticipate future limitations on Delta exports below the level of the 2000-2007 time periods in its Delta plan to meet the Delta ecosystems restoration goals. Those future reductions, at whatever levels they turn out to be, can only be accomplished if consumption levels are simultaneously decreased.

The major flaw with the Delta Plan continues to be unwillingness to address the root causes of the failing Delta ecosystem and what are referred to as "unreliable" water supplies. The root causes include:

- Unwillingness of public agencies to examine realistic California water supply availability and to adjust export contract amounts downward for junior appropriators in keeping with reliable yields. The current over promises in the SWP and CVP contracts allow water exporters to claim disappointment in planned exports and to continue to pressure for increased exports and new export conveyance.
- Unwillingness of the Delta Plan to require a cost-benefit analysis for all projects submitted for Delta Plan approval (including BDCP – although that project has recently indicated that it will accomplish a cost-benefit analysis) in order to in order to assure that public monies are spent on the most cost effective projects among reasonable

alternatives. This unwillingness on the part of the state and public agencies to accomplish a meaningful financial analysis constitutes abrogation of fiscal responsibilities to California citizens, taxpayers, and ratepayers.

- The Council as well as other public agencies has trustee responsibilities to perform Public Trust Doctrine balancing as part of a process of actually attempting to save the threatened Delta. The Public Trust Doctrine establishes the state's duty to protect the peoples' common heritage in waterways including the Delta and rivers, streams, marshlands and tidelands. However, there is no balancing of public trust obligations and resolution of competing demands on the Delta in the Delta Plan. Nor could there be given the failure to obtain essential information and perform required analysis. As pointed out below, the Plan itself admits that critical information including actual water availability is absent. Without obtaining and analyzing essential factual information, it is not possible to perform Public Trust Doctrine analysis and balancing. Examining the alternatives to exported water would be a significant step in accomplishing an economic analysis of Public Trust values. The alternatives to continuing a high level or increasing the already high level of Delta exports are many. These alternatives are contained in the efficiency and water use reduction solutions that are recommended in the EWC report: *California Water Solutions Now,* which is an alternative that should be subject to extensive consideration and analysis by the Council.

The Delta Flows Criteria promulgated by the State Water Resources Control Board indicate that the state has reached, and exceeded, the amount of water that can be responsibly diverted from the Delta. The Council should, consequently, anticipate future limitations on Delta exports below the level of the 2000-2007 time periods in its Delta Plan to meet Delta ecosystems restoration goals. ROR007-9

One of the surest ways to improve water supply *reliability* is to reinforce key Delta levees above the PL 84-99 standards, which is recommended in the Delta Protection Commission's Economic Sustainability Plan. We fail to see why this significant recommendation is being ignored by both the Delta Plan and the BDCP, since it is a far more cost effective protection against earthquake, sea level rise, and flooding than the BDCP tunnels plan. Ignoring this recommendation related to the levees is verified in Appendix N, "Projected Budgets for…Delta Protection Commission…" whereby no budget is allocated for implementation of the Delta Protection Commission's Economic Sustainability Plan (Table N-1).

We summarize below some key issues and deficiencies in the Delta Plan. Following that, we reiterate some specific recommendations that we have made to you in the past.

Lack of Essential Information And Analysis

The Plan itself contains its own admissions that a useful and valid Plan cannot be prepared at this time. As the Plan says in a heading, "informed decision making requires information." (105). (All page number references are from the Final Draft Delta Plan unless otherwise indicated). Yet the Plan concedes that "California does not have a clear understanding of its water demands, the amount of water available to meet those demands, how water is being managed, and how that management can be improved to achieve the coequal goals." (112-113). Further, "One of the greatest challenges to California water management is a lack of consistent, comprehensive, and

accurate estimates of actual water use by the type of use (agricultural, urban, and environmental) and by hydrologic region." (105, 112). The Plan lists numerous science and information needs including understanding of the hydrologic systems, patterns of water use, and effects of climate change as being "essential to improving the management of California's water supplies to achieve the coequal goals." (114).

There is more. The Plan concedes that "The amount of water used in California's stream systems is not fully known because water users under pre-1914 and riparian water rights have not been required, until recently, to submit annual reports accounting for their diversions." (83). After mentioning that "the SWRCB has the authority to determine when a river or stream has been 'over-appropriated'" the Plan goes on to state that "Understanding and reconciling the human demands for water to the supply available, while providing enough water to ensure desired and legally protected environmental and water quality goals, is a difficult process. This process is nonetheless essential to achievement of the coequal goals." (83).

The Plan admits that the original SWP and CVP contracts assumed greater water export quantities than consistently can be delivered. (91) In fact, a recent workshop conducted by the State Water Board has shown that legitimate claims to water flowing into the Bay Delta exceed the available water supply by more than five times in most years. In the absence of what the Plan concedes to be essential information, the Plan at this point in time is a classic case of putting the cart before the horse. As previously mentioned, it is necessary to first conduct detailed analysis and study of how much water is actually available for export from the Delta, a valid cost-benefit analysis to determine what project or projects might make economic sense, and environmental analysis and public trust balancing in order to protect the public interest and the environment. ROR007-9

In short, it is necessary to obtain information and perform analysis before making policy, and then establish policy before deciding on what if any plumbing to do. The Council is proceeding in the dark like a city or county would be doing if it attempted to adopt a General Plan without obtaining basic factual and environmental baseline information such as how much and what type of development, open space, and other land uses already exist, along with their placements and locations within the area to be governed by the General Plan.

The Plan is not ready for adoption because essential information has not been obtained and essential analysis has not been performed. Likewise, it is not possible at this time to lawfully authorize or approve development of the Delta Tunnels that would divert massive quantities of freshwater around the Delta because of the absence of essential environmental information and analysis.

Catastrophic Decline And Environmental Baseline Not Dealt With

The Plan concedes that "the long-term impacts of these diversions, on the Delta and its watershed, in combination with many other factors, are causing native fisheries to decline. In recent years the populations of salmon and several other fish species have reached their lowest numbers in recorded history and many of California's salmon runs are now listed as endangered by the State or federal government." (71). The simple fact is that the Delta is in grave danger of being turned into a salty, stagnant pond lethal to fish, and gravely impaired as an agricultural and

recreational resource. The Delta requires more freshwater, not less freshwater. Exports must be reduced, not increased. Two recent state agency reports, establish that an increase in Delta outflow is necessary to protect and restore the estuary's aquatic ecosystem.

There are already significant diversions of water from the Sacramento River and its tributaries before the water gets to the Delta. For the other major river extending to the Delta, most of the water from the San Joaquin, is diverted upstream, following the construction of Friant Dam. The Plan indicates that about 60% of inflows into the Delta are already diverted. (87). These diversions include 31% of the flow from the Delta watershed, about 4% for use within the Delta, and about 24% for the CVP and SWP export systems. The true environmental baseline is that the quantities of water already diverted before reaching the Delta are so great, that the Delta is in crisis such that further massive diversions should not be permitted. The Delta is not a clean slate. The water situation-shortage-in the Delta is far worse than it was decades ago.

For the Delta Plan to meet legislatively mandated goals, it is necessary that the Plan meet existing water quality laws including those pertaining to salt, selenium, temperature, flow, and contaminants harmful to public health and ecosystem health. In prior EWC submissions and comments to previous drafts, all adopted here by reference, the EWC has provided comments and evidence regarding the importance of meeting water quality standards, flow requirements, and temperature standards for the health of the ecosystem. The Plan as, it presently exists, fails to enforce existing water quality laws, and fails to ensure that any future covered actions will be required to meet flow requirements, water quality constraints, and protect public trust values. The Delta is in crisis. The Plan by its weakness is in denial.

ROR007-9

Salinity Intrusion Is Bad Now And Will Worsen With Climate Change And New Massive Upstream Diversions

The Plan concedes that one of the problems water exports are causing is that the Delta experiences salinity intrusion. "A portion of the water flowing into the Delta is specifically allocated to Delta outflow to help repel salinity intrusion from the San Francisco Bay and to maintain low salinity water near the western edge of the Delta. This means that water that might otherwise be used for exports must be released from upstream reservoirs to help control salinity (NRC 2012)." (91).

A different portion of the Plan admits that as a result of climate change, "Sea level rise, as much as 55 inches by 2100 (OPC 2011), will result in high salinity levels in the Delta interior, which will impair water quality for agricultural and municipal uses and change habitat for fish species. Maintaining freshwater conditions in the Delta could require unanticipated releases of water from storage, which will reduce available water supplies for fish." (80).

The Plan fails to connect even the most obvious dots within it. Given that salinity intrusion is already a huge problem now for the Delta, and will greatly worsen as a result of changing conditions including climate change, adding new massive diversions of freshwater upstream from the Delta to export to regions south of the Delta would have the effect of further exacerbating the already bad and worsening problem of salinity intrusion in the Delta.

Two Of Three BDCP Conveyance Options Will Induce Diversions Of Greater Quantities Of Water And Will Exacerbate Conflicts Between The Delta And Exporters

The Plan refers to the BDCP process and those options for conveying water through or around the Delta as being: through-Delta Conveyance by continuing to divert water in the southern Delta; Isolated Conveyance by massive new diversions upstream from the Delta through proposed 35 mile-long Delta Tunnels; and Dual Conveyance, by continuing through-Delta conveyance and adding the massive new diversions upstream from the Delta and the 35 mile-long Delta Tunnels. (97). The Plan, with no supporting facts or analysis as pointed out above, calls in its Policies and Recommendations for exporting larger quantities of water from the Delta during wet years and expanding conveyance capacity (111-112), meaning development of the Delta Tunnels.

At present, despite existing conflicts, both the Delta and the exporters have a common interest in minimizing the worsening of salinity intrusion. That is true because the exporters have an interest in having water of not too low quality water in the southern Delta, as that is the location for their existing diversions. However, if either the Isolated Conveyance or the Dual Conveyance projects – the Delta Tunnels – are carried out, the exporters will have no interest at all in keeping any kind of lid on salinity in the southern Delta. The exporters' water would be taken out near Clarksburg, miles upstream from the Delta. The reality which must be addressed by the Plan is that constructing the Delta Tunnels project would create a situation in which extremely wealthy and powerful interests including Westlands Water District and Kern County Water Agency users would have a strong incentive to divert huge quantities of water upstream from the Delta while having no corresponding interest in preventing salinity intrusion as well as other water quality issues from worsening in the Delta and southern Delta. And all of this would take place accompanied by climate change which as stated above, will result in high salinity levels in the Delta due to sea level rise by as much as 55 inches by 2100. Given the already desperate straits that the Delta is in with respect to water quality, salinity intrusion, and declining and endangered fish populations, along with other certainties including the sea level rise resulting from climate change, going forward with the Delta Tunnels would be a prescription for completing the destruction of the Delta environment. ROR007-9

The Council has an obligation under the Delta Reform legislation of 2009 to comment on upcoming plans. The Council needs to rise above politics and tell the truth about the Delta Tunnels plan. As an example, the recommendation in the economic Sustainability Plan to reinforce Delta levees above the PL 84-99 standard would cost far less than the $15 billion Delta Tunnels project. The Delta Plan fails as an informational document by failing to raise the question of why that would not be a better alternative than the Delta Tunnels to accomplish the same ends.

Another example of bias and predetermination in pushing the Delta Tunnels project is that the Delta Reform Act requires the Delta Independent Science Board to "provide oversight of the scientific research, monitoring, and assessment programs that support adaptive management of the Delta." The independence of the science and adaptive management component is crucial to a project of the magnitude of the Delta Plan. However, current proposals of BDCP would circumvent the authority of the Council in this regard and should not be tolerated by the Council.

The Plan is woefully deficient in failing to clearly and succinctly set forth basic, undisputed facts, such as that adding massive new diversions upstream from the Delta to export water south of the Delta would lead to greatly worsened saltwater intrusion in the Delta. To be blunt, the state is wittingly or unwittingly aiding and abetting the effort by wealthy and powerful special water interests to be able to take massive quantities of freshwater away from the Delta, upstream, while no longer having any concern about or interest in limiting the worsening salinity intrusion and water quality in the Delta.

The Delta Tunnels Would Be In Conflict With Both Of The "Co-Equal Goals" As Well As The Policy Of Reducing Reliance On The Delta

The Delta Reform Act establishes "coequal goals" which "mean the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place." (67, quoting Water Code § 85054). As already shown, the Delta Tunnels with new, massive upstream diversions, would further damage to the point of destroying the Delta ecosystem. That is contrary to the goal of protecting and restoring the Delta ecosystem.

The other goal, of providing a more reliable water supply, should be met by gathering the missing information and performing the absent analysis of actual water demands, amount of water available to meet those demands, and improvement of water management as set forth above. Again, the Plan admits that the "original SWP and CVP contracts" "assume greater water export quantities than consistently can be delivered." (91). Excess contractual amounts should be limited in the contracts and in the meantime should be disregarded for planning purposes. There is no rational reason to construct massive new public works projects or exacerbate the salinity and water quality conditions in the Delta by attempting to export unrealistic quantities of water from the Delta. A more reliable water supply would be provided by identifying, and then seeking to provide a water supply that is realistic taking into account what is actually available as well as environmental constraints including the needs of Delta users, fish populations, climate change, and ever worsening salinity and water quality conditions in the Delta.

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The state has established through the Delta Reform Act "a new policy for California of reducing 'reliance on the Delta in meeting California's future water supply needs' (Water Code section 85021)." (73). Establishing massive new diversions upstream from the Delta by way of constructing the Delta Tunnels would be contrary to that policy. The Tunnels, a massive public works project costing billions of dollars, would increase reliance on the Delta by taking even more freshwater away from the Delta before the water even gets to the Delta. The concept of the Delta Tunnels is to take water through the Tunnels to those same water interests south of the Delta that are presently taking the water from the southern Delta. At present, at least the water being taken by the southern exporters passes through the Delta and is available for Delta fisheries, and other Delta uses, before it is taken.

Reinforcing the above paragraph, Appendix P, "Demonstrating Consistency with……..Reduced Reliance on the Delta…" does not take the required step of reducing SWP Table A amounts,

which would be a true indicator of compliance with WR P1 and the statuary requirements of SB X7 7.

Falsification of Project Purposes And Project Description

The Plan attempts to set the stage for the Delta Tunnels by asserting that the Delta ecosystem will be protected by development "to optimize diversions in wet years when more water is available and conflicts with the ecosystem less likely, and limit diversions in dry years when conflicts with the ecosystem are more likely." (72).

Studies have shown that there is not enough water available to justify the cost of more storage north or south of the Delta, such as the proposed Sites and Los Banos Grande reservoirs. In addition, evaporation and other losses would take a large portion of any additional storage. Thus the claim that "Delta water that is stored in wet years will be available for water users during dry years" ignores the reality that there is not enough water to justify the cost of more storage.

The Plan fails to make any kind of environmental full disclosure. As set forth above, construction of the Delta Tunnels would allow special water interests south of the Delta to divert massive quantities of freshwater while those interests would not be affected by increasing salinity and decreasing water quality in the Delta. Those interests are presently affected by increasing Delta salinity and worsening Delta water quality because they now divert water from the southern Delta. The true purpose of the Delta Tunnels is to increase reliance on and exports away from the Delta contrary to the Delta Reform Act and contrary to the patently false claims that the Delta Tunnels project is intended to help rather than further damage the Delta. ROR007-9

The description of the project is false. The project, including the Delta Tunnels, is to allow greatly increasing exports of water away from the Delta, upstream, to powerful special water interests south of the Delta that are presently constrained by inability to divert as much water as they would like to divert from the southern Delta because diversions there draw in greater salinity from the Bay.

The claim about optimizing diversions in wet years also is made in the absence of any analysis of the adverse impacts resulting from reducing the flushing of southern San Francisco Bay by Delta outflows (84), and from reducing the flushing of the Delta by large freshwater flows in wet years. Studies have shown that with increasing upstream diversions, "the historical 'flushing' of the Delta with freshwater is no longer occurring. This lack of flushing can also allow waste from urban and agricultural development upstream of and within the Delta to accumulate. Contaminants and toxics have been identified as factors in the decline of the Delta ecosystem. (Baxter, et al., 2007)." (Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay, Water Resources Department, p. 41, Contra Costa Water District, February 2010, Tech. Memo. WR 10-001). Further reduction of flushing during wet years would further damage the Delta.

Because Of Climate Change There Will Be More Dry Years And Fewer Wet Years Making The Stated Objective Of Optimizing Diversions In Wet Years Absurd Given The Facts

The Plan now admits under the heading "Climate Change Complicates Management of California's water" that "Since 1906, California has seen 'dry or critically dry' years one-third of the time. This trend is increasing (California Data Exchange Center 2011)." (80). "Warmer temperatures throughout the state will cause higher evaporation rates, particularly during the hot summer and early fall months, contributing to reduced stream flows, drier soils, reduced groundwater infiltration, higher losses of water from surface reservoirs, increased urban and agricultural demand for irrigation water, and more water needed for ecosystem protection (California Natural Resources Agency 2008)." (80).

Recent studies sponsored by the California Climate Change Center, released in support of the 2012 and 2009 California Climate Change Assessments demonstrate that there will be a significant increase in dry and critically dry years by the latter half of this century, with a corresponding decrease in wet and above normal years. Given the reality of what is actually happening with respect to climate change, the stated objective of developing massive, costly Tunnels "to optimize diversions in wet years when more water is available" (72) is absurd. There are not going to be very many wet years in the future. Moreover, as shown above, climate change will also result in a significant rise in the sea level, worsening the already serious salinity intrusion in the Delta. Climate change, consequently, constitutes at least a double whammy establishing the absurdity of creating massive new diversions upstream from the Delta. As the climate warms up and dries out worsening environmental conditions, the Delta is going to need every last drop of remaining freshwater that it can get.

The Recirculated Draft PEIR states that "there is no reasonably plausible scenario in which a potential significant impact would occur. It is therefore concluded that this impact would be less than significant. Future project-specific analyses may develop adequate information to arrive a different conclusion; however for purposes of this program-level analysis, there is no available information to indicate that another finding is warranted or supported by substantial evidence." ROR007-9

Previous DEIR comments by the EWC noted a plausible scenario in which a potentially significant impact could occur. Those comments were:

> "There are potentially significant statewide, cumulative impacts to the [BDCP] Proposed Project, which could increase exports of water from the Sacramento Valley watershed through the Delta to Southern California. Because water supply ultimately drives growth, one of the biggest impacts would be a shift in growth from the Sacramento Valley watershed, which includes the western Sierras as well as the Sacramento Valley, to the San Joaquin Valley, the Inland Empire, and coastal southern California. Temperature projections from the state's Climate Adaptation strategy show that inland Southern California regions will be some of the hottest areas in the state, with mean peak daily temperatures in July as high as 110 degrees by 2070.[5]

[5] 2009 California Climate Change Adaptation Strategy, California Natural Resources Agency, p i. Available at http://resources.ca.gov/climate_adaptation/docs/Statewide_Adaptation_Strategy.pdf. Incorporated by reference.

> "No analysis has been done of the increased greenhouse gas emissions from shifting development to these regions, or of the increased GHG emissions from an increase in demand for air conditioning. For this and other reasons, we disagree with the conclusion that projects implemented under the Delta plan would not conflict with other plans adopted by the state for the purpose of reducing GHG emissions, as long as the individual projects were evaluated for conformance to statewide and regional policies."

The initial economic analysis performed by David Sundig for BDCP also specifically referenced the assumption that the state should attempt to sustain the explosive mid-2000s level of growth in inland Southern California, and to provide water for lawns in the resulting subdivisions in the desert. The economic analysis did not look at GHG impacts of subsidizing the use of fossil fuels to ship water 400 miles south to water lawns in the desert, and such an analysis would not be done in determining consistency with local GHG emission reduction plans. The state needs to perform a top-level evaluation of whether constructing a large project to meet such needs are consistent with AB 32,[6] or with optimal allocation of increasingly scarce water supplies.

These are plausible scenarios that show a significant impact of the proposed BDCP project on GHG emissions that could be in conflict with existing state policies. For this reason, the conclusion that this impact is less than significant is not correct. This impact must be reclassified to significant for this RDPEIR to be valid.

Failure to Perform Cost Benefit Analysis And Public Trust Balancing

ROR007-9

The reason the state has so far failed to perform cost benefit analysis or conduct public trust balancing with respect to the Delta Tunnels project is that the special water interests are in control of the process and know that a candid, honest process would result in the Delta Tunnels not being developed. Two thirds of the water taken away from the Delta would go to mega farming interests including those in Westlands Water District and the Kern County Water Agency which already get subsidized water to grow unsustainable crops on drainage-impaired land. They are growing cotton, almonds and other permanent water-intensive crops on arid-desert land. In addition, "these project rights are junior in priority to the rights held by water users in the Delta and within the Delta watershed." (82). In contrast to those water interests, many urban, residential, commercial, and industrial users are making great strides in terms of water conservation, water recycling, use of water from local and other sources, and use of other mechanisms to reduce reliance on the Delta as well as to save the costs of exporting water from the Delta.

Up to this point, the state has only conducted cost-benefit analysis in terms of whether benefits to the exporters would exceed cost to the exporters. There has been no true state-wide cost-benefit analysis, or cost-benefit analysis considering impacts on the Delta and Delta watershed interests and users because the exporters controlling the process know that the costs of the project would exceed any benefits. The recent indication by the BDCP to conduct a cost-benefit analysis, while seemingly encouraging, is also discouraging due to the apparent biases already being built into the cost-benefit analysis.

[6] PPIC report lawns

Likewise, there has been failure to perform balancing as required by law, under the Public Trust Doctrine. The state "has an affirmative duty to take the public trust into account in the planning and allocation of water resources and to protect public trust uses whenever feasible." (82, citing *National Audubon Society v. Superior Court*, 33 Cal.3d 419 (1983). The Plan explains that in the cited case the California Supreme Court "unanimously affirmed that the state's navigable lakes and streams are resources that are held in trust for the public and are to be protected for navigation, commerce, fishing, recreational, ecological, and other public values." (82). Because of the absence of information and analysis as discussed above, including absence of information on how much water is actually available for export, and absence of cost-benefit analysis to determine what project or projects might make economic sense, together with the deteriorating water quality, increasing salinity, and declining fish populations in the Delta, the state presently lacks the information necessary to accomplish the required public trust balancing.

The state should not rush to develop the Delta Tunnels to funnel massive quantities of fresh water around the Delta to the special water interests south of the Delta which are junior appropriators that should be last in line in terms of obtaining water from the Delta. The state needs instead to obtain the essential factual information and perform the necessary analyses in order to protect the Delta as required by the Delta Reform Act and the Public Trust Doctrine.

EWC Reduced Exports Plan

The EWC Reduced Exports Plan contains numerous actions to compensate for reduced exports. These actions include alternatives for achieving water supply reliability and Delta ecosystem restoration. This alternative relies on strict enforcement of water quality laws, adoption of the SWRCB and Fish and Game flow recommendations, shoring up existing levees, ceasing the unreasonable use of water to irrigate toxic soils that return pollution to the estuary, while also providing for exports and water supply along with water conservation measures to ensure existing supplies are extended to meet demand. This is a reasonable alternative that has not been adequately considered in the Delta Plan or the Delta Plan DPEIR. ROR007-9

Unless the state is willing to write off vibrant Delta waterways, fish and wildlife, the state needs a system that allows it to plan effectively for the water needs of both Californians and California ecosystems. The dangerously well-trod path of "use, overuse, environmental decline, then hasty and unplanned reaction" can begin to be broken by granting waterways the right to be at the planning table from the beginning, at a level truly "co-equal" to human water uses, rather than at the end when the damage has been done.

If the state is actually committed to "co-equal" goals, and if water rights are to be the legal measure by which water is allocated for human uses of the state, then waterways also must be granted equivalent water rights that reflect the flows and water quality necessary to ensure waterway and larger ecosystem health, with a margin of safety. That would be the process by which the Delta Plan would fill responsibilities under the Public Trust Doctrine, and environmental and species protection laws. The Plan must include an analysis of this "water rights for waterways" option to ensure compliance with law and the Public Trust Doctrine.

Comments on Policies And Recommendations

The single most significant and negative policy change is that the Revised Project WR P1 changes the definition of "Reduced Reliance on the Delta". The prior definition included a policy calling for a reduction of net water used from the Delta watershed. The new definition omits references to water use in the Delta watershed and only applies to water "exported from, transferred through or used in the Delta." The ramification of this change in definition is that it appears that all diversions upstream of the Delta would not be required to comply with the proposed prohibitions on Delta exports, or the legally mandated requirement to reduce reliance on the Delta, because they are not using water exported from, transferred through or used in the Delta.

Policy WR P1 (108) limits exports from the Delta depending on three apparent findings. The third finding requires for limitation, that "the export, transfer, or use would have a significant adverse environmental impact in the Delta." These Policies turn proper planning upside down. Existing exports have already a significant adverse environmental impact in the Delta. The Delta needs more freshwater, not less freshwater. Instead of attempting to turn burdens upside down, placing burdens on those seeking to preserve the Delta, a limit needs to be set on exports, with no water being exported above the set limits. Whether or not water suppliers have instituted conservation or improved regional self-reliance, exports must be limited to amounts consistent with restoring the Delta.

Recommendation WR R3 calls on the SWRCB to evaluate applications that would result in new or increased uses of water from the Delta for consistency with the constitutional principle of reasonable and beneficial use. First, such applications are not ready for consideration unless and until informational needs including actual water availability discussed above, have been met. Second, such applications must also be evaluated in light of the Public Trust Doctrine for protection of the Delta. ROR007-9

The Plan in its policy sections calls for improving, meaning increasing, conveyance. (111-112). As shown above, there is no existing informational or analytical basis supporting development of the Delta Tunnels. There is no basis for the Plan's assumption that "The completion of the BDCP.... are needed but may take many years to implement". (111-112). It would take many years to complete the Delta Tunnels, but they are not needed. Moreover, as shown above, with increasing salinity resulting from climate change and diversions, and increasing dry years and fewer wet years as result of climate change, there would be no need or viable use for the Delta Tunnels by the time they would be constructed. As pointed out above, findings in the Plan such as "The State does not have sufficient information to assess the current reliability of its water supplies or to meaningfully measure progress toward achievement of more reliable water supplies for California" (113) demonstrates that nothing other than pre-decisional bias supports the conclusory statements that the BDCP should be completed (112, WR R12), and that larger amounts of water should be exported from the Delta during wet years requiring expansion of conveyance capacity, meaning the Delta Tunnels. (111).

We incorporate by reference the 18 Recommendations made in the EWC Comments on the Fifth Staff Draft of the Delta Plan (September 30, 2011) dealing with water supply subjects such as:

water efficiency and conservation; flow criteria; overturning the provisions of the Monterey Agreement; protections for Northern California groundwater supplies; cautions on conjunctive use; and protections for the Trinity River and Native American Tribes.

CHAPTER 4 – RESTORE THE DELTA ECOSYSTEM

In general, this chapter makes many valid and accurate points regarding the relationship between natural flows and species viability in the Delta. EWC commends the DSC on its astute observations of the need for drastic measures to help restore natural habitat for native species and to ensure flows which resemble historic flows to the extent possible. At times the Plan fails, however, to link these sound conclusions with the policies proposed in this Plan. There are critical gaps in linking these scientific conclusions to Delta Plan and especially to the BDCP. The following are specific examples of such inadequacies:

- Page 129. This section states that to restore the Delta ecosystem, Californians will need to place greater reliance on reservoirs, and the development of alternatives supplies, and modern water diversions that protect fish while providing reliable water supplies. "For these reasons, restoring the Delta ecosystem will require new investment in water facilities and alternative supplies, not just regulation of water project operations or restoration of habitats for fish and wildlife."

    - Did the authors consider the need for enhanced water conservation as part of this suite of measures needed for future Delta uses? Development of strong conservation measures and well as incentives for local water supply development should be added to this section. ROR007-9
    - Also, to what extent has the construction of additional reservoirs been evaluated in this Plan and its PEIR? If the policies in this Plan are encouraging such additional water storage, the impacts must be evaluated.

- Page 132. The Plan states, "Nearly all the rivers historically flowing to the Delta were dammed, creating Shasta, Folsom, Millerton, and Oroville lakes and other impoundments described in Chapter 3. These dams, together with levees constructed to prevent flooding, blocked access to spawning areas and other habitats critical to salmon, splittail, and other fish. . . ."

    - EWC appreciates the acknowledgment of this reality and hopes that DSC will consider that many of the policies proposed in the Delta Plan and in the BDCP will alter operations of these existing dams and also encourage the development of new dams that will further hinder the success of these fish species. Dams are not a mere problem of the past, and should be evaluated as an indirect effect of this Plan.

- Page 134. The Plan states, "[R]estoration seeks to return areas to a close approximation of their natural potential, including reestablishing natural habitat and ecosystem functions, as feasible, within the context of the current configuration of the Delta, the

current biological communities, and the permanent modifications to Delta land forms and hydrology.

  - EWC agrees with this conclusion and hopes for additional clarification. How can construction of facilities that divert a large portion of the flow from the Sacramento River achieve a close approximation of the natural potential of the Delta? Also, what does DSC consider to a "permanent modification of the Delta forms"? How have you determined that some impacts to the Delta are irreversible?

- Page 135. Under the sidebar Delta Ecological Principles, Principle 2, the Plan states that a management implication of the fact that the Delta ecosystem is part of a large ecosystem means the following: "Management of the Delta cannot occur independently of structures and events upstream and in the ocean, in regional and state economies, or in the wider governance context."

  - EWC agrees with this principle and management implication. How are structures and events upstream addressed in this Delta Plan and in its PEIR? Have you considered how the changes to reservoir operations could affect the policies contained herein? Have you considered how the corresponding agencies with jurisdiction over these structure who have various ESA, CEQA, NEPA obligations of their own will interplay with the policies herein and the policies encapsulated by the BDCP?

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- Page 137. In the sidebar, Bay Delta Conservation Plan Delta Ecosystem Restoration" the Plan notes that if approved the BDCP will be a Natural Community Conservation Plan pursuant to Chapter 10 of the Fish and Game Code, a Habitat Conservation Plan under the federal ESA, and will be incorporated in the California Water Code. The Plan then states, "The Council has a potential appellate role regarding the inclusion of the BDCP in the Delta Plan."

  - Please explain this last sentence. In what sense does the Council play an "appellate role" regarding the inclusion of the BDCP in the Delta Plan?

- Page 139. The Plan notes "Flows sometimes have not reflected the Fish and Game Code Section 5937 requirement that dam owners should allow sufficient water at all times to pass through a fishway. . . ."

  - EWC agrees with this conclusion and asks that you add a statement regarding the current compliance with the other legal constraints on Delta operations. For example, it would be helpful to add a small section on SWRCB decision (D-1641) and the Delta Smelt Consolidated cases ("Wanger decision"). Please add a section on how the Public Trust Doctrine obligates the DSC to restore and protect the Delta for the use of the citizenry. As required by Water Code §85203: "[t]he longstanding constitutional principle of reasonable use and the public trust

doctrine shall be the foundation of state water management policy and are particularly important and applicable to the Delta."

- Please explain how the DSC plans to address these currently degraded, and often illegal conditions, in the baseline analysis. Degraded conditions are often subsumed in the baseline, thereby minimizing the appearance of a project's impacts and artificially inflating its benefits. To do so, however, would greatly compromise the DSC's mission of restoring the Delta to a close approximation of natural potential. Please explain how the DSC plans to address this issue.

- Page 141. Regarding timing of the updated Delta Flow Objectives, the SWRCB is not scheduled to complete these objectives until 2014. (ER P1) This deadline cannot be reconciled with the Delta Plan's goal of being complete by early 2013 or with the BDCP goal of being complete by the end of 2013. Neither the Delta Plan nor BDCP should be approved without valid flow criteria approved by SWRCB, and the DSC cannot enforce SWRCB's deadline. This chapter should analyze alternative scenarios for ensuring flows "to protect the Delta ecosystem and the reliability of the Delta's water supplies" (as called for on page 141).

- Page 142. "Greater reverse flows caused by pumping in the south Delta increase the numbers of fish entrained."

    - Please provide a more detailed description of how this Plan will ameliorate this impact. Is it imperative that South Delta pumps cease operating altogether in order to address this impact? — ROR007-9

- Page 144. There are important discrepancies between "Land elevations in the Delta and Suisun Marsh" as shown in Figure 4 of Appendix H and "Habitat Types Based on Elevation" as shown in Figure 4-5 of the Delta Plan final draft. The map in Appendix H distinguishes among five different "subtidal" elevations, a term that usually refers to zones that are submerged most of the time. By contrast, Figure 4-5 combines these five areas in a single area identified as "subtidal". The Plan then fails to refer to subtidal in the text at all, instead referring (on page 144) to "subsided" land. The implication is that this entire region of the Delta is uniformly subsided, if not actually submerged, a serious misrepresentation of the situation.

- Page 144. Figure 4-5, "Habitat Types Based on Elevation," should reflect a range of subsided areas as shown in Figure 4, "Land elevations in the Delta and Suisun Marsh," on page 32 of Appendix H. "Subtidal" refers to zones below low tide that are submerged all or most of the time. This is not an accurate description of any subsided area in the Delta. Therefore, the designation of any area of the Delta as "subtidal" or "intertidal" is misleading to any reader not personally familiar with the Delta region. The use of either term should be accompanied by a description of what distance below sea level it refers to, as in Figure 4 in Appendix H.

- Page 144, lines 13-14 should read as follows: As described in Chapter 5, some of the Delta cannot be restored to its original ecological functions because of the degree of its

subsidence. Figure 4-5 shows degrees of subsidence and refers to zones as "intertidal" or "subtidal" based on their distance below sea level, although in the case of the Delta, these subsided lands are not submerged.

- Page 144. The Plan states that "the most promising [habitat] restoration opportunities are found in the less-subsided flood basins, river corridors, and brackish tidal marshes on the Delta's perimeter" (lines 20-21). The Plan then identifies the Lower San Joaquin floodplain between Stockton and Manteca as a promising area for habitat restoration (page 147 and map on page 159). This is prime farmland currently under cultivation, not sufficiently subsided to escape scrutiny as a "promising" area for habitat restoration, including tidal marsh. Appendix H notes (page 30) that "Existing non-urban land uses, infrastructure, and other constraints of these locations [restoration opportunities] were not considered for this map" [Figure 4]. The Plan does not contain sufficient detail to indicate that these constraints have been considered in the final draft of the Delta Plan or that habitat benefits there have been balanced against the costs of loss of that land for agriculture or as part of the local tax base.

- Page 144. Another area identified for habitat restoration is the Cache Slough Complex (see map on page 159). This project has complicated hydraulic impacts on groundwater and septic systems on Ryer Island, which have already been affected by testing for the project. In addition, the proposal to expand the Yolo Bypass will impact transportation on Ryer Island when the Bypass is flooded, affecting recreation consumers, farm equipment, and emergency vehicles from Rio Vista.

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- Page 155, Policy 1. "Development, implementation, and enforcement of new and updated flow objectives for the Delta and high priority tributaries are key to the achievement of the coequal goals. . . By June 2, 2014, adopt and implement updated flow objectives for the Delta that are necessary to achieve the coequal goal."

    - Please explain how this Plan affects the speed or effectiveness of SWRCB's policies and approvals. Also, please explain how the 2014 deadline can be reconciled with the 2013 deadlines for the Delta Plan and the BDCP.
    - Are these policies intended to completely offset the problem statement? What are the metrics of success?
    - This policy and many of those that follow defer specifics until a time that DFG can provide input. Without these specifics, the policies are rendered largely useless. For example, under ER P3, it is unclear what is meant by "Protect Opportunities to Restore Habitat." A discussion of protection of "opportunities" to restore habitat is a vague to say the least. We need specific performance measures, and specifics on how each effort will directly result in survival and recovery of endangered and threatened species.

- Page 157, ER R1. The Plan lists restoration projects that should be prioritized by the BDCP and implemented.

- Please describe the specific species that would be recovered by each project and how this assures that each endangered species in the region will benefit. There is only one mention of a specific species, the Chinook Salmon, next to the Yolo Bypass project.

- Page 158, ER R2. "Complete and Implement Delta Conservancy Strategic Plan." The Plan states that as part of its Strategic Plan, it will "Develop and adopt processes for ownership and long-term operations and management of land in the Delta and Suisun Marsh acquired for conservation or restoration". . . "Develop, in conjunction with the Wildlife Conservation Board, the Department of Water Resources, Department of Fish and Game and Bay Delta Conservation Plan implementers and other State and local agencies, a plan and protocol for acquiring the land necessary to achieve ecosystem restoration consistent with the coequal goals and the Ecosystem Restoration Program Conservation Strategy."

    - How are these two bullets different? Does the DSC plan to acquire land separate and apart from land acquisition efforts made in concert with the other agencies mentioned? Has there been any analysis of land availability or cost? Does the State plan to use condemnation procedures? How will land acquisition specifically improve the survival and recovery rates for each endangered species in the region?

- Page 165, under Output Performance Measures. "The SWRCB implements Delta flow objectives by June 2, 2014." — ROR007-9

    - If the SWRCB adopts weak flow objectives, then the restoration policies of the Delta Reform Act would potentially be rejected or compromised. It would be more helpful if the Plan provided more guidance as to what would constitute favorable flow objectives in terms of ecosystem restoration.

- Page 165, under Outcome Performance Measures. "Progress toward restoring in-Delta flows to more natural functional flow patterns to support a healthy estuary. Metrics: results from hydrological monitoring and hydrodynamic modeling. (ER P1)."

    - Please provide a more robust description of what hydrological monitoring and hydrodynamic modeling would pass muster under the Delta Plan. Again, this Plan could benefit from specific metrics of success and performance measures.

- Page 179. The DPC's *Economic Sustainability Plan* (ESP, Figure C) estimates an annual crop loss of up to $20m resulting from the BDCP proposal for habitat restoration in the San Joaquin River Floodplain. Yolo Bypass Fishery Enhancements involve losses of $7m to $10m annually, dependent on flood duration. Restoring 65,000 acres of tidal marsh would involve $18m to $77m in crop losses, with the highest losses in the South Delta. Selection of agricultural land in the Lower San Joaquin River Floodplain and other areas of the Delta for conversion to any habitat not compatible with agriculture is

inconsistent with the core strategy to "Maintain Delta agriculture as a primary land use, a food source, a key economic sector, and a way of life." (lines 27-28)

Comments on Policies and Recommendations

- Earlier comments by the EWC recommended adding "establish an enforceable mechanism to ensure water exports from the Delta and water transfers are consistent with the flow standards established by SWRCB recommendations and, until they are issued, the current Biological Opinions for Delta Smelt and Salmon/steelhead should apply." (ER P1) This addition has not been made.
- Earlier comments by EWC recommended incorporating into the Delta Plan consideration of water use and diversions north of the Delta. This has not been done. The recently released report by Fish Agencies on how to operate conveyance under BDCP to benefit combined species (CS5) makes it clear that species recovery can only be achieved with reoperation of upstream storage. The Delta Plan states (page 135, Principle 2) that "Management of the Delta cannot occur independently of structures and events upstream and in the ocean, in regional and state economies, or in the wider governance context." In addition to acknowledging this, the Plan should consider how changes to reservoir operations could affect the policies in the Plan.
- We still see no recommendations in this chapter that are specific to the recovery of endangered fish species or the CVPIA requirement for doubling of salmon populations. Measurable goals for species recovery need to be included as part of ecosystem recovery actions. (ER R1)
- If the intent of ER R5 and ER R6 (Page 162) is to reduce populations of Striped Bass in order to reduce predation by introduced fish, we refer you to the ruling by the California Fish and Game Commission which defeated proposed fishing regulations which would have increased the take of Striped Bass in order to accomplish this goal. Predation by Striped Bass on salmon was shown not to be significant and the long term tradition of having Striped Bass available in the Delta for recreational fishing was deemed more important. The Delta Stewardship Council should be guided by this policy decision of the Fish and Game Commission. — ROR007-9

General Comments on the Bay Delta Conservation Plan

The BDCP has not defined "greater water supply reliability," but it is well know that the applicants and their contractors are working to remove more water from the Delta System. Additionally, incorporation of the BDCP into the Delta Plan is anticipated if DFG, FWS, and NMFS certify it as meeting their biological standards. We ask the DSC to provide guidance to the BDCP on what is required to meet the legislative mandates of Delta ecosystem recovery, improved water quality in the system for fish and wildlife, as well as the Delta human needs, and the need to factor in the State Water Board's Delta and tributary flow requirements coming in the future.

The definition of "water supply reliability" is important and can impact economic sustainability of the Delta. The Delta Plan acknowledges multiple strategies or objectives referenced in the Delta Reform Act that must be addressed to improve water supply reliability. A more specific

definition of water reliability allows for economic analysis or at least the presentation of factors relevant to economic sustainability. For example, if water reliability is defined as export levels prior to 1970, reduced by the effects of climate change and needs within the watershed, this might represent the average level of exports which could realistically be more reliable. This level had less of an impact on fish populations than the impact of exports from 1970 to 2010. The 1970 level of export is conceivably sustainable with through Delta conveyance and this would have a different impact on economic sustainability than that of expanded exports. Expanded exports utilizing isolated facilities, which has been proposed in the BDCP, would have a footprint that takes farmland out of protection, off local tax rolls, and could alter channel flows threatening the salinity of the Delta. These conflicts with the Plan's proposed performance measure in Chapter 8, which states that progress toward improving economic sustainability of Delta land uses and protection of the Delta's agricultural values should be measured by "total agricultural acreage and gross revenue in the Delta (that) will be maintained or increased in the future." A more precise definition of "water supply reliability" could avoid these kinds of conflicts.

With reference to the Delta Flow Criteria adopted by the State Water Board, the Council should determine specific maximum quantities of water that can be exported under varying water type years and hydrological conditions in order to provide measurable criteria for the goal of "water supply reliability." We cannot manage what is not measured.

CHAPTER 5 – DELTA AS PLACE

This Delta Plan includes some performance measures, but they are still lacking in quantitative specificity, as noted in the EWC comments on an earlier draft. There is still no clear recognition that water quality and improved water flow through the Delta are an integral part of the Delta as Place. The plan mentions the importance of including Delta residents and Delta communities in planning for the Delta's future but is vague regarding mechanisms for ensuring this inclusion. Every process mentioned operates from the top down, in keeping with the colonizing of the Delta by the state and federal water projects. ROR007-9

The Plan acknowledges the primacy of agriculture as an economic driver but still hedges on the difficult choices necessary not just to protect the Delta but to increase its general prosperity, as required by the Swamp and Overflow Land Act, and to ensure an adequate water supply for the Delta, as required by the California Water Code.

- Page 179. Selection of agricultural land in the Lower San Joaquin River floodplain and other areas of the Delta for conversion to habitat, especially tidal marsh is not consistent with the value of: "Maintain(ing) Delta agriculture as a primary land use, a food source, a key economic sector, and a way of life" as stated in lines 27-28.

- Page 187. "Impacts on agriculture, such as decreasing revenues, are also likely if Delta water supplies increase in salinity . . . and water demand increases." (lines 13-14) Although no one can predict the actual consequences of climate change, the Delta Plan should be more than just descriptive of those possible consequences. The Plan should take a more affirmative position to protect Delta agriculture, guard against increased salinity, and manage water demand. In fact, that is part of the DSC's mandate.

- Page 192, (lines 21-22). This sentence suggests that water from the Delta is now and will continue to be abundant and of high quality. That depends upon how the Delta Plan is implemented. It would be more accurate to say: "Water-dependent industries like those in Collinsville, Rio Vista, Pittsburg, and Antioch require abundant and high-quality water from the Delta."

- Page 179, (lines 27-28). Selection of agricultural land in the Lower San Joaquin River Floodplain and other areas of the Delta for conversion to any habitat not compatible with agriculture is inconsistent with the core strategy to "Maintain Delta agriculture as a primary land use, a food source, a key economic sector, and a way of life."

Comments on Policies and Recommendations

- We concur that conflicts with local land use must be avoided or reduced when siting water management or flood facilities or restoring habitats (DP P2). The phrase "when feasible" on line 25 is meaningless in this context and should be deleted. One example of a conflict with existing uses is the Cache Slough Complex and expanding the toe of the Yolo Bypass, both of which will adversely impact groundwater and septic systems of landowners on Ryer Island and any resort or other property with waterfront on Steamboat Slough.

- The Problem Statement for "Maintain Delta Agriculture" (page 207) lists threats to Delta agriculture, including changing water quality, but the Plan includes no recommendation regarding safeguarding Delta water quality. This section should reference Policy ER P1, Update Delta Flow Objectives (Chapter 4). In protecting the Delta, the DSC has an obligation to advocate for adequate flows for the Delta itself as it considers the effect of SWRCB flow objectives on the achievement of the coequal goals. ROR007-9

- For Sustain a Vital Delta Economy, please clarify what entity or entities should support the ports of Stockton and West Sacramento (DP R18).

- Under Issues for Future Evaluation and Coordination, please clarify what entity or entities should compensate for losses to the Delta economy from habitat restoration, water conveyance, or revised levee investment priorities (page 211, lines 11-15). Compensation would NOT be adequately addressed by, for example, branding and marketing the Delta or encouraging agritourism.

CHAPTER 6 – IMPROVE WATER QUALITY TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT WATER QUALITY

SBX7 1, the Sacramento-San Joaquin Delta Reform Act of 2009, set state policy to "improve water quality to protect human health and the environment," a goal declared to be "inherent in the coequal goals for management of the Delta." (Water Code § 85020(e).) The Act further identified the foundation of state water management policy as the "longstanding constitutional principle of reasonable use and the public trust doctrine," mandates "particularly important and

applicable to the Delta." (Water Code § 85023.) To advance implementation of its goals and mandates, the Act states that the Delta Plan "shall" include specific measures to meet the "needs for reasonable and beneficial use of water" and "improv[e] water quality," with required "performance measurements that will enable the Council to track progress." (Water Code § 85302(d).) The Act further requires that the Delta Plan "shall…[d]escribe the methods by which the council shall measure progress toward achieving the coequal goals" using these performance measurements and other means. (Water Code § 85308(d).)

Once again, we incorporate by reference all prior submitted comments by EWC on earlier iterations of draft Delta Plans. These comments found, as we again do now, that the current draft Delta Plan continues to fail to meet the Act's legal mandates and the needs of the Delta.

In prior comments, EWC provided analysis and evidence to demonstrate the necessity for swift, decisive action to address water quality and flow issues in the Delta, described the limitations of the then-draft Delta Plans to meet the mandates of the Act, and offered clear alternative actions that would meet Delta challenges. Once again, the Delta Plan fails to ensure implementation of existing water quality laws, take action to evolve the law where needed, or provide assurances that future covered actions will be required to meet necessary flow requirements, water quality constraints, public trust values, or reasonable use mandates.

The additions and changes to the water quality recommendations, commented on previously, fail to rise to the level of meaningful action to advance healthy waterways as mandated by the Act. For example, WQ R1 merely restates existing state and federal water quality law, which already requires protection of beneficial uses. WQ R2 simply corrects an oversight in requiring covered actions to identify significant impacts to water quality, which is essential to meeting the Act's mandate to improve water quality. WQ R3 requires nothing, stating only that the Water Board "should" evaluate and "if appropriate, propose" additional water quality protections where discharges could adversely impact beneficial uses. This entirely voluntary recommendation fails to even apply to the whole Delta, most of which is *already* impaired by pollutant discharges that adversely impact beneficial uses. Rather, WQ R3 applies only to "priority" habitat restoration areas (again, not even all restoration areas), raising the question of how the Delta Plan views the state's responsibility to address discharges that impair now the beneficial uses in the Delta as a whole. ROR007-9

The continued refusal to include policies in the Delta Plan to address water quality concerns further evidences the Plan's emasculation of the Act's mandate to actually *improve* water quality, rather than continue the status quo. Despite the serious and broadly recognized impacts that deteriorating water quality poses to the viability of the Bay-Delta, Chapter 6 calls for no new, meaningful actions to address this threat. Rather, Chapter 6 simply reiterates existing efforts and already-planned initiatives that will do little to reverse the ongoing slide. At a minimum, R1, R2, and R3 should all be incorporated into the Delta Plan as regulatory Policies rather than Recommendations.

Further, the Plan is essentially silent on how it will meet the Act's requirement to build programs – including water quality programs – on a foundation of reasonable use of water and protection of the public trust. Consistent with this flawed approach, the Delta Plan fails to meet the Act's

mandates to meaningfully "[d]escribe the methods by which the council shall measure progress toward achieving the coequal goals" or provide necessary "performance measurements that will enable the Council to track progress" towards water quality. The Plan cannot measure the progress of actions to which it has not fully committed and/or that go beyond the status quo of continued degradation.

Specific quantifiable timetables, performance measures, endpoints, and consequences for failure are the necessary drivers of any meaningful plan that realistically expects to improve water quality. For example, monitoring results need to trigger automatic actions prior to violation of standards to prevent irreversible ecosystem damage and degradation of beneficial uses. Given the extensive information on pollution impacts in the Delta, a credible Delta Plan must provide the yardsticks to evaluate progress (including mass loading reductions), end points, and citizen enforcement tools to hold all polluted dischargers to account and provide consequences for failure. The Plan should include such specific accountability measures.

We urge the Council to review EWC's proposed alternative, which addresses such continued failures of the Plan to comply with the Act. EWC proposed alternative includes strict enforcement of water quality laws, adoption of the State Water Board and Fish and Game flow recommendations, shoring up of existing levees, ceasing the unreasonable use of water (including but not limited to irrigation of toxic soils that return pollution to the Delta), and providing water supply solutions that ensure existing supplies are extended to meet necessary demand. This reasonable alternative has not been fully considered in the current Delta Plan or in the Delta Plan DEIR, and must be part of the dialogue both to meet the Act's mandates and to ensure the health of the Delta, and all of us who depend on it. ROR007-9

In reviewing the EWC's already-submitted comments, we call on the Council to incorporate our specific recommendations for enhancing the development, implementation, and enforcement of water laws to protect the well-being of the Delta. These recommendations include, but are not limited to, the following:

- The weak Central Valley Irrigated Lands Regulatory Program has failed, and will continue to fail as currently written, to protect the health of the Bay-Delta Estuary. The inadequacies of the existing Central Valley Irrigated Lands Regulatory Program have been exhaustively documented and referenced in EWC prior comments. The Delta Plan must specifically address these inadequacies in controlling contaminated agricultural runoff, and ensure that the changes outlined in EWC comments are implemented and enforced.
- Chapter 6 briefly references permits issued pursuant to the National Pollutant Discharge Elimination System (NPDES) and "encourages" the timely development and enforcement of the Program, under the unquestioned – and mistaken – assumption that this program is working. We urge the Council to include in the Delta Plan specific oversight strategies that will ensure the Central Valley Regional Board fully complies with NPDES permitting regulations, including anti-degradation requirements and allowance for mass loading and additive and synergistic interactions.
- State and federal anti-degradation requirements are routinely ignored and, consequently, the Central Valley Regional Board has little idea of the total mass loading of pollutants in

a watershed. For example, the Regional Board issued a permit granting Linda County Water Agency all of the remaining assimilative capacity for salt in the Feather River. Subsequently, Yuba City was granted the *same* assimilative capacity in their permit renewal. The California Court of Appeals recently (since the release of the current Draft Plan) found the Central Valley Regional Board's dairy waste discharge program violated anti-degradation requirements, with potential implications for many of the Regional Board's existing water quality programs. (*Asociacion de Gente Unida por el Agua et al. v. Central Valley Regional Water Quality Control Board (CA App. Ct., 3rd Dist., Nov. 6, 2012.)*) We strongly urge the Council to include in the Delta Plan a process for ensuring that the Regional Board fully complies with anti-degradation requirements in its permitting and all other applicable pollutant control activities.

- The Council should further require in the Delta Plan that the Central Valley Regional Board prepare pollutant-specific mass load estimates for the Delta and tributary watersheds, with documented estimates of reductions in mass loadings required to be provided to the Council on a yearly basis, applicable to discharges controlled under both state and federal law. The Plan should specifically require the Regional Board to increase controls in NPDES permits, WDRs, and waivers if meaningful mass loading reductions are not being achieved.
- The Council should do more than simply recommend that the Water Boards conduct special studies of selected emerging contaminants. It should make the funding and implementation of aggressive suite of such studies a condition of approval of covered actions, and should ensure that the State and Regional Water Boards actually implement controls on emerging contaminants as needed to protect the health of the Delta.
- It is not enough to simply measure progress in protecting water quality by the number of programs initiated or TMDLs written. The Plan must include specific measures that the Council will take in the event that relevant state agencies cannot annually demonstrate actual progress in implementation of these programs and associated reductions in contamination. Demonstration must include interim yardsticks with specific quantifiable load reductions. This should apply to all sources of impairing pollutants, including municipal and industrial stormwater/wastewater, and irrigated agriculture return flows. ROR007-9
- Additionally with respect to TMDLs, we strongly recommend that the Plan specifically call on the State and Regional Water Boards to immediately (beginning with the 2012 Clean Water Act Section 303(d) impaired water bodies list) start identifying water bodies that are threatened or impaired due to low flows, rather than just chemical or biological pollution. Healthy flows are essential to ensuring good water quality, and numerous other states already identify waterways impaired by altered flows. Flows must be incorporated into relevant Total Maximum Daily Loads to restore the water bodies to health. (*See* http://www.waterboards.ca.gov/board_info/agendas/2012/aug/linda_sheehan.pdf).
- Finally, waterways must be granted water rights to the instream flows and water quality needed to ensure waterway and system health. The Final Delta Plan and its PEIR should include an analysis and recommendation of this "water rights for waterways" alternative to ensure the Final PEIR's compliance with CEQA, and the Plan's compliance with the Act.

The Delta Plan is characterized as a statewide plan with at least a 50-year horizon. Given its decades-long time-frame and the deep, systemic challenges facing the state in turning around the trend of Delta health, the Delta Plan must take action to address the root causes of these challenges through progressive recommendations that mandate action and accountability. It also must assess all reasonable alternatives that will advance environmental sustainability over this lengthy projected period, including water rights for waterways. The current Delta Plan fails to consider a reasonable range of alternatives in light of either this time frame or the major water challenges before the state. We urge the Council to review the EWC's prior submitted comments and construct a Delta Plan that will lead the state in effective governance of its relationship with the Delta ecosystem throughout the 21st century.

CHAPTER 7 – REDUCE RISKS IN THE DELTA

We find the Final Draft Delta Plan to be less acceptable than previous versions of the Delta Plan when it comes to reducing risks. Because of reduced Delta levee standards, the Revised Project will result in even less levee investment than the Proposed Project of approximately a year ago. The Revised Project does not meet the requirements or intent of Water Code Section 85305(a) to "reduce risks to people, property and state interests in the Delta"… "by promoting"…."strategic levee investments." For example, despite a recommendation from the Delta Protection Commission and a policy from CALFED, the Delta Plan still doesn't include a policy or recommendation for Delta levees to meet the PL 84-99 levee standard.

The description of risks does not include both seismic and ground subsidence threats to the California Aqueduct and Delta-Mendota Canal. For instance, the January 2009 Newsletter of the International Water Resources Association[7] stated the following regarding B.F. Sisk Dam (San Luis Dam): ROR007-9

"The dam and reservoir are located in an area of high potential for severe earthquake forces from identified active faults, primarily the Ortigalita Fault that crosses the reservoir. It is also near two major seismic faults: 45 kilometers (28 miles) from the San Andreas Rift Fault, and kilometers (23 miles) from the Calaveras-Hayward Fault. Reclamation has identified several conditions that require action to reduce risks. Studies and deformation analysis conducted indicated that during a major earthquake, crest settlement greater than freeboard, or cracking associated with embankment deformation, could occur and lead to dam failure. Failure of the dam could inundate hundreds of square kilometers including the town of Santa Nella and numerous farms and houses along the San Joaquin River, including some areas of Stockton."

Geologic Fault Maps by the California Geologic Survey[8] clearly show greater fault risks to San Luis Reservoir/Dam and the California Aqueduct than risks in the Delta.

Catastrophic failure of San Luis Dam would inundate the California Aqueduct, Clifton Court Forebay, the Delta Mendota Canal and other water conveyance facilities. The San Joaquin

[7] "IRWA Update" Newsletter of the International Water Resources Association, January 2009, Volume 22, Issue 1, page 15. http://www.iwra.org/doc/iwraupdatejanuary2009.pdf
[8] http://www.conservation.ca.gov/cgs/cgs_history/Pages/2010_faultmap.aspx

County Dam Emergency Plan[9] inundation timeline for San Luis Dam failure estimates that it will reach Clifton Court Forebay in 50 hours and Brannan and Staten Islands in 100 hours. It describes the area affected as "San Joaquin River Areas, West Stockton and Delta Islands" with an estimated 165,000 people threatened.

A map of the entire San Luis Dam inundation area[10] shows an inundation zone throughout most of the southern and central Delta.

Land subsidence along the Delta Mendota Canal (DMC) is well-documented. The intertie between the DMC and the California Aqueduct was necessary because subsidence from groundwater overdraft reduced the capacity of the DMC. Groundwater overdraft continues rampantly along and near the route of the DMC and California Aqueduct. However, the Delta Plan does not disclose this risk in the "Subsidence" section nor are there any policies or recommendations to regulate the risk of aqueduct failure or reduced capacity from subsidence as a result of ongoing groundwater overdraft.

How can it be that the risk section of the Delta Plan completely omits the risks of San Luis Dam failure and aqueduct subsidence to central and southern California's Delta water supply reliability? We can only conclude that the focus on earthquake risk to Delta levees is part of the scare tactics to promote the Peripheral Tunnels. However, it is not supported by existing scientific information.

We recommend that the Reduce Risk Chapter of the Delta Plan be rewritten to include the relative risks to reliable water supplies from hazards such as San Luis Dam failure and aqueduct subsidence. We also recommend policies and recommendations to reduce those risks such as mandatory groundwater regulation for areas adjacent to important water conveyance facilities such as the DMC and California Aqueduct. ROR007-9

Overall the Reduce Risk chapter of the Delta Plan to be woefully inadequate. This is exemplified by the Plan's omission to evaluate all risks to Delta water supplies, failure to adopt a minimum PL 84-99 levee standard and a reduced emphasis on levee protection for many Delta lands. One can conclude that the Delta Plan is not intended to evaluate and reduce Delta risks, but instead is intended to promote the Peripheral Tunnels project by using unsubstantiated scare tactics about Delta levee failure from earthquakes. The real risks to south of Delta water supplies are not disclosed or addressed in any way whatsoever because they are inconvenient truths that might distract from the push to build the Twin Tunnels.

CHAPTER 8 – FUNDING PRINCIPLES TO SUPPORT THE CO-EQUAL GOALS

This chapter is wholly lacking in any substantial recommendations or policies to determine whether plans for substantial public investments in new Delta conveyance and ecosystem restoration are worth it. As mentioned previously in EWC comments, a Public Trust balancing

[9] Page 21 http://www.sjgov.org/oes/getplan/Dam_Emergency_PLAN.pdf

[10] http://www.cityofripon.org/DisasterManagement/Figures/Ripon%20Inundation%20Fig%208A%20A%20size.pdf

must occur along with an independent cost/benefit analysis and a water availability analysis. It is foolhardy to move ahead with multi-billion dollar investments in new infrastructure without knowing how much water is available pay for the project and whether or not the costs are less than the benefits.

We repeat the EWC recommendation that you promote three critical actions that have been missing from all versions of the Delta Plan and BDCP as follows:

- A Water Availability Analysis for the Central Valley and Trinity River in order to determine the extent of water rights claims from Delta tributary watersheds compared to the actual availability of water from those rivers for export south of the Delta. Recently the California Water Impact Network (C-WIN) presented testimony[11] to the State Water Resources Control Board (SWRCB) showing that the San Joaquin and Sacramento Rivers have water rights claims exceeding actual supplies by a factor of over five. C-WIN also presented information indicating that the Central Valley Project and State Water Project are junior water right contractors with little available water during drought or as a result of reallocation to implement the SWRCB's 2010 Bay-Delta Outflow Decision. The Delta Plan and BDCP must include a Water Availability Analysis in order to be useful planning documents. The Delta Stewardship Council should include such criteria for BDCP as a condition of approval.

- A Cost/Benefit Analysis is a standard way of doing business for any major construction project. CEQA guidelines suggest that it may be accomplished if warranted. If a Cost/Benefit analysis will be prepared for a proposal, NEPA provides guidelines to accomplish it. (See 40 CFR Sec. 1502.23) Given the history of significant cost overruns for major construction projects, a cost/benefit analysis only makes sense. The State of California and the federal government would be negligent to not include a legitimate cost/benefit analysis for BDCP and the Peripheral Tunnels. ROR007-9

- The Public Trust Doctrine is an affirmation of the duty of the state to protect the people's common heritage in streams, lakes, marshlands, and tidelands. The application of the Public Trust Doctrine requires an economic and sociological analysis of the public trust values of competing alternatives, as was directed by the State Water Board in the Mono Lake Case. Its applicability to alternatives for the Delta, where species recovery and ecosystem restoration are being pitted against further water exports, is exactly the kind of situation suited to a Public Trust balancing, which should be required by the Delta Plan. As required by Water Code §85203: "[t]he longstanding constitutional principle of reasonable use and the public trust doctrine shall be the foundation of state water management policy and are particularly important and applicable to the Delta." The Council, therefore, clearly has trustee responsibilities in balancing the public trust, but you have punted on that responsibility to date. Planning and allocation of limited and oversubscribed resources implies analysis and balancing of competing demands. Inexplicably, we

[11] http://www.c-win.org/webfm_send/265

find no effort whatsoever to balance the public trust obligations and resolve competing demands in previous drafts of the Delta Plan. The Delta Stewardship Council must include a Public Trust balancing for both the Delta Plan and BDCP as a condition of approval of BDCP and other projects submitted for the Delta Plan.

In addition to the above deficiencies in the Delta Plan, there is no mention of the concept of "price elasticity" and how it will affect the ability of participating water agencies to pay their share of costs. It is blindly assumed that ratepayers can continue to assimilate increased rates and that water consumption and agency revenues will remain the same. We have seen this not to be the case in many instances where water rates have risen and agency revenues have declined due to decreased consumption. The Montecito Water District is a classic example of price elasticity.[12] Montecito is spending 39% of its budget on State Water Project water, yet is using none of it in 2012-2013 because demand has reduced to the point that SWP water is no longer needed because of price increases. Local sources are meeting all demands. ROR007-9

A cost/benefit and Public Trust analysis for the Delta Plan and BDCP should take into consideration price elasticity in determining whether the project beneficiaries can actually afford the project. Many local water agencies are already experiencing budgetary difficulties due to continual cost increases that result in rising water rates and declines in revenue. The costs of personnel, materials, and energy are continually rising and causing rate increases. It is questionable whether many water agencies can afford the cost of the Peripheral Tunnels project.

Finally, any economic analysis such as cost/benefit and Public Trust analyses must include the subsidies provided to agricultural interests, including but limited to Central Valley Project agricultural service contractors. For instance, the Environmental Working Group has identified significant public subsidies to San Luis Unit CVP contractors in the form of water, crop and energy subsidies.[13] The Bureau of Reclamation also estimated a net loss of $5-15 million/year[14] to provide drainage to the San Luis Unit and recommends that Congress authorize additional subsidies for the San Luis Unit. We are confident that the costs of providing water to south of Delta subsidized agricultural interests would not be worth the benefit and would, in some cases, increase subsidies.

[12] See "Why We Cannot Afford the Peripheral Canal/Tunnel: The Santa Barbara County Experience." California Water Impact Network, July 2012 http://www.c-win.org/webfm_send/248

[13] See reports by the Environmental Working Group on Central Valley agricultural subsidies "Throwing Good Money at Bad Land", "Power Drain" and "Soaking Uncle Sam" at http://ewg.org/featured/10

[14] See National Economic Development Act Analysis of Alternatives, Appendix N from Final Environmental Impact Statement for San Luis Feature Re-Evaluation, Table N-10. http://www.c-win.org/webfm_send/275

EWC SECTION 2 –RECIRCULATED DPEIR COMMENTS

In addition to the comments below, we incorporate by reference the following comments, as they are consistent with these EWC comments, by:

- CSPA, C-WIN, AquAlliance Comments on Recirculated Draft PEIR, dated January 14, 2013
- Friends of the River Comments on Recirculated Draft PEIR, dated January 11 and January 14, 2013
- Previous Delta Plan and Delta Plan DEIR Comments submitted on June 10, 2012 and February 2, 2012

ROR007-10

Due to the importance of Chapter 25 and the importance of the EWC comments for this chapter, we have presented it first, although it is numerically out of sequence with the remaining chapter numbers.

CHAPTER 25 – COMPARISON OF ALTERNATIVES

INTRODUCTION

Like Prince Hamlet's "To Be or Not To Be" choice between two opposite alternatives, the two basic alternatives here, "To Dig or Not To Dig," are also opposites. The Delta Plan, the previous DEIR, the Policies and Recommendations, the RDPEIR, and the Rulemaking Package call for new conveyance. What that means is the construction and operation of two tunnels that would have the capacity to divert 15,000 cubic feet per second (cfs) out of the Sacramento River upstream from the Delta between Freeport and Walnut Grove. The water taken would not flow through the Delta. Instead, the water taken would be transported directly through the tunnels to the South Delta State Water Project (SWP) and Central Valley Project (CVP) pumping plants. That would be done even though all responsible public agencies and organizations have found that exports from the Delta must be ***reduced***, not ***increased***, because of the environmental crisis in the Delta that has resulted from ever increasing diversions and exports of fresh water. That is the "To Dig" alternative which is called the Revised Project by the RDPEIR. The "Not To Dig" alternative is presented by Alternative 2 submitted by the Environmental Water Caucus (EWC). Alternative 2 calls for no new conveyance, with continued use of the conveyance facilities and diversions at the South Delta. That allows freshwater to flow through the Delta, maintaining some balance given ever increasing water pollution from many sources and also salinity intrusion from the Bay. Alternative 2 would serve to help preserve what is left of the fisheries, agricultural uses, commercial uses, and recreational uses in the Delta. Alternative 2 would also reduce exports from the Delta serving to commence the restoration of the Delta whereas by massively increasing the capacity for exports the Revised Project would hasten the accelerating environmental destruction of the Delta. Just as Hamlet's choice of his "To Be" alternative led to tragedy, so too would the choice of the "To Dig" Revised Project alternative lead to tragedy. The Revised Project would likely turn the Delta into a polluted and salty stagnant pond and further accelerate the already rampant decline of numerous fish species.

ROR007-11

Response to comment ROR007-10

Comment noted.

Response to comment ROR007-11

The Final Draft Delta Plan includes recommendation WR R12, which recommends that the BDCP be completed by December 31, 2014, but does not make any recommendations about the content of the BDCP. Final Draft Delta Plan, p. 112; RDEIR, p. 23-2. The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1. As described in Section 23 of the Recirculated Draft Program EIR, if the BDCP is completed and approved by the California Department of Fish and Wildlife, the Delta Stewardship Council must hold at least one public hearing on the BDCP and shall incorporate the BDCP into the Delta Plan if it meets the statutory requirements of the Delta Reform Act, Water Code §§ 85320(d) and 85320(e). The Delta Reform Act potentially gives the Council three distinct but connected roles related to Delta water conveyance: contingent authority to approve proposed conveyance improvements, authority to generally recommend conveyance options in the Delta Plan, and authority to provide comments to other agencies during the BDCP process. Conveyance options are currently being studied in detail by the agencies and interested parties preparing the BDCP and the related EIR/EIS. If a government agency, such as DWR, proposes to implement the BDCP preferred conveyance project, the BDCP preferred conveyance project would be consistent with the Delta Plan regardless of whether the Delta Plan had previously endorsed a different conveyance option. Accordingly, the Council's regulatory authority over conveyance would only take effect if a different conveyance project is proposed as a covered action prior to BDCP's incorporation into the Delta Plan. It is highly unlikely that a non-BDCP conveyance project would be proposed as a covered action to come before the Council prior to BDCP completion. For this reason, the Delta Plan does not include any regulatory policies regarding Delta conveyance. The Delta Plan includes recommendations to DWR should the BDCP process not be completed by December 31, 2014 for the Council to consider approaches to develop and complete the ecosystem and conveyance planning process without BDCP. If the BDCP is not completed and presented to the Council, and if the Council then

decides to amend the Delta Plan to include regulatory policies regarding Delta conveyance, the Council would do so only after analysis of the conveyance options and completion of environmental review. Delta Plan, Appendix G, page G-2.

This epic "To Dig or Not To Dig" choice and the environmental consequences of both alternatives should be the focus of the Draft EIR and RDPEIR. Instead, the silence on this epic choice is deafening. Unlike Hamlet, there is not even a soliloquy to analyze the issues and consequences of this fateful choice. ROR007-11

The Draft EIR and RDPEIR are so deficient, indeed, to the point of being environmental frauds, that Orwellian falsification along the lines of "peace is war, war is peace" is perpetrated. The Delta Plan ("DP" at page 72, all number references are to page numbers unless otherwise indicated) and Regulations (5005(a) admit that the Delta Reform Act has established a new policy in Water Code section 85021 "of ***reducing reliance on the Delta*** in meeting California's future water supply needs." The Council is supposed to be preparing a Plan pursuant to the Delta Reform Act. The RDPEIR actually claims the Revised Project will lead to "reduced reliance on Delta exports." (RDPEIR ES-2). Calling for the creation of massive new capacity to divert more water before it even gets to the Delta is, in the real world outside the water exporters' dream world, ***increasing not reducing reliance on the Delta*** in meeting California's future water supply needs.

Because of the magnitude of the epic choice made by the Delta Plan to increase conveyance as well as the enormous volume of the planning and environmental documents thrust upon the public, for the public to attempt to digest in a 45 day review period these comments are lengthy and pertain to other chapters of the RDEIR as well as Chapter 25's comparison of alternatives. For example, the failure of the EIR preparers to develop an accurate, stable, and finite project description does make it impossible to make an environmentally informed comparison of the alternatives. However, the failure to develop the required accurate project description is also a separate and independent violation of CEQA. The same is true of other issues raised such as the failure to address the environmental impacts of diverting so much water upstream from the Delta. This portion of the comments is lengthy because the "To Dig or Not To Dig" choice is the starting point that will guide all further decisions. Nothing of value has been supplied by the RDPEIR or Draft EIR to aid the decision-makers or the public in understanding ***why*** the Delta Plan process has chosen improved, meaning new, conveyance, and ***what*** and ***how severe*** the environmental effects of creating ***and operating*** that new conveyance will be. ROR007-12

A brief summary of some of the comments to follow include:

- The DSC (including what has been set forth in the Delta Plan, Draft EIR, RDPEIR and Regulations) has failed to provide the accurate, stable, and finite description of the true project in violation of CEQA. ROR007-13
- The DSC has failed to provide an adequate description of the environmental setting of the Delta environmental crisis. ROR007-14
- The DSC has failed to focus the Draft EIR and RDPEIR on the significant and admitted adverse environmental effects of the Revised Project including degradation of water quality in the Delta and adverse impacts on fish species that are already endangered. ROR007-15
- The DSC has failed to provide any real environmental information or analysis pertaining to the critical issues of how and why and to what extent the Revised Project will result in ROR007-16

Response to comment ROR007-12

Please see response to comment ROR007-11 and Master Response 1. As stated in the Revised Draft PEIR at page ES-4, the Project's objectives are: "Furthering achievement of the coequal goals and the eight 'inherent' objectives, in a manner that (1) furthers the statewide policy to reduce reliance on the Delta in meeting the state's future water supply needs through regional self-reliance, (2) is consistent with specific statutory content requirements for the Delta Plan, (3) is implementable in a comprehensive, concurrent, and interrelated fashion, and (4) is accomplished as rapidly as realistically possible without jeopardizing ultimate success." These objectives reflect the priorities and goals that the Legislature set for the Delta Plan and the Delta Stewardship Council in the Delta Reform Act, including the coequal goals (Water Code §85054 and Public Resources Code § 29702(a)), the objectives inherent in the coequal goals (Water Code § 85020), and the policy of the State of California to reduce reliance on the Delta in meeting California's water supply needs through a statewide strategy of investing in improved regional and supplies and regional self-reliance, conservation, and water use efficiency (Water Code § 85021).

Response to comment ROR007-13

Please see responses to comments ROR007-37 to ROR007-43.

Response to comment ROR007-14

Please see responses to comments ROR007-44 to ROR007-47.

Response to comment ROR007-15

Please see responses to comments ROR007-44 to ROR007-47.

Response to comment ROR007-16

Please see responses to comments ROR007-44 to ROR007-47.

the significant adverse environmental consequences for Delta water quality and endangered fish species. ROR007-16

- The DSC has failed to provide a consistent and coherent description of the future demand for new water and the amount of surface water that is potentially available to meet that demand. ROR007-17
- The DSC has failed to analyze the environmental impacts of utilizing the particular sources of long-term water supply for the proposed new diversions. ROR007-18
- The DSC has failed to address the environmental effects resulting from creating new points of diversion, upstream from the Delta, for 15,000 cfs of water. ROR007-19
- The DSC has failed to provide decision-makers and the public with sufficient facts to evaluate the pros and cons of supplying the amount of water that the new conveyance would take. ROR007-20
- The DSC has failed to provide any of the quantification that is necessary to comply with CEQA in analyzing water supply issues. ROR007-21
- The DSC has failed to provide decision-makers and the public with sufficient facts and analysis to make a meaningful comparison between the alternatives. ROR007-22
- The DSC has failed to disclose and analyze the environmental effects, including reducing necessary flushing of the Delta and Bay by optimizing meaning increasing diversions in wet years. ROR007-23
- The DSC has failed to assess the "double whammy" on the Delta by creating massive new diversions upstream coupled with climate change induced 55 inch rise in sea level further exacerbating the salinity intrusion in the Delta. ROR007-24
- The DSC has unlawfully attempted to defer and/or "tier" to future environmental documents and processes that have not been completed such as the BDCP process and the State Water Resources Control Board duties yet to be performed under the public trust doctrine to determine water availability, cost benefit analysis, flows, and standards to protect the Delta. ROR007-25
- By calling for development of new conveyance without assessing the true project, meaning the BDCP Delta Tunnels, The DSC has unlawfully segmented the project which is a *per se* violation of CEQA. ROR007-26
- The DSC has failed to defer calling for new conveyance until adequate CEQA analysis, cost benefit analysis, and public trust doctrine analysis have been performed to attempt to ensure protection of the Delta. ROR007-27
- The DSC has failed to address in the RDPEIR the fact that the recent and only cost benefit analysis of new conveyance to date has demonstrated that costs will would exceed benefits by 2.5 times and that new conveyance therefore makes no economic or financial sense. ROR007-28
- The DSC has failed to address in the RDPEIR the fact that the exporters in control of the BDCP process are attempting to shift all possible direct and indirect costs of mitigating the environmental disaster that would be caused by new conveyance to the taxpayers. ROR007-29

Response to comment ROR007-17

Please see responses to comments ROR007-48 to ROR007-49.

Response to comment ROR007-18

Please see responses to comments ROR007-11 and ROR007-50 to ROR007-53.

Response to comment ROR007-19

Please see responses to comments ROR007-11 and ROR007-50 to ROR007-53.

Response to comment ROR007-20

Please see responses to comments ROR007-11 and ROR007-50 to ROR007-53.

Response to comment ROR007-21

As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. Without specific details of future projects, it is not possible for the Delta Stewardship Council to develop quantitative thresholds of significance, conduct site-specific quantitative analyses, and design site-specific mitigation measures. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR. Please refer to Master Response 2.

Response to comment ROR007-22

Please see responses to comments ROR007-59 to ROR007-60 and Master Response 3.

Response to comment ROR007-23

Please see response to comment ROR007-57.

Response to comment ROR007-24

Please see response to comment ROR007-57.

Response to comment ROR007-25

Please see response to comment ROR007-55.

Response to comment ROR007-26

Please see responses to comments ROR007-11 and ROR007-50 to ROR007-53.

Response to comment ROR007-27

Please see responses to comments ROR007-11 and ROR007-50 to ROR007-53.

Response to comment ROR007-28

Please see responses to comments ROR007-11 and ROR007-56.

Response to comment ROR007-29

Please see responses to comments ROR007-11 and ROR007-56.

- The DSC has failed to address in the RDPEIR the fact that the exporters are trying to impose 75% of the new conveyance project costs that would be paid by exporters on the ratepayers of the Metropolitan Water District of Southern California, even though those ratepayers would only receive 25% of the water resulting from the new conveyance. ROR007-30
- The DSC has called for developing massive new conveyance capacity diverting freshwater upstream from the Delta in violation of the co-coequal goals calling for reduced exports under which you are developing the Delta Plan. ROR007-31
- The DSC has misrepresented Alternative 2 calling for no new conveyance and reduced exports of water from the Delta and, arbitrarily without supporting substantial evidence, reached the desired conclusion that Alternative 2 is "slightly environmentally inferior" to the Revised Project. ROR007-32
- The DSC has failed to develop a reasonable alternative that would not call for new conveyance and that would call for reducing exports from the Delta even if the reductions would be less than the reductions that would take place under Alternative 2. ROR007-33
- The DSC has produced a Draft EIR and RDPEIR so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment have been precluded. ROR007-34
- You must prepare and circulate a new Draft PEIR so that the public and decision-makers are afforded the information and analysis that they must have pursuant to CEQA in order to make a reasoned and meaningful comparison of alternatives. ROR007-35

Each of the above failures as well as other failures discussed below, constitute a violation of CEQA. The concluding words of the California Supreme Court in its landmark CEQA water supply decision in *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412 should be instructive to you in complying with CEQA by withdrawing the Delta Plan, Regulations, Draft EIR and RDPEIR in so far as they call for new conveyance. "The preparation and circulation of an EIR is more than a set of technical hurdles for agencies and developers to overcome. The EIR's function is to ensure that government officials who decide to build or approve a project do so with a full understanding of the environmental consequences and, equally important, that the public is assured those consequences have been taken into account. For the EIR to serve these goals, it must present information in such a manner that the foreseeable impacts of pursuing the project can actually be understood and weighed, and the public must be given an adequate opportunity to comment on that presentation before the decision to go forward is made. On the important issues of long-term water supply and impacts on migratory fish, the County's actions in the present case fell short of these standards." 40 Cal.4th 412, 449-450. ROR007-36

The Delta Plan Draft EIR and RDPEIR have not presented "information in such a manner that the foreseeable impacts of pursuing the project [new conveyance] can actually be understood and weighed." Therefore, you must withdraw the Delta Plan, Regulations, RDPEIR and Draft EIR in so far as they call for new conveyance and embark upon the full disclosure, environmental analysis, and development of a reasonable range of alternatives required by CEQA.

Response to comment ROR007-30

Please see response to comment ROR007-56.

Response to comment ROR007-31

Please see response to comment ROR007-11 and Master Response 1.

Response to comment ROR007-32

Please see response to comment ROR007-59.

Response to comment ROR007-33

The range of alternatives analyzed in the EIR is a reasonable range of alternatives based on thorough consideration of public input and the requirements of CEQA, all as described in Subsections 2.3.1.4 through 2.3.1.6 of the DEIR. An additional alternative, the Revised Project, was analyzed in the RDEIR. Please see response to comment ROR007-59 and Master Response 3.

Response to comment ROR007-34

Please see the responses to the other comments in this letter.

Response to comment ROR007-35

Please see the responses to the other comments in this letter.

Response to comment ROR007-36

Please see response to comment ROR007-11 and Master Response 1.

THE DELTA PLAN, REGULATIONS, DRAFT EIR AND RDPEIR FAIL TO ACCURATELY DESCRIBE THE TRUE PROJECT

It is essential to understand what the project actually is in order to be able to assess alternatives. "[A]n accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 199. "A curtailed, enigmatic or unstable project description draws a red herring across the path of public input." 71 Cal.App.3d at 197-198. "[O]nly through an accurate view of the project may the public and interested parties and public agencies balance the proposed project's benefits against its environmental cost, consider appropriate mitigation measures, assess the advantages of terminating the proposal and properly weigh other alternatives." *City of Santee v. County of San Diego* (1989) 214 Cal.App.3d 1438, 1454. ROR007-37

All that the Draft Plan reveals is that the BDCP process is considering a range of options for conveying water through or around the Delta. (Delta Plan 97). Those options are, first, "Through-Delta Conveyance: Continue to divert water in the southern Delta at existing or modified intakes/diversions for SWP and CVP operations." Second, "Isolated Conveyance: Divert water from the Sacramento River at new intakes/diversions and convey the water to the existing SWP and CVP pumping plants through a pipeline/tunnel." Third, "Dual Conveyance: Combine through-Delta conveyance and isolated conveyance to allow operational flexibility." (DP 97).

The water resources (Section 3) portion of the RDPEIR reveals that the Revised Project would encourage certain types of actions including "Conveyance facilities (pipelines and pumping plants)." (RDPEIR 3-11). The Policies and Recommendations portion of Section 3 of the Draft Plan on water resources in a short, conclusory statement, says that "The timing and pattern of Delta diversions must be shifted so that more water can be exported during wet years, when there is significantly more water available for diversion, and less is taken in dry years, when the water is needed for in-Delta water quality and ecosystem protection. The ability to export larger amounts of water from the Delta during wet years will require improved conveyance to increase operational flexibility as well as more storage both North and South of the Delta so that this water can be captured, stored, and ultimately delivered to meet the water needs of both people and fish. With these improvements, Delta operations and, importantly, Delta export deliveries will become more predictable." (DP 111). The Proposed Regulations restate these policies in nearly identical language. (Regs 2, § 5001 (e) (1) (A) and (C). ROR007-38

The Plan asserts that the Delta ecosystem will be protected by development "to optimize diversions in wet years when more water is available and conflicts with the ecosystem less likely, and limit diversions in dry years when conflicts with the ecosystem are more likely." (DP 72).

The Plan recommends "Complete Bay Delta Conservation Plan", reciting that "The relevant federal, State, and local agencies should complete the Bay Delta Conservation Plan, consistent with the provisions of the Delta Reform Act, and receive required incidental take permits by December 31, 2014." (Draft Plan 112). The Plan claims that "The state's interconnected network of surface and groundwater storage is insufficient in volume, conveyance capacity, and flexibility to achieve the coequal goals. The completion of the BDCP and the implementation of

Response to comment ROR007-37

The Revised Project is the 2012 Final Draft Delta Plan, which is analyzed in the RDPEIR (see, e.g., RDPEIR, p. ES-1). The revised project description is Section 2, Description of Revised Project, of the RDPEIR. The Fifth Staff Draft Delta Plan, which was the "Proposed Project" analyzed in the DPEIR, is now referred to as the Proposed Project Alternative for purposes of clarity, and is analyzed in the RDPEIR as an alternative (see, e.g., RDPEIR Section 25.3). Please see Master Response 1.

Response to comment ROR007-38

Please see response to comment ROR007-11 and Master Response 1.

major new surface and groundwater storage facilities are needed but may take many years to implement." (DP 111-112). ROR007-38

All that the RDPEIR discloses in this regard is that the Revised Project "seeks to improve water supply reliability by encouraging various actions which, if taken, could lead to construction and/or operation of projects that could provide a more reliable water supply." (RDEIR 2-5). The pertinent description is "Surface water projects (water intakes, treatment and conveyance facilities, reservoirs, hydroelectric facilities)." (RDEIR 2-5). Similarly, the Executive Summary of the RDPEIR describes the project in pertinent part as "improved management of Delta water supplies using increased storage and improved Delta conveyance." (RDPEIR ES-2).

The project description is not only inaccurate; it actually descends to the level of hiding the ball by way of intentional omission of material facts. Deputy Director Jerry Meral of the Department of Water Resources described the BDCP project at the June, 2012 public meeting on the BDCP. On July 25, 2012, the Governor announced at his special press conference that he was going to get this $14 billion Delta Tunnels project done. The project would be the dual conveyance option and is actually referred to as the Delta Tunnels. The peripheral canal, rejected in a referendum by 63% to 37% of the voters in California, has risen again. The true conveyance project would consist of two 35 mile-long tunnels taking water from new diversions near Clarksburg on the Sacramento River upstream from the Delta to divert water around the Delta to pumping plants south of the Delta. Each tunnel would be 33 feet in diameter. The tunnels would have the capacity to transport 15,000 cubic feet per second (cfs) of water. That is an enormous quantity in comparison to the Sacramento River, equivalent to the average entire summer water flow of the Sacramento River in that area. Though the BDCP has reduced the number of proposed intakes from 5 to 3, claiming a reduction in capacity to 9000 cfs of water, it would be easy to add two more intakes in the future to achieve the 15,000 cfs capacity of the tunnels. ROR007-39

The RDEIR conceals rather than discloses the Red Flag warnings from federal fishery agencies issued during the first half of 2012 about the proposed BDCP project. Also concealed rather than disclosed is the conclusion by the National Academy of Sciences that the BDCP process had put the cart before the horse by pre-determining that new conveyance should be constructed and operated without first determining whether that was the best alternative. ROR007-40

The RDPEIR also evades discussion of the BDCP project by simply incorporating by reference sections in earlier volumes of the Draft EIR as opposed to disclosing that key information in the RDPEIR. (RDPEIR 23-1, ¶ ¶ 23.2, 23.3). Consequently, it is necessary at this time to discuss Section 23 which described the relationship of the Delta Plan to the BDCP in the incorporated document, the Draft Delta Plan Program Environmental Impact Report ("Draft EIR").

According to the Council, as required by the Delta Reform Act (Water Code § 85320 et seq.) the BDCP if completed, and approved by DFG, ***must*** be included in the Delta Plan. (Draft EIR 23-1). Moreover, according to the RDPEIR "This EIR ***assumes*** that the Delta Plan will be successful and ***will lead to other agencies taking the encouraged actions***." (RDEIR ES-2) (emphasis added). In other words, the BDCP is not just some speculative contingency. According to the Council, inclusion of the BDCP in the Delta Plan upon completion and approval, ***is mandatory***. The Draft EIR declares that "It is anticipated that the BDCP will include ROR007-41

Response to comment ROR007-39

Please see the response to comment ROR007-11 and Master Response 1.

Response to comment ROR007-40

Please see the response to comment ROR007-11 and Master Response 1.

Response to comment ROR007-41

Please see the response to comment ROR007-11 and Master Response 1.

actions to. . . modify SWP and CVP Delta water conveyance facilities and operations in the Delta. . . ." (Draft EIR 23-2).

The Draft EIR describes the Delta conveyance concepts as construction of "New intakes/diversions constructed along the Sacramento River between Freeport and Walnut Grove with an isolated conveyance to the existing South Delta SWP and CVP pumping plants." (Draft EIR 23-18). The project would also include "a new intermediate forebay with a pumping plant would be constructed in the northern Delta to provide temporary storage prior to continued conveyance to the new forebay near Clifton Court Forebay." (Draft EIR 23-19). The conveyance concepts considered capacities up to 15,000 cfs per second. (Draft EIR 23-20). Further description is given in the Draft EIR as "15,000 cfs Five 3000-cfs intakes/diversions from Freeport to Courtland; all intakes/diversions upstream of Sutter and Steamboat Sloughs". (Draft EIR 23-22). In other words, the project would grab the freshwater far enough upstream to keep it from flowing into the Delta through the sloughs, as well as through the Sacramento River. ROR007-41

The RDPEIR preparers are hiding the ball as opposed to making environmental full disclosure by simply incorporating by reference back to the Draft EIR. At the BDCP public meeting in June 2012, as set forth above, the DWR Deputy Director stated that the BDCP is going forward, and that the project will be the Delta Tunnels with a capacity of 15,000 cfs (though initially only three intakes of 9000 cfs would be constructed). The preparers of the RDPEIR have attempted to evade their responsibilities to set forth an accurate, stable, and finite description of the actual project and assess the environmental impacts of the true project, by not addressing the fact that both the Governor and the head of the BDCP process have announced what the project will be, and then addressing that project.

The preparers of the EIR also seek to minimize the dominating status of the BDCP by referring to it as a "cumulative project". (Draft EIR 23-28). The BDCP is ***the*** project, not a ***cumulative*** project.

The Executive Summary of the RDPEIR asserts that the Delta Plan "is a suite of regulatory policies that would have the force of law and nonbinding recommendations, all aimed at achieving the coequal goals. The policies and recommendations do not approve or mandate the construction of any specific physical projects. Instead, they work to encourage other public agencies to take certain actions or they provide standards with which other agencies' actions must be consistent." (RDEIR ES-2). Under "reliable water supply" the Executive Summary asserts that "The Revised Project would improve management of California's water resources through increased reliance on local and regional water supplies, reduced reliance on Delta exports, and improve management of Delta water supplies using increased storage and improved Delta conveyance." (RDEIR ES-2). This is mere conclusory argument by the EIR preparers attempting to have their cake and eat it. They call for new conveyance but do not do the work required by CEQA to justify that decision in an EIR. ROR007-42

Far from reducing "reliance on Delta exports," the true project would create massive new diversion facilities with the capacity to divert enormous quantities of fresh water upstream from the Delta and consequently, ***increase***, rather than ***reduce***, reliance on Delta exports.

Response to comment ROR007-42

Please see response to comment ROR007-11 and Master Response 1.

CEQA requires that "an agency must use its best efforts to find out and disclose all that it reasonably can" about the project being considered and its environmental impacts." *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova*, 40 Cal.4th 412, 428 (2007); 14 Cal. Code Regs. 15144. "CEQA requires full environmental disclosure." *Communities for a Better Environment v. City of Richmond,* 184 Cal.App.4th 70, 88 (2010).

A primary goal of CEQA is "transparency in environmental decision-making." *Save Tara v. City of West Hollywood,* 45 Cal.4th 116, 136 (2008).

A person reviewing the Delta Plan and its EIR is not told that the actual project consists of the enormous new upstream diversion capacity accomplished by the Delta Tunnels capable of taking enormous quantities of freshwater away from the Delta by diverting it in tunnels around the Delta.

"While it might be argued that not building a portion of the project is the ultimate mitigation, it must be borne in mind that the EIR must address the project and assumes the project will be built.'" *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 444. (This decision will be cited throughout in short form as *Vineyard Area Citizens.*) A new Draft EIR must be prepared and recirculated for public review that addresses the BDCP project and assumes that the diversion tunnels with a capacity of 15,000 cfs will be developed and will be operated at capacity. Guideline § 15088.5(a) includes as events requiring an agency to recirculate an EIR changes in the project. After the Draft EIR but before issuance of the RDEIR the landscape has changed as both the Governor and the DWR Deputy Director have announced that the Delta Tunnels are the BDCP project and that they will carry out that project. Consequently, the RDPEIR is not relevant as it does not pertain to or evaluate the true project. ROR007-43

To proceed in a manner required by law, the Council must either unequivocally drop the plan to develop new conveyance at this time, or withdraw the Draft Plan, Regulations, and RDPEIR in order to prepare and issue new documents for public review containing an accurate, stable, and finite description of the true project. The true project is the BDCP Delta Tunnels with enormous diversion capacity.

THE RDPEIR FAILS TO ADDRESS THE ENVIRONMENTAL BASELINE THAT THE DELTA IS ALREADY IN CRISIS BECAUSE OF THE DIVERSIONS AND EXPORTS OF FRESH WATER AND THAT THE CRISIS WILL BE WORSENED BY CLIMATE CHANGE AND WOULD BE WORSENED EVEN MORE BY INCREASING DIVERSIONS UPSTREAM FROM THE DELTA ROR007-44

The Plan concedes that "the long-term impacts of these diversions, on the Delta and its watershed, in combination with many other factors, are causing native fisheries to decline. In recent years the populations of salmon and several other fish species have reached their lowest numbers in recorded history and many of California's salmon runs are now listed as endangered by the State or federal government." (DP 71). The simple fact is that the Delta is in grave danger of being turned into a salty, stagnant pond lethal to fish, and gravely impaired as an agricultural and recreational resource. The Delta requires more freshwater, not less freshwater. Exports must be reduced, not increased. Two recent state agency reports, establish that an increase in Delta outflow is necessary to protect and restore the estuary's aquatic ecosystem. ROR007-45

Response to comment ROR007-43

Please see response to comment ROR007-11 and Master Response 1. The Delta Plan must be reviewed at least once every five years and may be revised as the Council deems appropriate pursuant to Water Code section 85300(c). Hence, the Delta Plan would be amended when the BDCP is ready for incorporation.

Response to comment ROR007-44

Please see response to comment ROR007-45.

Response to comment ROR007-45

The environmental setting (baseline) for the analysis in this EIR consists of the existing conditions at the time of the publication of the Notice of Preparation of this EIR in December 2010, which is the normal CEQA environmental baseline pursuant to CEQA Guidelines section 15125(a). Sections 3 through 21 of the EIR describe the existing environmental and regulatory conditions relevant to the resource under discussion, including declining conditions in the Delta. The Environmental Setting and Regulatory Framework for the DPEIR are unchanged in the RDPEIR. Please see Master Response 1. Water quality impacts are discussed in Section 3 (Water Resources) of the EIR, and impacts on biological resources, such as native fish, are discussed in Section 4 of the EIR.

There are already significant diversions of water from the Sacramento River and its tributaries before the water gets to the Delta. As to the other major river extending to the Delta, most of the water from the San Joaquin is diverted upstream. The Plan indicates that about 60% of inflows into the Delta are already diverted. (DP 87). The true environmental baseline is that the quantities of water already diverted before reaching the Delta are so great, that the Delta is in crisis such that further massive diversions should not be permitted. The Delta is not a clean slate. The water situation-shortage-in the Delta is far worse than it was decades ago.

The Draft EIR in section 23 (incorporated by reference in the RDEIR as explained above) contains some admissions in this regard. "Water resources and fish and wildlife resources throughout the Delta watershed and Delta have been impacted by... water resource projects that modified the flow patterns, changed water quality, removed native vegetation, entrained fish in water supply intakes/diversions, and enhanced conditions in which non-native invasive species and predators thrive. Reliance on water from the Delta watershed and Delta has been increasing over the past 40 years as municipalities and agricultural areas have grown and the groundwater basins that these users had previously relied upon have become depleted. These factors, and many others, individually and in combination, contributed to the decline of fish and wildlife resources in California over the past 150 years. (Draft EIR 23-6).

There is more. "Following implementation of the CVPIA and CALFED programs in 2000, several Delta aquatic organisms listed as endangered or threatened under the ESA, CESA, or both continue to decline, including Delta smelt and certain salmonids. In response to declining populations of threatened and endangered aquatic species, the USFWS and NMFS issued several biological opinions to modify operations of the SWP and CVP facilities, which resulted in reductions in export flows. . . The DWR studies also described potential adverse effects to levee integrity, water quality, and water supplies that would be caused by up to 55 inches of sea level rise, which could occur by 2100." (Draft EIR 23-6). COR007-45

The California legislature in acting to require a Delta Plan has declared that "The Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis and existing Delta policies are not sustainable. Water Code § 85001(a). Policies enacted by the Legislature include "Restore the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem." Water Code § 85020.

Populations of Sacramento River and Delta native pelagic and salmonid fisheries and associated food webs are collapsing. This is not a surprise given that the estuary has been already deprived of half of its freshwater flow. The collapse of the fisheries is well-documented. After a long evidentiary hearing in 1978, the Board determined that "full mitigation of project impacts on all fishery species now would require the virtual shutting down of the project export pumps." (SWRCB 1978, D- 1485, p. 13). After another extensive evidentiary hearing in 1988, the Board stated "a safe level of exports is not known." (SWRCB 1988, Draft 1988 Water Quality Control Plan for Salinity, 7.3.2.5, pp. 7-32). By 1991, adult fall-run Sacramento River salmon escapement had been halved from its numbers in the late 1960s; spring-run Sacramento River salmon abundance was about 0.5% of historic runs; the San Joaquin River fall-run salmon escapement dropped from 70,000 in 1985 to 430 in 1991; adult striped bass declined from about

3 million in the early 1960s to about 590,000 in 1990; abundance of shrimp and rotifers declined between 67% and 90% in the 1970s and 1980s; white catfish populations declined severely since the mid-1970s and overall fish abundance in the Suisun Marsh has been reduced by 90% since 1980. (SWRCB, 1992, Draft Water Right Decision 16 30, p. 29).

The fisheries collapse has accelerated over the past decade. The Department of Fish and Game's (DFG) Fall Mid-water Trawl indices for 2009 revealed that young striped bass, Delta smelt, split tail and threadfin shad are at record historical lows and that longfin smelt and American shad are the second and third lowest levels in history. (DFG 2010, Fall Midwater Trawl, p. 3). ROR007-45

The greatest factors in causing the decline of these fisheries are the huge reductions in Delta inflow and outflow that have already taken place. The SWRCB conducted a hearing and then issued a final Report on August 3, 2010. (SWRCB 2010, Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem, August 3, 2010). The Report found that "the combined effects of water exports and upstream diversions reduced average annual net outflow from the Delta from unimpaired conditions by 33% and 48% during the 1948-1968 and 1986-2005 periods, respectively and that Sacramento River inflows over the last 18 to 22 years have been about 50% on average between April through June compared to unimpaired conditions. (Report, 3.3.2, p. 28). The Report determined that "recent Delta flows are insufficient to support native Delta fishes for today's habitats." The Report's criteria for flows include, "75% of unimpaired Delta outflow from January through June and 75% of unimpaired Sacramento River inflow from November through June." (Report, 1.2, p. 28).

Given the previous comments regarding many of these critical issues and changes, and the ignoring or downplaying in the Delta Plan and the RDPEIR of the extent of the crisis in the Delta, it appears that the Council has been engaged in a classic case of sweeping problems under the rug rather than performing the environmental full disclosure required by CEQA.

For the Delta Plan to meet legislatively mandated goals, it is necessary that the Plan meet existing water quality laws including those pertaining to salt, selenium, temperature, flow, and contaminants harmful to public health and ecosystem health. EWC in five prior submissions and comments to previous drafts provided comments and evidence regarding the importance of meeting water quality standards, flow requirements, and temperature standards for the health of the ecosystem. The Plan as it presently exists fails to enforce existing water quality laws, and fails to ensure that any future covered actions will be required to meet flow requirements, water quality constraints, and protect public trust values. The Delta is in crisis. The Plan and RDPEIR by omission and weakness are in denial. ROR007-46

<u>Salinity Intrusion is Bad Now and will Worsen with Climate Change and New Massive Upstream Diversions</u>

Recent research demonstrates that as bad as the straits the Delta is in now in terms of more salinity and pollution, and less freshwater, things are going to get a lot worse in the future. The Plan concedes that one of the problems water exports are causing is that the Delta experiences salinity intrusion. "A portion of the water flowing into the Delta is specifically allocated to Delta outflow to help repel salinity intrusion from the San Francisco Bay and to maintain low salinity ROR007-47

Response to comment ROR007-46

This is a comment on the project, not on the EIR. Impacts on water resources are analyzed in Section 3 and impacts on biological resources are analyzed in Section 4 of the EIR. Please see response to comment ROR007-53 and the responses to the commenter's prior letter, OR97.

Response to comment ROR007-47

The effects of climate change within the study period (through the year 2030) are described in Section 21, Climate Change and Greenhouse Gas Emissions, of the EIR. The cumulative impacts of the proposed Delta Plan, in combination with the impacts of the proposed BDCP, are described in Sections 22 and 23 of the EIR.

water near the western edge of the Delta. This means that water that might otherwise be used for exports must be released from upstream reservoirs to help control salinity (NRC 2012)." (DP 91).

A different portion of the Plan admits that as a result of climate change, "Sea level rise, as much as 55 inches by 2100 (OPC 2011), will result in high salinity levels in the Delta interior, which will impair water quality for agricultural and municipal uses and change habitat for fish species. Maintaining freshwater conditions in the Delta could require unanticipated releases of water from storage, which will reduce available water supplies for fish." (DP 80).

The Plan and RDPEIR fail to connect even the most obvious dots. Given that salinity intrusion is already a huge problem now for the Delta, and will greatly worsen as a result of changing conditions including climate change, adding new massive diversions of freshwater upstream from the Delta to export to regions south of the Delta would have the effect of further exacerbating the already bad and worsening problem of salinity intrusion in the Delta.

The plan to optimize diversions in wet years also is made in the absence of any analysis of the adverse impacts resulting from reducing the flushing of San Francisco Bay by Delta outflows (84), and from reducing the flushing of the Delta by large freshwater flows in wet years. Studies have shown that with increasing upstream diversions, "the historical flushing of the Delta with freshwater is no longer occurring. This lack of flushing can also allow waste from urban and agricultural development upstream of and within the Delta to accumulate. Contaminants and toxics have been identified as factors in the decline of the Delta ecosystem. (Baxter, et al. 2007)." (Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay, Water Resources Department, p. 41, Contra Costa Water District, February 2010, Tech. Mem. WR 10-001). Further reduction of flushing during wet years would further damage the Delta. RDR007-47

The Plan now admits under the heading "Climate Change Complicates Management of California's water" that "Since 1906, California has seen 'dry or critically dry' years one-third of the time. This trend is increasing (California Data Exchange Center 2011)." (DP 80). "Warmer temperatures throughout the state will cause higher evaporation rates, particularly during the hot summer and early fall months, contributing to reduced stream flows, drier soils, reduced groundwater infiltration, higher losses of water from surface reservoirs, increased urban and agricultural demand for irrigation water, and more water needed for ecosystem protection (California Natural Resources Agency 2008)." (DP 80).

Recent studies sponsored by the California Climate Change Center, released in support of the 2012 and 2009 California Climate Change Assessments demonstrate that there will be a significant increase in dry and critically dry years by the latter half of this century, with a corresponding decrease in wet and above normal years. Given the reality of what is actually happening with respect to climate change, the stated objective of developing massive, costly Tunnels "to optimize diversions in wet years when more water is available" (DP 72) makes no sense. There are not going to be very many wet years in the future. Moreover, as shown above, climate change will also result in a significant rise in the sea level, worsening the already serious salinity intrusion in the Delta. Climate change plus increasing diversions constitutes at least a

double whammy establishing the falsity of claiming that creating massive new diversions upstream from the Delta would somehow help the Delta. As the climate warms up and dries out worsening environmental conditions, the Delta is going to need every last drop of remaining freshwater that it can get. ROR007-47

In any event, the Delta Plan, Draft EIR, and RDEIR must be withdrawn, and the Council must prepare an adequate EIR dealing with the reality of the Delta already not getting enough freshwater while facing a surge of more salinity from the Bay due to rising sea levels plus loss of freshwater due to increasing diversions.

THERE IS NO LAWFUL BASIS UNDER CEQA OR THE PUBLIC TRUST DOCTRINE TO ADOPT IMPROVING – MEANING NEW EXPANDED – CONVEYANCE AT THIS TIME GIVEN THE ABSENCE OF INFORMATION AND ANALYISIS REQUIRED BY CEQA AND THE PUBLIC TRUST DOCTRINE

Absence of Environmental Information and Analysis

Again, CEQA requires that a public agency "must use its best efforts to find out and disclose all that it reasonably can" about the project being considered and its environmental impacts. Here, virtually no efforts have been undertaken to find out and disclose anything at all about the new conveyance and its impacts. The Council has failed to define the project as the BDCP 35 mile-long Delta Tunnels with the capacity to take 15,000 cfs of freshwater away from the Delta, before it would even reach the Delta, and evaluate the environmental consequences of doing so. And this would be done to the Delta even though the Delta is already in crisis as shown above. ROR007-48

The Plan itself contains its own admissions that a useful and valid Plan cannot be prepared at this time. As the Plan says in a heading, "informed decision making requires information." (DP 105). Yet the Plan concedes that "California does not have a clear understanding of its water demands, the amount of water available to meet those demands, how water is being managed, and how that management can be improved to achieve the coequal goals." (DP 112-113). Further, "One of the greatest challenges to California water management is a lack of consistent, comprehensive, and accurate estimates of actual water use by the type of use (agricultural, urban, and environmental) and by hydrologic region." (DP 105, 112). The Plan lists numerous science and information needs including understanding of the hydrologic systems, patterns of water use, and effects of climate change as being "essential to improving the management of California's water supplies to achieve the coequal goals." (DP 114).

There is more. The Plan concedes that "The amount of water used in California's stream systems is not fully known because water users under pre-1914 and riparian water rights have not been required, until recently, to submit annual reports accounting for their diversions." (DP 83). After mentioning that "the SWRCB has the authority to determine when a river or stream has been 'over-appropriated'" the Plan goes on to state that "Understanding and reconciling the human demands for water to the supply available, while providing enough water to ensure desired and legally protected environmental and water quality goals, is a difficult process. This process is nonetheless essential to achievement of the coequal goals." (DP 83). ROR007-49

Response to comment ROR007-48

Please see the response to comment ROR007-11 and Master Response 1.

Response to comment ROR007-49

This is a comment on the project, not on the EIR. Over-appropriation of water is a legal matter and not a physical issue.

The Plan admits that the original SWP and CVP contracts assumed greater water export quantities than consistently can be delivered. (DP 91). In fact, a recent workshop conducted by the State Water Board (SWRCB or Board) has shown that legitimate claims to water flowing into the Bay Delta exceed the available water supply by more than five times in most years. In the absence of what the Plan concedes to be essential information, the Plan at this point in time is a classic case of putting the cart before the horse. It is necessary to first conduct detailed analysis and study of how much water is actually available for export from the Delta, a valid cost-benefit analysis to determine what project or projects might make economic sense, and environmental analysis and public trust analysis in order to protect the Delta. "[B]ecause the State Water Project had never been fully constructed there is a huge gap between what is promised and what can be delivered, rendering State Water Project entitlements nothing more than hopes, expectations, water futures or as the parties refer to them, paper water. . .'" *Vineyard Area Citizens,* 40 Cal.4th 412, 430 (internal quotation marks omitted). ROR007-49

<u>The RDPEIR Admits the Revised Project would have Significant Adverse Environmental Impacts</u>

The RDEIR admits that the Revised Project would have significant and unavoidable environmental impacts including violation of water quality standards or substantial degrading of water quality and substantial adverse effects on special status species and on fish or wildlife species habitat and movement. (RDEIR 24-10). In *Vineyard Area Citizens,* the Supreme Court reminded that pursuant to CEQA Guideline § 15065(a)(1) "potential substantial impact on endangered, rare or threatened species is *per se* significant." 40 Cal.4th 412, 449.

The RDEIR concedes that: "Operations of new water supply facilities whether in-stream, such as storage reservoirs, or located near a waterway, such as pipelines, tunnels, canals, pumping plants, water intakes or diversions, may create long-term changes in local mixtures of source waters within water bodies." (RDEIR, water resources, 3-3). The RDEIR concedes that: "Operation of facilities within the rivers and streams upstream of the Delta or in the Delta could result in changes in salinity in the Delta by reducing Delta freshwater inflows during some periods of the year." (RDEIR 3-13). Similar admissions of the obvious are made in the Draft EIR (incorporated by reference in the RDEIR as set forth above). (Draft EIR 23-29, 30). The RDEIR gives no clue as to what those changes and their environmental impacts might be or how severe they might be. There is a difference between filling a water bottle from the river and diverting 15,000 cfs from the river. The RDEIR fails to explain why the Delta Plan Revised Project should "result in or encourage" development of new conveyance, when the need for new conveyance has not been demonstrated and the environmental consequences of providing it have not been identified let alone analyzed. Instead of thinking first, then acting, the Delta Plan and RDEIR constitute acting first, and then maybe, someday, someone will think. That turns CEQA upside down. ROR007-50

<u>The Draft EIR Admits that Necessary Environmental Analysis has Not Been Done</u>

And then there is Draft EIR section 23 (incorporated by reference in the RDPEIR as explained above). The earlier Draft admits that "Conveyance options are currently being studied in detail by the agencies and interested parties preparing the BDCP and the related EIR/EIS. A public draft of the BDCP and the related EIR/EIS is planned for release by mid-2012)." (Draft EIR 23- ROR007-51

Response to comment ROR007-50

Comment noted.

Response to comment ROR007-51

Please see the response to comment ROR007-11 and Master Response 1.

3). In fact, the public draft of the BDCP and the related EIR/EIS has ***not*** been released. The DWR Deputy Director stated at the BDCP public meeting of December 18, 2012 that the public draft of the BDCP and the related EIR/EIS will not be released before the late spring of 2013. The Draft EIR states that a requirement for the BDCP includes that it comply with CEQA, "including a comprehensive review and analysis of all of the following:

> A reasonable range of flow criteria, rates of diversion, and other operational criteria required to satisfy the criteria for approval of an NCCP (as provided in subdivision (a) of section 2820 of the Fish and Game Code), and other operational requirements and flows necessary for recovering the Delta ecosystem and restoring fisheries under a reasonable range of hydrologic conditions, which will identify the remaining water available for export and other beneficial uses.
>
> A reasonable range of Delta conveyance alternatives, including through-Delta, dual conveyance, and isolated conveyance alternatives and including further capacity and design options of a lined canal, an unlined canal, and pipelines.
>
> The potential effects of climate change, possible sea level rise up to 55 inches, and possible changes in total precipitation and runoff patterns on the conveyance alternatives and habitat restoration activities considered in the EIR.
>
> The potential effects on migratory fish and aquatic resources. . . The potential effects of each Delta conveyance alternative on Delta water quality." (Draft EIR 23-3, 4).

ROR007-51

The Draft EIR is correct on those requirements. All of those subjects must be analyzed pursuant to CEQA. That analysis, however, has ***not*** been done. At this time, a reasonable range of flow criteria, rates of diversion, flows necessary for recovering the Delta ecosystem and restoring fisheries, the potential effects of climate change, and the potential effects of each Delta conveyance alternative on Delta water quality are unknown. ***Except***, it ***is known*** that Alternative 2 by calling for ***reducing exports*** and ***not*** developing new conveyance, would be better for Delta water quality and endangered fish species than the Revised Project. (RDEIR in the 25-6, 7). Consequently, the release of the Delta Plan and the RDPEIR is premature. The Delta Plan and RDPEIR, at least in so far as they encourage or recommend new conveyance, water intakes, conveyance facilities, exporting more water in the wet years, optimizing diversions in wet years, improved conveyance and the like, must be withdrawn. The public has no environmental full disclosure before it in order to be able to determine whether encouraging or recommending new conveyance facilities or exporting more water in the wet years, should be done, or even can be done.

<u>CEQA's Disclosure, Informational, and Analytic Requirements have not been met by the Draft EIR and RDPEIR</u>

The Supreme Court held an EIR pertaining to long-term surface water supply issues arising from a development project deficient in *Vineyard Area Citi*zens, 40 Cal.4th 412. The water supply demands created by the development project were small in comparison to the enormous water

ROR007-52

Response to comment ROR007-52

Please see the responses to comments ROR007-11 and ROR007-51, and Master Response 1.

supply demands for the BDCP export project. Moreover, here, the massive new diversions constitute the project itself as opposed to a situation in which some development is going to require a water supply. Here, the new diversions ***are*** the project and the intended object of the project. The Council members must study, and must require the EIR preparers to study, the *Vineyard Area Citizens* decision as well as the earlier decisions it cites because it explains what public agencies must do in order to comply with CEQA when dealing with water supply issues. The decision sets forth many of the CEQA violations in that case which are also rampant throughout the Delta Plan CEQA process. The Supreme Court explained that the EIR "failed to disclose the impacts of providing the necessary supplies in the long term. While the EIR identifies the intended water sources in general terms, it does not clearly and coherently explain, using material properly stated or incorporated in the EIR, how the long-term demand is likely to be met with those sources, the environmental impacts of exploiting those sources, and how those impacts are to be mitigated." *Vineyard Area Citizens,* 40 Cal.4th 412, 421. The "EIR in this case was required to analyze the effects of providing water to this large housing and commercial development, and that in order to do so the EIR had, in some manner, to identify the planned sources of that water." 40 Cal.4th at 428.

An EIR must provide a "consistent and coherent description of the future demand for new water" and "the amount of new surface water that is potentially available" to meet that demand. *Vineyard Area Citizens* 40 Cal.4th 412, 439. An EIR must provide facts allowing the reader "to evaluate the pros and cons of supplying the [needed] amount of water", and must analyze the environmental impacts of utilizing the particular sources of long-term water supply. *Vineyard Area Citizens,* 40 Cal.4th 412, 429 (internal quotation marks omitted). CEQA's informational purposes are not satisfied by an EIR that simply ignores or assumes a solution to the problem of supplying water to a proposed project. "Decision-makers must, under the law, be presented with sufficient facts to 'evaluate the pros and cons of supplying the amount of water that the [project] will need.'" 40 Cal.4th at 430. "The ultimate question under CEQA, moreover, is not whether an EIR establishes a likely source of water, but whether it adequately addresses the reasonably foreseeable ***impacts*** of supplying water to the project." 40 Cal.4th at 434. (*Vineyard Area Citizens* was a "pure" CEQA case. Special Water Code requirements applicable to certain development projects were not at issue in the case. 40 Cal.4th at 433 fn. 8). ROR007-52

The Draft EIR and RDPEIR fail to adequately address the reasonably foreseeable ***impacts*** of supplying water for the new conveyance. In fact, beyond a few vague generalities, the impacts are not addressed at all. That omission violates CEQA.

The Delta Plan and EIR are vague and unquantified. ***Quantification*** is necessary to comply with CEQA in analyzing water supply issues. *Vineyard Area Citizens* 40 Cal.4th 412, 440. "An EIR that neglects to explain the likely sources of water and analyze their impacts, but leaves long-term water supply considerations to later stages of the project, does not serve the purpose of sounding an 'environmental alarm bell' before the project has taken on overwhelming bureaucratic and financial momentum." 40 Cal.4th at 441 (internal quotation marks and citation omitted). That is exactly what is going on here. The intent behind the Delta Plan and BDCP is to build up overwhelming bureaucratic and financial momentum before analyzing the environmental impacts of creating new, massive diversions upstream from the Delta. That violates CEQA. This "segmentation" of the true project and its environmental review violates

CEQA as well. "A fundamental purpose of an EIR is to provide decision-makers with information they can use in deciding *whether* to approve a proposed project, not to inform them of the environmental effects of projects that they have already approved. If postapproval environmental review were allowed, EIR's would likely become nothing more than *post hoc* rationalizations to support the action already taken. We have expressly condemned this use of EIR's." *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 394. ROR007-52

Expert Public Agencies have Tried to Explain the Deficiencies in its CEQA process to the Council

The State Water Resources Control Board attempted to explain some of the many deficiencies in the Council's environmental process in the Board's comment letter of February 2, 2012. "There is, in general, insufficient discussion of the potential environmental impacts of various project elements." (Board letter 3). With respect to the water resources and biological resources chapters "There is minimal discussion of the other [than construction] potential environmental impacts of the project." (Board 4). An issue that needs to be discussed is that "an impact of locating a new Delta conveyance system on the Sacramento River would be to increase the amount of San Joaquin River water that flows through the Delta to Suisun Bay (water that is now re-entrained at the State and Federal pumping facilities and used for agriculture in the San Joaquin Valley). This will increase the loads of selenium exported out of the San Joaquin Basin to Suisun Bay. The section should evaluate whether these impacts are significant." (Board 7).

The Board stated in seemingly clear language as the Problem Statement, that "The State cannot effectively plan, finance, and build new conveyance and storage facilities to improve the reliability of water exports from the Delta watershed when future Bay-Delta Water Quality Control Plan objectives and flow requirements are not known." (Board 20). Moreover, "Development, implementation, and enforcement of new and updated flow requirements for the Delta and high-priority tributaries are key to the achievement of the coequal goals. The State Water Resources Control Board should update the Bay-Delta Water Quality Control Plan objectives and establish flows as follows: By June 2, 2014, adopt and implement updated flow objectives for the Delta. . . By June 2, 2018, develop flow criteria for high-priority tributaries in the Delta watershed that are necessary to achieve the coequal goals." (Board 20-21). Though the Board mentions using existing Water Quality Control Plan objectives to determine consistency with the Delta Plan (Board 21), at this point in time it would violate CEQA to make a decision calling for new conveyance, which entails a massive, costly, public works project with enormous environmental impacts prior to the Board adopting and implementing its updated flow objectives. ROR007-53

The RDEIR admits in the water resources section that "the new flow objectives could result in reduced export of water from the Delta, which would potentially affect water supplies for water users in the areas outside the Delta that use Delta water." (RDEIR 3-12). Again, it would violate CEQA to make a decision calling for new conveyance, when as the Council admits in its RDEIR, new flow objectives could result in reduced export of water from the Delta, which would preclude approval of new conveyance to export massive quantities of freshwater around and away from the Delta by way of the massive Delta Tunnels.

Response to comment ROR007-53

The Delta Plan encourages the SWRCB to complete the updated Bay-Delta Water Quality Control Plan flow objectives. However, only the SWRCB has authority to set those objectives. The Delta Plan and the EIR therefore cannot project what those objectives will be. The Delta Plan and the sources it cites (including especially the SWRCB's 2010 Flow Criteria Report) explains that the flow objectives that best advance the coequal goals will be those that bring about more natural functional flows within and out of the Delta. *See* Delta Plan, pp. 136 to 142, 155, and sources cited therein. The EIR thus assumes, consistent with CEQA, that the SWRCB will adopt updated objectives that will advance such a flow regime. The general assumption of a more natural flow regime is sufficient for the EIR's programmatic approach. The impacts of the flow objectives are analyzed in greater, quantitative detail in the SWRCB's *Public Draft Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary: San Joaquin River Flows and Southern Delta Water Quality* (December 2012). See Master Response 5 for further discussion.

The San Francisco Bay Conservation and Development Commission ("Commission") also tried to explain some basic CEQA responsibilities to the Council in its letter of February 2, 2012. The Commission explained that "The Bay-Delta is a single estuary. . . The Bay should be included in the secondary planning area for the Final EIR, and the impacts of the Delta Plan on the Bay, including the impacts of the proposed water diversion and conveyance projects on fresh water and sediment flow to the Bay, should be analyzed." (Commission letter 2). The commission also explained, quoting from an earlier version of the DEIR that "Changes in flowing rivers that are tributary to the Delta might also influence the flow, currents, and temperature and salinity gradients in the Delta. These changes could reduce the quality and suitability of aquatic habitats for special-status fish species such as Delta smelt." (Commission 3). Also, "large Delta conveyance facilities (including canals, forebays, and intakes-diversions), in addition to the Delta Plan, could potentially increase interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors." (Commission 3). And, "we recommend that the Final EIR include analysis of the freshwater flow needs of the entire estuary, not just the Delta. This includes the need for peak flows that transport sediment and nutrients to the Bay, increase mixing of Bay waters, and create low salinity habitat in the Suisun Marsh, Suisun Bay, San Pablo Bay and the upper part of central San Francisco Bay. The potential impacts on freshwater flows of new water infrastructure for both storage and conveyance should be included in this analysis." (Commission 4). ROR007-53

Preparation and Recirculation of a New Draft EIR are Required

The Delta Plan and RDEIR put the cart before the horse, charging ahead blindly in the dark, to adopt the Delta Plan, RDEIR and implementing regulations ***prior to*** the completion of the BDCP and its EIR, and ***prior to*** public trust doctrine analysis and setting of flow objectives and standards by the SWRCB. The Council must withdraw the documents it has issued, and prepare and issue a new Delta Plan and new Draft EIR so that that the public has an accurate, stable and finite project description, and full disclosure of environmental impacts of the true project to serve as the basis for informed public review in compliance with CEQA. ***This is not a defect that can be cured simply by responding to comments in a Final EIR.*** The public as well as public agencies and the Council itself, have not had the opportunity required by CEQA to review and comment on an accurate, stable, and finite project description and meaningfully evaluate the true project including environmental full disclosure and analysis of the project's environmental impacts, in comparison to reasonable alternatives.

Recirculation of a Draft EIR for public review and comment is required when significant issues are raised that were not adequately addressed in the previously circulated draft EIR. *Vineyard Area Citizens* establishes that "When several agencies and private organizations commenting on the Draft EIR raised concerns regarding such effects[on water flows and habitats in the. . . River and the resulting impacts on salmon migration, County staff responded in the FEIR that due to restrictions on the amount of water to be pumped from the Well Field and the limited hydrological connections between the Cosumnes River and the aquifer from which water would be taken, the impact on Cosumnes River flows would be small and insignificant. The County adopted that conclusion in its findings approving the project. ROR007-54

Response to comment ROR007-54

Please see responses to comments ROR007-4, ROR007-11, and ROR007-53 and Master Response 1.

Plaintiffs contend, and we agree, that the County's finding is not supported by substantial evidence because the FEIR discloses a potentially significant impact of reduced River flows on aquatic species, including migrating salmon. . . Especially given the sensitivity and listed status of the resident salmon species, the County's failure to address loss of Cosumnes River stream flows in the Draft EIR 'deprive the public. . . of meaningful participation' in the CEQA discussion." *Vineyard Area Citizens,* 40 Cal.4th 412, 447-448. The Supreme Court required recirculation for public review.

ROR007-54

In short, it is necessary to obtain information and perform analysis before making policy, and then establish policy before deciding on what if any plumbing to do. The Council is proceeding in the dark. The Plan is not ready for adoption because essential information has not been obtained and essential analysis has not been performed. Likewise, it is not possible at this time to lawfully authorize or approve development of the Delta Tunnels that would divert massive quantities of freshwater around the Delta because of the absence of essential information and analysis. Moreover, it is not possible to lawfully call for new conveyance in the Plan and Regulations because of the absence of an accurate project description. In addition, information has not been provided about the environmental impacts of developing new conveyance which creates the capacity to increase exports. Analysis has not been done to show that exports from the Delta can be ***increased*** – when all the evidence demonstrates that the exports need to be ***reduced.***

<u>The Delta Plan CEQA Process Cannot Tier to Future Environmental Documents that have Not been Completed</u>

The Description of Revised Project, section 2, of the RDEIR contains confusing language seeking to justify failure to perform any meaningful environmental analysis of the proposed project. The statement is that "the Revised Project would not directly result in construction or operation of projects or facilities, and therefore would result in no direct impacts on many resources. The Revised Project could, however, result in or encourage implementation of actions or development of projects, including construction and operations of facilities or infrastructure. The severity and extent of project-specific impacts on the physical environment would depend on the type of action or project being evaluated, its specific location, its size, and a variety of project-and site-specific factors that are undefined at the time of preparation of this program-level study. Project-specific impacts would be addressed in project-specific environmental studies conducted by the lead agency at the time the projects are proposed for implementation." (RDEIR 2-26).

ROR007-55

In *Vineyard Area Citizens* the Supreme Court held "To the extent the FEIR attempted, in effect, to tier from a *future* environmental document, we reject its approach as legally improper under CEQA." 40 Cal.4th 412, 440. The Supreme Court explained that a public agency could defer analysis and approval of a project, then tier the project FEIR from the programmatic analysis performed in a later process. "What the County could not do was avoid full discussion of the likely water sources for the Sunrise Douglas project by referring to a not yet complete comprehensive analysis in the Zone 40 master plan update. CEQA's informational purpose 'is not satisfied by simply stating information will be provided in the future.'" 40 Cal.4th at 441. "[A]nalysis of the project's impacts could not be deferred in this manner [as explained earlier]. An EIR cannot be tiered from another EIR if the latter is not yet complete." 40 Cal.4th 449.

Response to comment ROR007-55

Please see responses to comments ROR007-11 and ROR007-21, and Master Responses 1 and 2. As described in subsection, 1.4, Overview of the Delta Plan Environmental Impact Report, of the Draft Program EIR, the Delta Plan Program EIR is a program-level EIR due to the broad, program level of the Delta Plan. Future environmental documents would be completed by other agencies when they propose to implement projects that are subject to consistency reviews by the Council, or projects which are encouraged or otherwise influenced by the Delta Plan. Hence, this program EIR is not intended to provide project-level clearance for any specific project.

"Tiering does not excuse the lead agency from adequately analyzing reasonably foreseeable significant environmental effects of the project and does not justify deferring such analysis to a later tier EIR or negative declaration." Guideline § 15152(b). "All phases of a project must be considered when evaluating its impact on the environment: planning, acquisition, development, and operation." Guideline § 15126.

A sufficient EIR, and also a sufficient draft EIR, considering such issues as water supplies, water availability, and addressing the environmental impacts of diverting massive quantities of water around and away from the Delta must be prepared and circulated for public review before a public agency enacts a Plan and Regulations calling for, encouraging, and recommending such new conveyance.

The Council has failed to proceed in a manner required by law. "The fundamental purpose of an EIR is to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment." *Vineyard Area Citizens*, 40 Cal.4th 412, 428 (internal quotation marks deleted). Thus an EIR must adequately identify and analyze the significant environmental effects of the proposed project. CEQA Guidelines § 15126.2 (a). "In assessing the impact of a proposed project on the environment, the lead agency normally examines the changes in existing environmental conditions in the affected area that would occur if the proposed activity is implemented." *San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645, 659-660 (internal quotation marks deleted). "Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects." CEQA Guidelines § 15126.2(a). "An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible . . . . The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure." CEQA Guidelines § 15151. SOR007-55

The CEQA Guidelines define a "significant effect on the environment" as a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." Guidelines § 15382. The Sacramento-San Joaquin Delta is a natural resource of statewide, national, and international significance, containing irreplaceable resources, and it is the policy of the state to recognize, preserve, and protect those resources of the Delta for the use and enjoyment of current and future generations. Public Resources Code § 29701. Reducing flows of freshwater through the Delta resulting in increases of salinity and pollution degrading water quality and further endangering already endangered fish species, are obvious potential impacts requiring complete environmental analysis under CEQA. Pursuant to CEQA, projects deemed by law to be of statewide, regional, or area wide significance include projects "which would be located in and would substantially impact the following areas of critical environmental sensitivity" including specifically the Sacramento-San Joaquin Delta. Guideline § 15206(b)(4)(E).

That the RDPEIR is a "program EIR" does not furnish the Council with a cover to produce environmental documents that do "not provide decision-makers, and the public, with the information about the project required by CEQA." *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892, 916. Indeed, the CEQA Guidelines' list of advantages in preparing a program EIR include a "more exhaustive" examination of the facts and alternatives, "full consideration" of cumulative impacts, and allowance for analysis of "broad policy alternatives and program wide mitigation measures" at a time when the lead agency has the best opportunity to address them properly. Guidelines § 15168 (b). The most profound decision to be made regarding the Delta with far-reaching environmental consequences will be "To Dig or Not To Dig"; whether or not to develop new conveyance designed and intended to divert enormous quantities of freshwater upstream from the Delta for the benefit of exporters south of the Delta, causing enormous reduction of freshwater flowing through the Delta. That will be a fateful decision. The people of California passed a referendum in 1982 by a vote of 63% to 37% overturning the legislation authorizing the peripheral canal. There is enormous controversy over "new conveyance" around the Delta. An accurate description of the project and a thorough environmental analysis is necessary before the Council adopts a Plan and policy calling for new conveyance. ROR007-55

The RDEIR does not fit the Plan's adoption of policies calling for development of new conveyance. There is no identification of, let alone analysis of, the environmental impacts of new conveyance. Admitting the obvious that diversions and tunnels "may create long-term changes in local mixtures of source waters within water bodies" is not the adequacy, completeness, and good faith effort at full disclosure required by CEQA.

Failure to Perform Cost Benefit Analysis and Public Trust Doctrine Analysis

The reason the state has so far failed to perform cost benefit analysis or conduct public trust balancing with respect to the Delta Tunnels project is that the special water interests are in control of the process. As set forth in the Draft EIR, the BDCP is being developed through a collaboration of water exporters including DWR, the Kern County Water Agency, Westlands Water District, and the Metropolitan Water District of Southern California. "These entities, collectively known as the 'Potentially Regulated Entities,' are preparing the BDCP." (Draft EIR 23-5). The exporters believe that a candid, honest process would result in the Delta Tunnels not being developed. Two thirds of the water taken away from the Delta would go to mega farming interests including those in Westlands Water District and the Kern County Water Agency which already get subsidized water to grow unsustainable crops on drainage-impaired land. They are growing cotton, almonds and other permanent water-intensive crops on arid-desert land. In addition, "these project rights are junior in priority to the rights held by water users in the Delta and within the Delta watershed." (DP 82). In contrast to those water interests, some urban, residential, commercial, and industrial users are making some strides in terms of water conservation, water recycling, use of water from local and other sources, and use of other mechanisms to reduce reliance on the Delta as well as to save the costs of exporting water from the Delta. ROR007-56

Up to this point, the state, in the BDCP process has only conducted cost-benefit analysis in terms of whether benefits to the exporters would exceed cost to the exporters. There has been no true state-wide cost-benefit analysis, or cost-benefit analysis considering impacts on the Delta and

Response to comment ROR007-56

Please see responses to comments ROR007-4 and ROR007-11 and Master Response 1. CEQA does not require a cost-benefit analysis. Economic impacts are not effects on the environment under CEQA, and are not analyzed in the EIR (CEQA Guidelines §§ 15064(e) and 15131).

Delta watershed interests and users because the exporters controlling the process believe that the costs of the project would exceed any benefits.

The RDEIR fails to disclose, let alone discuss, the findings of the cost-benefit study by the Eberhardt School of Business, University of the Pacific (July 12, 2012) that the costs of the Delta Tunnels would be 2.5 times higher than the benefits, so that the project does not make economic or financial sense. That is essential information that the public should have in weighing the pros and cons of which alternative should be selected. That development took place after the Draft EIR and prior to issuance of the RDEIR and needed to be included in the RDPEIR.

The RDPEIR attempts to obscure any information with respect to funding the project. The Revised Project would encourage use of "available funds" and "new funding sources with new statutory authority such as State and federal funds for public benefits not otherwise required for project mitigation required by law for other purposes". (RDEIR 2-24). The public is entitled to factual information in attempting to weigh the pros and cons of the alternatives as to how much of the costs of the project will be borne by the ratepayers of the Metropolitan Water District of Southern California who would obtain 25% of the water, as compared to the large agricultural interests that would obtain 75% of the water. Moreover, the public is entitled to see the details of the attempt by the large agricultural interests to have MWD ratepayers pay 75% of the costs of the project though they would only receive 25% of the water. Likewise, the taxpayers are entitled to see the details of the extent to which the exporters are attempting to impose direct and indirect costs of mitigating the environmental disaster inflicted on the Delta by the project, on the taxpayers. What we have here is an attempt by the exporters to take huge quantities of water away from the Delta while imposing as many of the mitigation costs as they can get away with on the taxpayers. This kind of economic and financial information is essential to allowing meaningful public evaluation of the Revised Project alternative which would be a massive, expensive, public works project. ROR007-56

Likewise, there has been failure to perform analysis as required by law, under the Public Trust Doctrine. The state "has an affirmative duty to take the public trust into account in the planning and allocation of water resources and to protect public trust uses whenever feasible." (DP 82, citing *National Audubon Society v. Superior Court,* 33 Cal.3d 419 (1983). The Plan explains that in the cited case the California Supreme Court "unanimously affirmed that the state's navigable lakes and streams are resources that are held in trust for the public and are to be protected for navigation, commerce, fishing, recreational, ecological, and other public values." (DP 82). Because of the absence of information and analysis as discussed above, including absence of information on how much water is actually available for export, and absence of cost-benefit analysis to determine what alternative might make economic sense, together with the deteriorating water quality, increasing salinity, and declining fish populations in the Delta, the state presently lacks the information necessary to accomplish the required public trust analysis.

Instead of rushing to develop the Delta Tunnels to funnel massive quantities of fresh water around the Delta to the special water interests south of the Delta which are junior appropriators that should be last in line in terms of obtaining water from the Delta, the Council needs to obtain the essential factual information and perform the necessary analysis in order to protect the Delta as required by the Delta Reform Act, Public Trust Doctrine, and CEQA.

THE REVISED PROJECT WILL INDUCE DIVERSIONS OF GREATER QUANTIES OF WATER AND WILL EXACERBATE CONFLICTS BETWEEN THE DELTA AND EXPORTERS

At present, despite existing conflicts, both the Delta and the exporters also have a common interest in minimizing the worsening of salinity intrusion. That is true because the exporters have an interest in having water of not too low quality in the southern Delta, as that is the location for their existing diversions. However, if the Delta Tunnels project is carried out, the exporters will have no interest at all in keeping any kind of lid on salinity in the southern Delta. The exporters' water would be taken out near Clarksburg, miles upstream from the Delta. The reality which must be addressed by the Plan and EIR is that constructing the Delta Tunnels project would create a situation in which extremely wealthy and powerful interests including Westlands Water District and Kern County Water Agency users would have a strong incentive to divert huge quantities of water upstream from the Delta while having no corresponding interest in preventing salinity intrusion as well as other water quality issues from worsening in the Delta and southern Delta. A new Draft EIR must be prepared and recirculated addressing the fact that the only logical reason to construct 35 mile-long tunnels costing billions of dollars with the capacity to divert 15,000 cfs of water away from the Delta is to actually do that. And all of this would take place accompanied by climate change which as stated above, will result in high salinity levels in the Delta due to sea level rise by as much as 55 inches by 2100. Given the already desperate straits that the Delta is in with respect to water quality, salinity intrusion, and declining and endangered fish populations, along with other certainties including the sea level rise resulting from climate change, going forward with the Delta Tunnels would be a prescription for completing the destruction of the Delta environment. ROR007-57

The RDPEIR is woefully deficient in failing to clearly and succinctly set forth basic, undisputed facts, such as that adding massive new diversions upstream from the Delta to export water south of the Delta would lead to greatly worsened saltwater intrusion in the Delta. To be blunt, the state is wittingly or unwittingly aiding and abetting the effort by wealthy and powerful special water interests to be able to take massive quantities of freshwater away from the Delta, upstream, while no longer having any concern about or interest in limiting the worsening salinity intrusion and water quality in the Delta. New conveyance would create both the capacity and the incentive to divert far more water than is presently diverted from the Delta. That basic fact is not dealt with in the Draft EIR and RDEIR. This catalyst effect and growth-inducing impact, in terms of increasing water exports, must be honestly and candidly addressed and dealt with in a new, recirculated Draft PEIR.

THE REVISED PROJECT WOULD BE IN CONFLICT WITH BOTH OF THE "CO-EQUAL GOALS" AS WELL AS THE POLICY OF REDUCING RELIANCE ON THE DELTA

The Delta Reform act establishes "coequal goals" which "means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place." (DP 67, quoting Water Code § 85054). As already shown, the Delta Tunnels with new, ROR007-58

Response to comment ROR007-57

The effects of climate change within the study period (through the year 2030) are described in Section 21, Climate Change and Greenhouse Gas Emissions, of the EIR. As described in subsection 3.4.3.2.1 of the Draft Program EIR, implementation of the Delta ecosystem restoration actions proposed in the Delta Plan, including changes to the SWRCB water quality and flow objectives and criteria and Delta ecosystem restoration, would benefit native species that evolved with the natural flow regime that the objectives would seek to emulate but would result in significant adverse site-specific impacts to water quality due to the potential for sediment disturbance, the introduction of biocides, and changes in salinity. Please see response to comment ROR007-11 and Master Response 1.

Response to comment ROR007-58

Please see the response to comments ROR007-5 and ROR007-11 and Master Response 1.

massive upstream diversions, would further damage to the point of destroying the Delta ecosystem. That is contrary to the goal of protecting and restoring the Delta ecosystem.

The other goal, of providing a more reliable water supply, should be met by gathering the missing information and performing the absent analysis of actual water demands, amount of water available to meet those demands, and improvement of water management as set forth above. Again, the Plan admits that the "original SWP and CVP contracts" "assume greater water export quantities than consistently can be delivered." (DP 91). Excess contractual amounts should be limited in the contracts and in the meantime should be disregarded for planning purposes. There is no rational reason to construct massive new public works projects or exacerbate the salinity and water quality conditions in the Delta by attempting to export unrealistic quantities of water from the Delta. A more reliable water supply would be provided by identifying, and then seeking to provide a water supply that is realistic taking into account what is actually available as well as environmental constraints including the needs of Delta users, fish populations, climate change, and ever worsening salinity and water quality conditions in the Delta. ROR007-58

The state has established through the Delta Reform Act "a new policy for California of reducing reliance on the Delta in meeting California's future water supply needs (Water Code section 85021)." (DP 73). Establishing massive new diversions upstream from the Delta by way of constructing the Delta Tunnels would be contrary to that policy. The Tunnels, a massive public works project costing billions of dollars, would increase reliance on the Delta by taking even more freshwater away from the Delta before the water even gets to the Delta. The concept of the Delta Tunnels is to take water through the Tunnels to those same water interests south of the Delta that are presently taking the water from the southern Delta. At present, at least the water being taken by the southern exporters passes through the Delta and is available for Delta fisheries, and other Delta uses, before it is taken.

These conflicts of the Revised Project with these laws must be addressed in a new, recirculated Draft PEIR.

THE RDPEIR EVADES A GENUINE COMPARISON BETWEEN THE REVISED PROJECT AND ALTERNATIVES AND ARBITRARILY CONCLUDES THE REVISED PROJECT IS ENVIRONMENTALLY SUPERIOR BY MISREPRESENTATIONS AND FAILURE TO TAKE A HARD LOOK AT ALTERNATIVES AND THEIR ENVIRONMENTAL IMPACTS

The preparation and circulation of the Draft EIR and RDPEIR which are so fundamentally and basically inadequate and conclusory in nature have obscured the true project and made meaningful public review and comment on an accurately described project and its environmental impacts impossible. As set forth above, the crisis in the Delta, and absence of environmental information and analysis required by CEQA and the Public Trust Doctrine require you to withdraw the Revised Project in order to proceed in the manner required by law. To call for new conveyance given the crisis in the Delta and the absence of information and analysis is somewhat like the state of the medical profession several hundred years ago. The patient would be weak and declining, so the doctors of the day would prescribe bleeding the patient which unfortunately had the consequence of killing patients who might otherwise have recovered. What you propose ROR007-59

Response to comment ROR007-59

As discussed in Master Response 3 and Section 25 of the Recirculated Draft PEIR, Alternative 2 is not environmental superior to the Revised Project (the Final Draft Delta Plan), because it would bring about more uncertainty regarding water supply and more conversion of agricultural land to non-agricultural uses than the Revised Project. Please see Master Response 3.

by way of the Revised Project would have a similar result by creating the capacity to take more fresh water away from the Delta when all relevant signs demonstrate that exports need to be reduced, not increased, to have any real chance to protect and restore the Delta. The Revised Project would likely be the last nail in the coffin for the Delta. ROR007-59

The RDPEIR Arbitrarily Concludes Without Proceeding in a Manner Required by Law and Without Substantial Evidence that Alternative 2 is "slightly environmentally inferior" to the Revised Project

The Comparison of Alternatives is set forth in Section 25 of the RDEIR. The RDEIR concedes that "an EIR is required to identify the environmentally superior alternative from among the range of reasonable alternatives that are evaluated." (RDEIR 25-16). The RDEIR description of Alternative 2 is that "Development of Alternative 2 was informed by proposals from environmental organizations led by the Environmental Water Caucus. It involves sharply decreased water exports from the Delta and its watershed to areas that receive Delta water (limited to a maximum of 3,000,000 acre-feet/year)." (RDEIR 25-4). Accordingly, the RDEIR concedes with respect to water resources, as it must, that "Overall, Alternative 2 would have less water quality impacts than the revised Project, because it involves fewer facilities and less diversions of water from the Delta and Delta watershed." (RDEIR 25-6).

With respect to biological resources, the RDEIR explains that "Biological resources in the Delta have been in decline for many years. That decline is expected to continue." (RDPEIR 25-7). The RDPEIR concedes, as it must, that "Alternative 2 contributes more to improving conditions for biological resources and arresting ecosystem decline than the Revised Project." (RDPEIR 25-7).

The RDPEIR also concedes that "Alternative 2 would do more than the Revised Project to reduce reliance on Delta water throughout California, including the Delta watershed, by requiring Urban Water Management Plans to include substantial water demand reduction, beyond the current statutory mandate of 20% by 2020." (RDEIR 25-18). In addition, "Alternative 2 would encourage new water flow objectives for the Delta and tributaries that emphasize meeting ecosystem needs ahead of all other beneficial uses of Delta waters; it would also eliminate the water quality impacts associated with agricultural runoff water from Tulare Lake Basin agriculture and areas with drainage constraints in the San Luis Drainage Area. It is thus environmentally superior to the Revised Project with respect to these types of impacts." (RDEIR 25-18; also, Executive Summary, ES-10). ROR007-60

The RDPEIR fails to disclose the findings of the Eberhardt School of Business, University of the Pacific (July 12, 2012) that the costs of the new conveyance would be 2.5 times higher than the benefits and that consequently, the project would make no economic or financial sense. That is a critical fact that The DSC has failed to address in reaching the arbitrary conclusion to adopt the Revised Project. It would surely be essential information for the decision-makers and the public to be made aware of the fact that Alternative 2 is not only environmentally superior to the Revised Project. Alternative 2 is also economically superior.

If any alternative other than 2 is adopted, the Council would have to make the specific findings required by Public Resources Code § 21081 and Guideline §§ 15092, 15093 required when a

Response to comment ROR007-60

Please see responses to comments ROR007-11 and ROR007-59. Please see Master Responses 1 and 3. CEQA does not require a cost-benefit analysis. Economic impacts are not effects on the environment under CEQA, and are not analyzed in the EIR (CEQA Guidelines §§ 15064(e) and 15131).

project is approved that has one or more significant effects on the environment, including eliminating all significant effects on the environment where feasible, and what specific economic, legal, social, technological, or other considerations make infeasible alternatives avoiding the adverse environmental impacts. *See Vineyard Area Citizens,* 40 Cal.4th 412, 434. The Council has the duty to prevent or minimize environmental damage. Guideline § 15021©.

The RDPEIR fails to accurately characterize the EWC's proposed Alternative 2 and instead piles on "poison pills" intended to portray Alternative 2 as "slightly environmentally inferior" to the Revised Project. Thus, the Draft EIR fails to present Alternative 2 for serious consideration. The Environmental Water Caucus' superior alternative of ecosystem protection and water supply reliability should be more accurately reflected in Alternative 2 and then selected as the Preferred Alternative for this EIR. Some specific corrections necessary to the DSC mischaracterization of Alternative 2 are set forth below. Alternative 2 is environmentally superior and meets the legislatively defined objectives and definition of the project, as required by CEQA. This is based on the superior weight of the "less-than-significant" impacts and superior ratings of Alternative 2 in all areas, including but not limited to, Delta restoration, water supply reliability, flood risks, water quality, biological resources, hazardous materials, greenhouse gas emissions, and climate change impacts. Additionally, when economics are considered, these ecological and economic balancing requirements which are met by Alternative 2 would meet the legal requirements of a preferred Revised Project.

But of course, this is an applicant-driven project controlled by the junior appropriators who are exporters and who want to take more water which has the inevitable consequence of leaving less water for the Delta. So, the RDPEIR preparers deliberately looked for ways to avoid reaching the ROR007-60
obvious conclusion that Alternative 2 is the environmentally superior alternative. They did that by claiming that "Alternative 2 is slightly environmentally inferior to the Revised Project primarily because of its impacts on water supply reliability. It would sharply reduce exports from the Delta, potentially creating a supply shortfall beyond the capacity of local and regional projects to meet demand." (RDPEIR 25-17, 18). The Executive Summary adds in addition to water supply reliability, "the substantial loss of agricultural land under Alternative 2." (RDPEIR, ES-10). The RDPEIR explains that as "Alternative 2 likely would lead to more conversion of agricultural land than the Revised Project because it would convert Tulare Lake (currently in agricultural production) to a reservoir, take farmland out of production in the San Luis Drainage Area, and potentially result in less water being available for agricultural uses in the San Joaquin Valley areas, which could in turn cause farmers to take land out of production." (RDEIR 25-9).

With respect to water supply reliability, it was pointed out in detail above, that the Delta Plan itself admits that the exporters' contracts assumed greater water export quantities than consistently can be delivered. (DP 91). All indications are that exports must be reduced to have any chance of preserving and restoring Delta water quality and freshwater balance. As shown above, there has not been any public trust doctrine analysis, or adequate CEQA analysis to determine how much water is actually available and how match water could or should be exported while maintaining and restoring Delta water quality and freshwater balance. Moreover, one of the statutory commands in the Delta Reform Act is "a new policy for California of reducing reliance on the Delta in meeting California's Peter water supply needs." (DP 73). Alternative 2 is the only alternative that does reduce exports and that would reduce reliance on

the Delta. Moreover, Alternative 2 would not develop new conveyance upstream from the Delta. Consequently, freshwater would continue to flow through the Delta and be able to provide environmental, habitat, agricultural, commercial, and other uses within the Delta before being taken and exported. That is an enormous difference between Alternative 2, and the Revised Project which calls for massive new conveyance and diversion of water upstream from the Delta. Beyond that, the RDEIR preparers have failed to produce any definition of "water supply reliability" consistent with the facts of the decline of the Delta, the law requiring public trust doctrine analysis, CEQA analysis, reducing reliance on the Delta for water supply, or common sense. Consequently, the issue of "water supply reliability" has not been demonstrated by analysis meeting the requirements of CEQA or the public trust doctrine sufficient to downgrade Alternative 2 to being "slightly environmentally inferior to the Revised Project." That downgrading is nothing more than conclusory, self-serving argument supporting the wishes of exporters.

The second main reason that Alternative 2 is not rated as a better alternative than either the previously Proposed Project or the Revised Project is due to the large amount of land retirement, including 380,000 acres in the San Luis Unit and 320,000 acres in the Tulare Basin for Tulare Lake Basin Reservoir, as well as potential land fallowing due to the limitation in Delta exports at 3 million acre feet (Section 25.5). However, it is clear that no solution is in place for the 380,000 acres of San Luis Unit drainage impaired lands either financially, technically or otherwise authorized by Congress at necessary funding levels. Ultimately, like the 100,000 acres already retired due to soil salinization, the full 380,000 acres (including the 100,000 acres already fallowed) will go out of production unless they are allowed to reopen the San Luis Drain and dump all of the San Luis Unit's pollution into the San Joaquin River. Continued irrigation of the 380,000 acres (actually 280,000 acres) of drainage impaired lands in the San Luis Unit will result in continued decline of soil productivity and will ultimately cause retirement of the land because it cannot support agriculture. Irrigation of these lands can only continue with huge subsidies and/or discharge of the toxins to the San Joaquin River and Delta. Therefore, continued irrigation of these lands does not meet the Delta Plan Financing Framework's key tenets for cost effectiveness and stressors. Taking into account the fact that Alternative 2's ultimate impact on agriculture by retirement of those 280,000 acres is really no different than Existing Conditions, the No Action Alternative, or the Revised Project, it removes another reason that Alternative 2 cannot be environmentally preferred to the Revised Project.

ROR007-60

The finding related to the negative impact of the loss of farmlands in the Tulare Basin is incorrect (Section 25.5). EWC did not recommend eliminating those lands from production; the recommendation in the Fifth Draft is to study the feasibility of converting the land to a basin reservoir. Therefore, the negative impact finding is premature and will have to wait until such a feasibility analysis is completed.

While EWC concurs with the DSC interpretation that Alternative 2 would eliminate the use of Delta water on drainage-impaired farmlands, we support dealing with drainage problems in the least environmentally damaging manner and the most long-range, cost-effective manner by retiring the drainage-impaired farmland and converting to less environmentally significant uses. Those uses would include, but not be limited to, dry farming or energy production which would also be more cost-effective through the elimination of plants and infrastructure to recycle the drainage water. The U.S. Geological Survey (USGS), in Open File Report No. 2008-1210 states

that "*Land retirement is a key strategy to reduce drainage because it can effectively reduce drainage to zero if all drainage-impaired lands are retired.*" (CEQA Guideline 15126.5, Discussion of Alternatives). Therefore, agricultural drainage treatment plants will not be part of Alternative 2 because the retirement of 380,000 acres of drainage impaired lands will eliminate the need for that type of facility and also the impacts those facilities will have, such as storage, transportation, and disposal of hazardous waste. Therefore, this negative finding is completely erroneous and has not been corrected in the RDEIR.

Some additional specific errors in the DSC characterization of Alternative 2 with necessary corrections are included here:

> EWC Alternative 2 is incorrectly characterized in the Fifth Draft as "Less emphasis than Proposed Project on ecosystem restoration throughout the Delta…" In our comments to the Fifth Draft of the Delta Plan, we indicated the following: "We agree with the Council's reliance on the *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011). We also support most of the Ecosystem Restoration Program features of the CALFED program. The previous finding that Alternative 2 places less emphasis than the Proposed Project on ecosystem restoration throughout the Delta is in error and our recommendation on this subject should indicate that our emphasis on Ecosystem Restoration is the same as or similar to the Proposed and Revised Projects, since they are similar as indicated in the Draft PEIR (Section 25 3.1).

ROR007-60

> The characterization that the EWC Alternative 2 "would do less to arrest the increasing flood risk" (Section 25.4.3) ignores the EWC recommendation to immediately initiate planning to upgrade core levees above the PL84-99 standard, in accordance with the recommendations of the Delta Protection Commission. This action is superior to both the Proposed and the Revised Project. If supported by the Delta Stewardship Council, this action would significantly reduce Delta earthquake, flooding, and sea level rise vulnerabilities, putting Alternative 2 on a superior rating to both the Proposed and the Revised Project (CEQA Guideline 15126.5, Discussion of Alternatives).
> With the exception of reinforcing core levees above the PL 84-99 standards and the installation of upgraded fish screens, Alternative 2 relies mainly on maximizing the use and improvement of existing facilities south of the Delta. Therefore, Alternative 2 can be shown to have far less significant impact on the Delta environment than any of the conveyance-oriented construction alternatives described or anticipated in the Draft PDEIR. Adding further to the beneficial effects of maximizing the use of existing conveyance is the probability that there will be little or no financing available for significant conveyance construction and that there in all probability will be no further water available from the Sacramento River as a result of a changing climate, as pointed out in numerous recent scientific journals.

The Fifth Draft Delta Plan improperly characterizes the EWC Alternative 2 as advocating more Ocean Desalination; the Draft PEIR indirectly indicates the same (Section 25.4.1). In all of our comments to the Delta Plans, beginning with the Scoping Documents, we have made no mention of Ocean Desalination. To be clear: EWC's view of Ocean Desalination is one of skepticism of this as an alternative for water supply because of the significant environmental and wildlife impacts caused by construction, by ocean intakes, by brine outflows, by the high energy usage, and by the high costs of the produced water. We also remain concerned about the significant impact on land use planning where desalinated water is used to induce growth. Lacking a comprehensive statewide policy on Ocean Desalination, it is premature to promote the most costly, energy intensive, and least reliable source of water supply. Before we reach the point of needing Ocean Desalination, we must exhaust the options of serious water conservation, by maximizing water reclamation, and capturing stormwater and urban runoff for water supply. By adding rainwater capture, graywater systems, and desalination for groundwater cleanup, it is possible to reduce per capita water demand to a level obtained by other countries before they even looked at Ocean Desalination. Spain, Israel, and Australia have each reduced per capita demand to 30 to 60 gallons per day per person, while California's statewide average is 174, with some areas of California using more than 300. ROR007-60

We would like to be on record that significantly favorable impacts to water supply reliability, especially for Southern California urban areas, would result with the return of the Kern Water Bank to public control, the return of the Article 18 urban preference, and the elimination of Article 21 surplus water from being sold as a private commodity. No mention of these provisions of the Monterey Amendments is made in this RDEIR.

The EWC Alternative 2 made no recommendation regarding abandonment of South Delta intakes. This error should be corrected.

The EWC Alternative 2 did not recommend expansion of Friant/Millerton reservoir; we made no comment related to Friant/Millerton. This reference still needs to be corrected.

CONCLUSION

"The CEQA process is intended to be a careful examination, fully open to the public, of the environmental consequences of a given project, covering the entire project, from start to finish. This examination is intended to provide the fullest information reasonably available upon which the decision makers and the public they serve can rely in determining whether or not to start the project at all, not merely to decide whether to finish it. The EIR is intended to furnish both the roadmap and the environmental price tag for a project, so that the decision-maker and the public both know, before the journey begins, just where the journey will lead, and how much they-and the environment-will have to give up in order to take that journey.'" *Natural Resources Defense Council, Inc. v. City of Los Angeles* (2002) 103 Cal.App.4th 268, 271. ROR007-61

Response to comment ROR007-61

Please see response to comment ROR007-11.

The first step in determining whether to start the project is whether to call for new conveyance. That would be the start of the journey that we believe would strike the last nail into a coffin for the Delta. The reason we continue to work so hard to try to get you to perform the environmental analysis required by CEQA and the water availability, flow, and other Delta-preserving measures required by the public trust doctrine is that we believe that if this work required by law is actually done, that last nail will not be struck and the Delta can still be saved. ROR007-61

SECTION 1 – INTRODUCTION AND GENERAL COMMENTS

EWC appreciates the opportunity to comment on this Recirculated Draft PEIR for the Delta Plan project. Most of the deficiencies outlined in EWC comments on the February DEIR remain. Many of these deficiencies pervade throughout the RDPEIR and DEIR; thus, we have provided a list of overarching comments that are generally applicable to the entire PDEIR, followed by specific citations to the RDPEIR by chapter. In light of the fact that "[The Revised Project] involves exporting similar amounts of water from the Delta and its watershed to areas that receive Delta water," the concerns that have been consistently raised by EWC and other environmental organizations regarding the inherent flaws in the proposed water deliveries remain unchanged. ROR007-62

THE RDPEIR FAILS TO SATISFY THE REQUIREMENTS OF A PROGRAM EIR

a.) The Delta Plan RDPEIR must provide at least a general factual analysis of the anticipated projects that will occur as a result of the approval of the Delta Plan.

Program EIRs are intended to allow flexible analysis of a broad program or plans and can be useful in providing a broad look at overarching policies and also at looking at potential cumulative impacts of a series of actions. It can also lead to superficial analysis, however, that is never supplemented by specific, site-specific analysis. It also makes tentative significance determinations while simultaneously acknowledging that little information is available on the location and size and general nature of future projects.

A program EIR is an EIR which may be prepared on a series of actions that can be characterized as one large project and are related either: (1) Geographically, (2) A logical parts in the chain of contemplated actions, (3) In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or (4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways. (CEQA Guidelines, § 15168, subd. (a).) The benefits of Program EIRs include providing for an occasion for a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action, ensuring consideration of cumulative impacts that might be slighted in a case-by-case analysis, and avoiding duplicative reconsideration of basic policy considerations, among other things. ROR007-63

While the Delta Plan could logically be interpreted to be a "program" given that is chain of contemplated actions, the latter portion of the Guidelines clarifies that programmatic analysis of

Response to comment ROR007-62

Please see the responses to the commenter's prior letter, OR 97.

Response to comment ROR007-63

Please refer to Master Response 2. A programmatic level of analysis in an EIR is not the same as a "program EIR" as defined in CEQA Guidelines section 15168. See CEQA Guidelines §§ 15146 ("The degree of specificity in an EIR will correspond to the degree of specificity involved in the underlying activity that is described in the EIR") and 15146(b) (an EIR on a planning document should focus on the secondary effects that can be expected to follow from adoption of the plan, and need not be as detailed as an EIR on a specific construction project). As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR.

vague principles as is found in the PDEIR will not further the goals of CEQA. The Program EIR is intended to help reduce duplicative analysis and to help capture the overall picture of the related cumulative impacts. If there are no details available on any of the projects or facilities, however, then such benefits cannot be reaped. Without even a broad understanding of the types of projects that will follow, the PDEIR cannot possibly contain substantial evidence to support its conclusions. (CEQA Guidelines, § 15384.) Using a program EIR does not satisfy CEQA if it is document that "does not provide decision-makers, and the public, with the information about the project required by CEQA." (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892, 916.) ROR007-63

b.) The DEIR and RDPEIR Fails to Explain How This Analysis Shall Be Incorporated in Future Projects.

The Project Description needs to be revised to clearly describe how future projects may rely on the analysis in the RDPEIR. The Vol.1 RDPEIR notes, "Future environmental documents would be completed by other agencies when they propose to implement projects that are subject to consistency reviews by the Council, or projects which are encouraged or otherwise influenced by the Delta Plan. Hence, this program EIR is not intended to provide project-level clearance for any specific project." The RDPEIR at least acknowledges that this analysis should not be understood to provide project-level "clearance", though the term "clearance" is not defined and it does not address how the information in the EIR shall be used.

The Delta Plan RDPEIR is vague enough that it allows for the possibility of future project applicants relying on the purely descriptive analysis contained in the RDPEIR without taking a hard look at the impacts of the projects the Delta Plan encourages. The RDPEIR is intended to serve as a Program EIR and yet fails to specify how this PEIR shall be relied upon in future analysis. These unsupported conclusions can be used in future environmental documents to justify decisions that never had any factual support in the first place.

CEQA Guidelines, section 15168, c(5) states, "A program EIR will be most helpful in dealing with subsequent activities if it deals with the effects of the program as specifically and comprehensively as possible. *With a good and detailed analysis of the program, many subsequent activities could be found to be within the scope of the project described in the program EIR, and no further environmental documents would be required.* (Emphasis added.) ROR007-64

The RDPEIR does not state whether future EIRs should tier from this document, and whether it anticipates that much of the analysis will be incorporated by reference. There is a close relationship between Program EIRs and First-Tier EIRs, and agencies carrying out the policies and recommendations of the Delta Plan should know whether this RDPEIR is a First-Tier document, the analysis in which will be incorporated in future EIRs or negative declarations. A First-Tier document can streamline later environmental review by allowing its relevant conclusions to be assumed in later EIRs. The policies embraced by the Delta Plan have not been given any quantitative analysis, however, and to avoid later consideration of these policies would be to completely bypass a true analysis. The fact that the RDPEIR anticipates future "environmental documents" does not guard against future superficial analysis, as a mere initial study determining that an individual project falls within the scope of the analysis in the Program

Response to comment ROR007-64

As described in subsection, 1.4, Overview of the Delta Plan Environmental Impact Report, of the Draft Program EIR, the Delta Plan Program EIR is a program-level EIR due to the broad, program level of the Delta Plan. Future environmental documents will be completed by the lead agencies for proposed project that are either covered actions or that are encouraged or otherwise influenced by the Delta Plan. This program-level EIR is not intended to provide project-level clearance for any specific project. Please see Master Response 2.

EIR could be construed as an "environmental document," leading to the omission of any meaningful environmental review. (See *Citizens for Responsible Equitable Enviornmental Development v. City of San Diego Redevelopment Agency* (4th Dist. 2005) 134 Cal.App.4th 598.) ROR007-64

The RDPEIR notes that it anticipates that future projects would conduct separate environmental documents, but it is not clear whether the RDPEIR appears to permit an agency to determine that unspecified future projects are "within the scope" of the Delta Plan, thereby sidestepping further environmental review. Given the superficial and at times non-existing analysis in this EIR, such a determination would be grossly inappropriate. The DEIR should be revised to specify that it is not intended to be the sole environmental review for any future projects.

THE RDPEIR MUST ANALYZE REASONABLY FORESEEABLE INDIRECT EFFECTS OF A PROJECT AS WELL AS IRREVERSIBLE COMMITMENT OF RESOURCES.

A project includes the whole of an action that may result in either a direct or reasonably foreseeable indirect physical change in the environment. (CEQA Guidelines, § 15278, subd. (a).) Just because the project does not approve or mandate any specific physical projects does not mean that the RDPEIR need not anticipate the types of impacts that the Delta Plan encourages by adopting these Policies and Recommendations. The Discussion following Section 15152 state that there will be some effects for which mitigation will not be feasible at an early step of approving a particular development project, and the section would allow a Lead Agency to defer mitigation of that kind of effect to a later step . . . *At the same time, this section makes clear that tiering does not excuse the Lead Agency from analyzing reasonably foreseeable significant effects, or justify deferring analysis to a later tier EIR or Negative Declaration.* (Emphasis added.) The Delta Plan must also include an analysis of reasonably foreseeable indirect impacts. While a Program EIR need not analyze impacts that would be better addressed in a site-specific analysis, the RDPEIR fails to identify significant effects of the projects it proposes with any specificity. Moreover, the RDPEIR makes significance determinations on these impacts that for which it has admittedly has little to no information.

The DEIR and RDPEIR fail to explain how the Delta Plan will result in the Irreversible Commitment of Resources. CEQA Guidelines section 15126.2, subd (a) states, "Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects. . . . (c) Significant Irreversible Environmental Changes Which Would be Caused by the Proposed Project Should it be Implemented. Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified." ROR007-65

The RDPEIR makes no attempt at analyzing reasonably foreseeable significant effects, even for projects that have already been formulated and have some degree of analysis that has been completed. (See for example the discussion below on the Shasta Dam raise, the Temperance Flat

Response to comment ROR007-65

Please refer to Master Responses 1 and 2. To the extent known, projects that may be encouraged by the Delta Plan are named in the EIR. In addition, types of projects that may be encouraged by the Delta Plan are identified. The potential environmental effects of these projects, which would be indirect effects of the Delta Plan, are disclosed in the EIR. Both short term impacts (e.g., temporary construction impacts) and long term impacts (permanent impacts and operational impacts) are disclosed. Significant irreversible environmental changes are discussed in Section 24.4 (Other CEQA Considerations) of the EIR. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in DEIR and RDEIR Sections 22 and 23.

Reservoir, and the Sites Reservoir.) The Delta Plan incorporates and encourages the completion of the BDCP, and yet fails to provide a meaningful discussion on how this unprecedented behemoth infrastructure would commit Californians to an unsustainable water delivery system for many generations to come. The irretrievable commitment of upstream resources without any real analysis, and the lack of analysis of the large scale infrastructure (the BDCP) violate Section 15126.2. ROR007-65

THE RDPEIR MITIGATION MEASURES VIOLATE CEQA IN THAT THEY IMPROPERLY DEFER MEANINGFUL ANALYSIS TO A LATER TIME WHILE FAILING TO INCLUDE ANY TYPE OF PERFORMANCE MEASURE.

The Mitigation Measures are general and not tied to specific impacts; therefore, it is impossible to determine whether they are or will be effective. The Revised Project allegedly adds performance measures to assist in implementation of the policies and recommendations in the Plan (RDPEIR p. ES-1) but the RDPEIR is still woefully inadequate in this regard. It is not clear whether some or all of the proposed mitigation must be adopted in order to be considered a "Covered Action" or "Recommended Action." In addition, given the generic discussion of mitigation measures, it is impossible to determine whether they would reduce impacts to a less than significant level. Any predictions made in the RDPEIR are misleading and will misguide future decisions. In many instances, formulation of mitigation measures are deferred to a later time. In many other instances, mitigation measures contain no performance standards. These fatal flaws must be remedied.

CEQA Guidelines 15126.4 states, "Where several measures are available to mitigate an impact, each should be discussed and the basis for selecting a particular measure should be identified. Formulation of mitigation measures should not be deferred until some future time. However, measures may specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way." "Mitigation measures must be fully enforceable through permit conditions, agreements, or other legally-binding instruments. In the case of the adoption of a plan, policy, regulation, or other public project, mitigation measures can be incorporated into the plan, policy, regulation, or project design." The enforceability of all the offered mitigation measures remains unclear. There are only a few mitigation measures that offer anything resembling the required performance standards. ROR007-66

CEQA emphasizes the importance of performance standards at the Program level. "The use of performance standards is particularly appropriate in connection with 'first tier' approvals or other planning decisions that will necessarily be followed by additional, project-level environmental review. On the other hand, where a mitigation measure embodies nothing more than the hope that the agency or applicant with more effort or analysis, can somehow find a solution to a thorny environmental problem, an agency may violate CEQA in concluding that such a measure will render a significant effect less than significant." (Remy, et al., Guide to the California Environmental Quality Act (11th Ed. 2007), p. 552, internal citation omitted.)

The RDPEIR relies on vague mitigation measures and it's not clear whether future project proponents will need to adopt some or all of them. Furthermore, in several instances, the RDPEIR offers as mitigation potential land purchases or water transfer purchases without

Response to comment ROR007-66

Mitigation measures for future projects that are either covered actions or are encouraged by the Delta Plan are identified in Sections 3 through 21 of the EIR. The impacts that would be mitigated by each mitigation measure are identified. See, e.g., RDEIR, p. 7-24 (Mitigation Measure 7-2 mitigates Impacts 7-2a through 7-2e, and p. 3-17 (Mitigation Measure 3-1 mitigates Impacts 3-1a through 3-1e). However, without specific details of future projects, it is not possible to develop quantitative project-specific and site-specific mitigation measures to be implemented by other agencies. Pursuant to Policy G P1, all applicable feasible mitigation measures identified in this EIR must be included in all covered actions, as demonstrated through the certification process, unless the mitigation measure is not applicable, infeasible, or the lead agency for the covered action substitutes mitigation measures that are equally or more effective. Each lead agency's project-specific environmental review must be conducted in compliance with CEQA. The mitigation measures identified in the EIR, as required by CEQA, are not the same as the performance measures that are in the Delta Plan and are part of the project description. Please see Master Response 1 regarding the performance measures in the Delta Plan. The comment on the performance measures in the proposed Delta Plan is a comment on the project, not on the EIR. Please see Master Response 4.

conducting any analysis on the availability of such mitigation. This approach violates CEQA. There is no assurance that such mitigation measures are actually available or will be adequate, rendering this analysis meaningless. (*Kings County Farm Bureau v. City of Hanford* (5th Dist. 1990) 221 Cal.App. 3d 692.) While the Plan is admittedly broad and vague in scope and specific mitigation measures will not always be available as a result, the Plan should include performance standards to ensure that the projects that it encourages will be fully mitigated. ("Even when an agency prepares a program EIR with later EIRs or negative declarations in mind, the authors believe that the agency, to be prudent, should formulate and adopt performance standards or objectives (e.g., "no net loss of wetlands") that can function as "first tier mitigation" and then be translated into site-specific mitigation measures when site-specific CEQA analysis is prepared.") (Remy et al, supra, p. 638.) ROR007-66

Lastly, CEQA requires that lead agencies describe the impacts that will result from the mitigation measures themselves. CEQA Guidelines section 15126.4, subd. (a)(1)(D). If a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed. (*Stevens v. City of Glendale* (1981) 125 Cal.App.3d 986.) This RDPEIR fails to identify the impacts that would arise from mitigation measures, such as purchases of additional water for transfer and land purchases, much less mitigate for those impacts.

THE RDPEIR MAKES UNSUBSTANTIATED CONCLUSIONS REGARDING THE SIGNIFICANCE OF THE IMPACTS WHILE SIMULTANEOUSLY ADMITTING THAT IT HAS LITTLE TO NO INFORMATION ON THESE VERY SAME IMPACTS.

The RDPEIR states, "Environmental Impacts and Benefits of the Proposed Project. "In many regards, therefore, the Delta Plan involves an environmental tradeoff between short-term impacts resulting from construction (in areas including air quality, cultural and paleontological resources, noise, and transportation) and long-term reduction in pre-existing adverse effects related to water reliability, water quality, flood risk, and ecosystem health. This does not mean, however, that projects the Delta Plan encourages would have no long-term adverse environmental impacts. A new desalination plant on the Southern California coast, a new reservoir in the Sierra Nevada foothills, or a new wetland habitat area in the Delta, for example, could have long-term impacts to ocean views, riparian and oak woodland habitat, or Delta agricultural land, respectively." (RDPEIR, p. ES-3.)

EWC appreciates that admission that the projects the Delta Plan encourages will result in long-term environmental impacts, many of which will likely be significant. The DRPEIR fails, however, to describe these types of impacts, much less offer any proposed mitigation. This approach violates CEQA. The RDPEIR should also mention that these projects will also have impacts to fish species that are affected by reservoir operations in the Sierra Nevada foothills. Even if the RDPEIR need not analyze each potential project in detail, it can evaluate reasonably foreseeable impacts given the general type of project and given the type of terrain and habitat in the Sierra Nevada region. There is also no substantiation in the RDPEIR to support the claim that there would be a long-term reduction in pre-existing adverse effects related to water reliability, water quality, flood risk and ecosystem health. ROR007-67

Response to comment ROR007-67

Please see response to comment ROR007-21 and Master Response 2. The thresholds of significance in this EIR are based on Appendix G to the CEQA Guidelines. Both short term impacts (e.g., temporary construction impacts) and long term impacts (permanent impacts and operational impacts) are disclosed. Mitigation measures for the significant environmental effects of the proposed Delta Plan, including the projects and actions that may be encouraged by the Delta Plan, are identified in Sections 3 through 21 of the EIR. Without specific details of future projects, it is not possible to develop site-specific mitigation measures to be implemented or adopted by other agencies. Because the ability to require changes or alterations in future projects encouraged by the Delta Plan may be within the responsibility and jurisdiction of other public agencies, in such cases the Delta Stewardship Council cannot conclude that the mitigation measure will be implemented or that the impact will be reduced to a less-than-significant level (Public Resources Code section 20181(a)(2)). Please see Master Responses 2 and 4.

In several instances, the RDPEIR notes that an impact may be Less Than Significant or Significant, depending on the circumstances of the individual project. It then makes a determination on the impacts significance without any substantial evidence to support such a conclusion. For example, the discussion of Impact 3-3b states, "Because of the availability of alternative water supplies and continued availability of Delta water supplies, there is substantial evidence that this impact would not be significant. This conclusion is based on the inability to identify a reasonably plausible scenario in which a potential significant impact would occur. It is therefore concluded that this impact would likely be less than significant. Future project specific analyses may develop adequate information to arrive at a different conclusion; however, for purposes of this program-level analysis, there is no available information to indicate that another finding is warranted or supported by substantial evidence."

This statement reflects a perversion of the substantial evidence. Just because there is not substantial evidence to support a significance determination does not imply that there is substantial evidence to support a less than significant determination. There is little to no evidence, much less substantial evidence, offered in this RDPEIR. This example is particularly egregious as environmental groups have provided plenty of scenarios demonstrating scenarios in which this impact would be significant. ROR007-67

The RDPEIR concludes in several occasions that certain impacts may be significant and unavoidable. While it does not make a determinative conclusion in this regard, to indicate that such a conclusion may be merited is without any justification given the analysis in this RDPEIR. The "Significant and Unavoidable" conclusion is only reached after an agency has made a determination with respect to the feasibility of mitigation measures and alternatives. Since this RDPEIR does not do any analysis of feasibility of mitigation measures, such a conclusion is premature. CEQA contains a substantive mandate that public agencies not approve projects with significant environmental effects if there are feasible alternatives or mitigation measures that can substantially lessen or avoid those effects. (Pub. Resources Code, § 21002, *Mountain Lion Foundation v. Fish and Game Commission* (1997) 16 Cal.4th 105, 134.) Such conclusions regarding the "unavoidable" nature of impacts misleads the public and skews future analysis by site-specific projects.

THE DEIR HAS INADEQUATE PROJECT OBJECTIVES

CEQA Guidelines section 15124, subdivision (b) requires a statement of objectives sought by the proposed project. "A clearly written statement of objectives will help the lead agency develop a reasonable range of alternatives to evaluate in the EIR and will aid the decision makers in preparing findings or a statement of overriding considerations, if necessary. The statement of objectives should include the underlying purpose of the project.

The RDEIR project objectives (largely unchanged from the former Proposed Project) are invalid. The RDEIR states: ROR007-68

> "Further achievement of the coequal goals and the eight "inherent" objectives, in a manner that: (1) furthers the statewide policy to reduce reliance on the Delta in meeting the State's future water supply needs through regional self-reliance, (2) is

Response to comment ROR007-68

Please response to comment ROR007-12 and see Master Response 1.

consistent with specific statutory content requirements for the Delta Plan (Water Code sections 85302(c) through (e), and 85303-85308), (3) is implementable in a comprehensive, concurrent and interrelated fashion, and (4) is accomplished as rapidly as realistically possible without jeopardizing ultimate success."

The DEIR confuses an objective of a project with the methodology use to carry out an objective. The objectives are largely just descriptions and modifiers of a single objective. These objectives are still far too vague to provide any meaningful way to shape alternatives. This error belies the entire analysis in the EIR and in particular renders the alternatives analysis invalid. The objectives also overlook the statutory mandate that "The coequal goals [] be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place." (Wat. Code, § 85054.) ROR007-68

The faulty description of project objectives mimics the error observed in *Habitat and Watershed Caretakers v. City of Santa Cruz* (2012) 211 Cal.App.4th 429. The Sixth Appellate District found that the City of Santa Cruz's inaccurate description of its project objectives rendered its alternatives analysis and analysis of mitigation measures invalid. The City's primary objective was improper because it stated that the City was required to provide water and sewer services to a section of the University when truly the City was only required to initiate a LAFCO application for an amended Sphere of Influence under a settlement agreement between the parties. This misstatement resulted in a failure to consider potentially feasible alternatives that would have avoided the project's significant water supply impacts, such as a reduced-development or limited-water alternative. The Court pointed out that the stated objectives mistook the underlying purpose of the project with the general nature of the project.

Similarly, the Delta Plan project objectives merely describe the nature of the proposed project, and fail to outline the underlying purposes of the project upon which a reasonable range of alternatives could be developed.

THE RDPEIR CLAIMS TO HAVE A NEW BROADER FOCUS ON UPSTREAM AREAS, AND YET FAILS TO DEFINE THE GEOGRAPHIC SCOPE OF THE ANALYSIS.

One of the distinctions of the Revised Project is that it considers "upstream areas." However, the RDPEIR does not include a revised project description that delineates the geographic scope of these upstream areas. Furthermore, the RDPEIR fails to revise the regulatory setting and environmental setting to include this new area of focus.
CEQA Guidelines 15124 states, "The description of the project shall contain the following information but should not supply extensive detail beyond that needed for evaluation and review of the environmental impact. (a) The precise location and boundaries of the proposed project shall be shown on a detailed map, preferably topographic. The location of the project shall also appear on a regional map. . . . (c) A general description of the project's technical, economic, and environmental characteristics, considering the principal engineering proposals if any and supporting public service facilities." ROR007-69

Response to comment ROR007-69

The EIR study area has not changed from the Draft Programmatic EIR to the Recirculated Draft Programmatic EIR. The study area in the EIR was delineated in the manner described in Section 1 of the Draft Program EIR because these are the areas in which the significant environmental effects of the Delta Plan may occur, which includes a greater geographic area than the area in which the Delta Stewardship Council has jurisdiction over covered actions pursuant to the Delta Reform Act. For example, the impacts of Delta ecosystem restoration projects within the Delta may include impacts associated with the construction and operating footprint of the projects, while the impacts of such projects in the Delta watershed and in areas outside the Delta that use Delta water would primarily relate to changes in water supply. Because Central Valley Project and State Water Project water flows through the Delta, many of the changes to the management or delivery of such water would "occur, in whole or in part, within the boundaries of the Delta," would therefore potentially be a "covered action" under Water Code section 85057.5. The environmental setting (baseline) for the analysis in this EIR consists of the existing conditions at the time of the publication of the Notice of Preparation of this EIR in December 2010, which is the normal CEQA environmental baseline pursuant to CEQA Guidelines section 15125(a). Sections 3 through 21 of the EIR describe the existing environmental and regulatory conditions relevant to the resource under discussion. As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. To the extent known, projects that may be encouraged by the Delta Plan are named in the EIR. In addition, types of projects that may be encouraged by the Delta Plan are identified. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR. Please see Master Responses 1 and 2.

CEQA Guidelines 15130 states, "Lead agencies should define the geographic scope of the area affected by the cumulative effect and provide a reasonable explanation for the geographic limitation used."

The RDPEIR claims to have expanded its scope into upstream areas, but fails to describe these areas or justify the parameters of its scope. Vol. I RDPEIR (Section 1.4.2) included a map of a large area that includes what is likely considered "upstream areas" but did not include actual analysis of most of these areas so it is unclear how the analysis has changed in this RDPEIR. This section states, "The project area to be considered in this RDPEIR is defined by the purposes and uses of the Delta Plan. The project area, shown in Figure 1-1, includes the Delta, the Delta watershed that contributes water to the Delta, and areas outside of the Delta that use Delta water." The DSC erred in failing to revise the Project Description to describe the upstream areas in the impact analysis and explain why certain tributaries to the Delta were excluded.

In failing to provide an adequate description of upstream areas, the RDPEIR also violates CEQA mandates on establishing a baseline. CEQA Guidelines § 15125 subdivisions (c) and (d) state, "Knowledge of the regional setting is critical to the assessment of environmental impacts. Special emphasis should be placed on environmental resources that are rare or unique to that region and would be affected by the project. The EIR must demonstrate that the significant environmental impacts of the proposed project were adequately investigated and discussed and it must permit the significant effects of the project to be considered in the full environmental context. The EIR shall discuss any inconsistencies between the proposed project and applicable general plans and regional plans. Such regional plans include, but are not limited to, . . . habitat conservation plans, natural community conservation plans and regional land use plans . . . ROR007-69

While this RDPEIR states that the Revised Project includes upstream areas, it fails to establish the environmental setting for these areas; thus, its discussion of potential impacts to these areas is essentially speculation. It furthermore does not include a description of the relevant regulatory schemes in these areas and how such regulations would be reconciled with the policies and recommendations in the Delta Plan. This omission violates CEQA. (CEQA Guidelines, § 15125.) The current state of the Delta as well as its tributaries must be established in order to have a legitimate discussion of a project's impacts.
The RDPEIR gives a cursory mention of upstream projects and implies that little is known about these projects. In fact, there is substantial information available on these projects, and such information should have been incorporated in this RDPEIR. Regarding the Los Vaqueros Reservoir Project, the DWR web site states, "The Los Vaqueros Expansion Investigation is taking a two step approach. The CCWD Board certified a Final PEIR and approved an expansion from 100 TAF to 160 TAF on March 31, 2010. CCWD has completed design and is moving forward with construction scheduled to begin in 2011. With additional funding, local, state, and federal partners may choose to continue to study the feasibility of a 275 TAF expansion alternative in the context of other Delta initiatives to improve Delta conveyance and better protect Delta fisheries, including long-term programs being explored in the BDCP."

In addition, DWR and U.S. Bureau of Reclamation are currently preparing a Plan Formulation Report for the Upper San Joaquin River Basin Storage Investigation. Simultaneously, surveys for environmental documentation and permit applications are being performed in the study area.

Surveys for engineering assessments, including drilling and other geotechnical work has been in progress since 2006.
As such, the RDPEIR erred in glossing over these projects and their related impacts. ROR007-69

THE REVISED PROJECT ENCOURAGES PROJECTS AND CONSTRUCTION OF FACILITIES WITHOUT MAKING A DETERMINATION THAT SUCH PROJECTS WOULD MEET THE GOALS OF THE DELTA REFORM ACT.

The Revised Project would encourage projects such as new or expanded reservoirs, groundwater production facilities, groundwater production facilities (wells and pipelines), ocean desalination facilities, and recycled water facilities, and above all the BDCP, among other things. It is improper for the DSC to encourage projects without even a minimal look at the impacts associated with these types of projects. Moreover, several such projects are in the pipeline already and the RDPEIR should not take a "head in the sand" approach by claiming that the nature of these projects is unknown. This is most notably true for the BDCP and the upstream reservoir projects that have already undergone agency analysis. Rather, the RDPEIR should provide at least a general description of these projects and the types of impacts that are anticipated, propose suggested mitigation measures, and indicate how these encouraged projects and their associated projects can be reconciled with the goals of the Delta Reform Act. ROR007-70

Moreover, each impact section states that the Project "does not direct the construction of specific projects and would not directly result in construction or operation of projects or facilities; therefore, it would result in no direct impacts on any resources." Yet WR R12 states that: "The relevant federal, State, and local agencies should complete the Bay Delta Conservation Plan, consistent with the provisions of the Delta Reform Act, and receive required incidental take permits by December 31, 2014." As is fully evident from records available to the Council and the numerous briefings provided to the Council by BDCP proponents, the BDCP is a specific project that proposes that specific diversion facilities and habitat be constructed. The BDCP will have many significant environmental effects and must be considered as a cumulative project.

SECTION 2 – DESCRIPTION OF REVISED PROJECT

CEQA Guidelines 15124, requires *A statement briefly describing the intended uses of the EIR.* (1) This statement shall include, to the extent that the information is known to the Lead Agency, (A) A list of the agencies that are expected to use the EIR in their decision-making, and (B) A list of permits and other approvals required to implement the project. (C) A list of related environmental review and consultation requirements required by federal, state, or local laws, regulations, or policies. To the fullest extent possible, the lead agency should integrate CEQA review with these related environmental review and consultation requirements. (2) If a public agency must make more than one decision on a project, all its decisions subject to CEQA should be listed, preferably in the order in which they will occur. The RDPRIR and DEIR fail to include a comprehensive statement of intended uses of the RDPEIR, leaving it vulnerable to misuse in the future and violating CEQA Guidelines, section 15124. ROR007-71

EWC reiterates its comments made on the February 2012 DEIR in that little substances has been added to this RDPEIR. The RDPEIR does not consider public trust doctrine and fails to

Response to comment ROR007-70

This EIR considers the significant environmental effects of, and identifies mitigation for, all of the different types of projects encouraged by the Delta Plan: water supply reliability projects, Delta ecosystem restoration projects, water quality improvement projects, flood risk reduction projects, and projects to protect and enhance the Delta as an evolving place. The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. Therefore, the BDCP is a cumulative project. Recommendation WR R12 is a recommendation to other agencies and is not a regulatory policy. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1.

Response to comment ROR007-71

Please see the responses to the commenter's prior letter, OR97, and Master Response 2. As explained on DEIR pages ES-9 and 1-13 to 1-14 and on RDEIR pages ES-11 and 1-2, the intended use of this EIR is by the Delta Stewardship Council to adopt the Delta Plan and associated rulemaking by the State Office of Administrative Law. Reservoir projects potentially influenced by the Delta Plan are analyzed in Section 22 of the EIR, cumulative impact assessment. The comment on ER R5 is a comment on the project, not on the EIR.

incorporate the conclusions made by the State Water Resources Control Board regarding adequate inflows and outflow to the Bay Delta. The DRPEIR does not include estimates for jobs lost, when CEQA requires such a description. (CEQA Guidelines, § 15131, *Citizens Association for Sensible Development of Bishop Area v. County of Inyo* (4th Dist. 1985) 172 Cal.App.3d 151, 170, (even if economic effects are not to be considered significant impacts in isolation, the EIR must determine the relationship between economic impacts and potentially significant environmental impacts.) Most importantly, this Project does not meet goal of reducing reliance on the Delta.

Throughout the DEIR and RDPEIR the following statement appears, "At this time, it is not known which agency would implement any such projects, where the facilities would be located, or how the facilities would be operated. Therefore, for the purposes of this Environmental Impact Report (EIR), general types of projects and facilities are considered possible outcomes of implementation of the policies and recommendations." For purposes of a CEQA EIR, and although this is considered a Programmatic EIR, this statement and many more like it throughout the document are too vague and lacking the precision that would allow decision makers to proceed with evaluation, approval, public trust balancing of alternatives, or tiering of future EIR's (CEQA Guideline 15151, Standards of Adequacy for an EIR). This statement also evinces a "head in the sand" approach that is used throughout the analysis. The RDPEIR lists many reservoir projects that would be affected by the Delta Plan, and yet fails to conduct even a superficial analysis of these projects; it adds little value to the discussion to mention projects that are occurring but fail to discuss any of the impacts that are likely to occur in these vicinities. It actually damages informed decision-making when the agency takes it a step further and makes significance determinations on these very impacts. ROR007-71

(Page 2-9), Section 2.1.4, Line 40. If the intent of ER R5 is to reduce populations of Striped Bass in order to reduce predation by introduced fish, we refer you to the ruling by the California Fish and Game Commission which defeated proposed fishing regulations which would have increased the take of Striped Bass in order to accomplish the same goal. Predation by Striped Bass on salmon was shown not to be significant and the long term tradition of having Striped Bass available in the Delta for recreational fishing was deemed more important. The Delta Stewardship Council should be guided by this policy decision of the Fish and Game Commission.

SECTION 3 – WATER RESOURCES

The single most significant and negative policy change in the Final Delta Plan is that the Revised Project WR P1 changes the definition of "Reduced Reliance on the Delta." The prior definition included a policy calling for a reduction of net water used from the Delta watershed. The new definition omits references to water use in the Delta watershed and only applies to water "exported from, transferred through or used in the Delta." The ramification of this change in definition is that it appears that all diversions upstream of the Delta would not be required to comply with the proposed prohibitions on Delta exports, or the legally mandated requirement to reduce reliance on the Delta, because they are not using water exported from, transferred through or used in the Delta. ROR007-72

Response to comment ROR007-72

The comment on WR P1 is a comment on the project, not on the EIR. Please refer to Master Responses 1 and 2. To the extent known, projects that may be encouraged by the Delta Plan are named in the EIR. In addition, types of projects that may be encouraged by the Delta Plan are identified. The potential environmental effects of these projects, which would be indirect effects of the Delta Plan, are disclosed in the EIR. The environmental setting (baseline) for the analysis in this EIR consists of the existing conditions at the time of the publication of the Notice of Preparation of this EIR in December 2010, which is the normal CEQA environmental baseline pursuant to CEQA Guidelines section 15125(a). Sections 3 through 21 of the EIR describe the existing environmental and regulatory conditions relevant to the resource under discussion. Please also see the response to comment ROR007-5.

In spite of repeated requests for more information on upstream projects by DWR and EWC among others, the RDPEIR continues to provide vague and incomplete information on the projects encouraged by the Delta Plan.

The cited projects in progress include: North of Delta Offstream Storage Investigation (Sites Reservoir), Los Vaqueros Reservoir Project - Phase 2, the Upper San Joaquin River Basin Storage Investigation Plan (Temperance Flat Reservoir), and the next update of the Department of Water Resources (DWR) Bulletin 118 *California's Groundwater* (DWR 2003). The DSC has to decide whether it has enough information to evaluate these projects at least on a general level or not. If so, it must provide a description of the types of the impacts that could be anticipated from such projects. For all of these named projects, there is preliminary information available and such information should be summarized here. If DSC does not feel like it has enough information to merit a discussion on the impacts, then it cannot make any conclusions regarding the associated impacts and should not make any related Recommendations or Policies. It cannot have it both ways. However, given that DSC is clearly encouraging these types of projects and these projects have clearly gained shape and momentum, the RDPEIR is remiss in failing to include a comprehensive discussion of these projects and at least a high-level analysis of the likely impacts that would result from their implementation.

The RDPEIR also fails to include a meaningful discussion of the Shasta Lake Water Resources Investigation, but rather only briefly mentions it in the Cumulative Impacts chapter. The Draft Feasibility Report for the Shasta Reservoir Expansion and Dam Raise clearly anticipates BDCP as a related project. ("Other programs and projects currently in the planning phase could influence the [Shasta Lake Water Resources Investigation] in the future. Prominent examples include the Delta Plan and the Bay Delta Conservation Plan (BDCP). These projects and programs have not been included in the evaluation of the alternative plans for the SLWRI because there has not been a specific decision to implement them at this time.") (Draft Feasibility Report, Nov. 2011, ES -1.) Given that over a year has passed, many more details are available on this project and should be included in this RDPEIR as it is so closely connected with the BDCP. — ROR007-72

As noted in our last round of comments, as a matter of environmental policy, many EWC organizations will oppose further surface storage projects that are included in the Proposed Project due to the significant negative environmental impacts that they have on California riverine habitat and due to the lack of any consideration of public trust values that should be associated with the questionable cost evaluations that accompany those projects. This includes but is not limited to: expansion of Shasta Dam, Sites Reservoir, and Temperance Flat Reservoir. The Revised Project (as well as the Proposed Project) supports these projects without any quantitative justification on costs, yield, impacts on the environment, or evaluation of the public trust values involved. (CEQA Guideline 15126.5, Discussion of Alternatives, Guideline 15146, Degree of Specificity).

The Environmental Setting should be revised to reflect the state of drastic overextended entitlements of water coming from the Delta. The DEIR/RDPEIR may not assume the past illegal water deliveries if the very activity that is being approved in the Delta Plan. An agency may not escape its duty by ignoring that duty and then presenting the result as a *fait accompli* incorporated into an environmental baseline. *League to Save Lake Tahoe v. Tahoe Reg'l*

Planning Agency, 739 F. Supp. 2d 1260, 1272 (E.D. Cal. 2010) aff'd in part, vacated in part, remanded, 469 F. App'x 621 (9th Cir. 2012).

ROR007-72

The DEIR and RDPEIR erred in failing to include a comprehensive analysis of the availability of water coming into the Delta. It conclusions on water supply, among other impact areas, are utterly without justification without this basic analysis.

Impact 3-3b: Substantially Change Water Supply Availability to Water Users That Use Delta Water.

The RDPEIR states, "Because of the availability of alternative water supplies and continued availability of Delta water supplies, there is substantial evidence that this impact would not be significant. This conclusion is based on the inability to identify a reasonably plausible scenario in which a potential significant impact would occur. It is therefore concluded that this impact would likely be less than significant. Future project specific analyses may develop adequate information to arrive at a different conclusion; however, for purposes of this program-level analysis, there is no available information to indicate that another finding is warranted or supported by substantial evidence. This conclusion is not supported by substantial evidence because the RDPEIR does not include any quantification of water supplies that would occur from the projects it encourages. There is no evidentiary basis of this conclusion, and this should be omitted in the Final PEIR. All Less Than Significant determinations in this chapter suffer from this flaw. The discussion of "water efficiency and conservation programs" is undefined and unquantified, and DSC cannot provide any assurance that such programs would be implemented.

ROR007-73

Section 3.4.2.1 – Reliable Water Supply

The RDPEIR states, "The Revised Project would apply to areas of the Delta watershed located upstream of the Delta unlike the Proposed Project. In most of this upstream area, groundwater supplies are not substantial, especially in the foothills and mountains that surround the Sacramento and San Joaquin valleys. In these areas, it is anticipated that projects to recycle wastewater and stormwater would predominate over groundwater projects. Thus, impacts related to the construction and operation of reliable water supply projects under the Revised Project would be greater than under the Proposed Project because of the newly-covered upstream area; these increased impacts would largely be the result of new storm water and wastewater recycling projects, while impacts related to groundwater projects would not increase over the Proposed Project." (Page 3-2)

These upstream areas are not delineated and the projects therein are described far too vaguely. There is no substantiation for the conclusion that groundwater projects would be minor compared with wastewater and stormwater. The RDPEIR erred by failing to provide a citation for this conclusion. See Appendix D, Section 1.3.2, "The counties that incorporate groundwater-related ordinances in the areas that might be affected by the Delta Plan are: Shasta, Tehama, Glenn, Colusa, Yolo, Sacramento, San Joaquin, Calaveras, Tuolumne, Madera, Fresno, Kern, Napa, Ventura, San Diego, San Bernardino. Local county ordinances vary by authority or agency and region, but typically involve provisions to limit or prevent groundwater overdraft, regulate

ROR007-74

Response to comment ROR007-73

Please see response to comment ROR007-74.

Response to comment ROR007-74

The Delta Plan encourages, and in certain circumstances would require, water supply agencies to reduce reliance on the Delta water through implementation of local and regional water supply projects, including water use efficiency, water recycling, and groundwater conjunctive use programs to meet water demands. The proposed Delta Plan includes policies (WR P1) and recommendations (WR R9, WR R10, and WR R11) to sustainably use groundwater and to reduce groundwater overdraft situations. As described in Section 2A of the Draft Program EIR and Section 2 of the RDEIR, it is anticipated that under the proposed Delta Plan, water users would develop other local and regional water supplies in accordance with Delta Plan policies and recommendations. The Reliable Water Supply subsections of sections 3 through 21 of the Recirculated Draft PEIR analyze the environmental impacts of developing such supplies. The RDPEIR recognizes that agencies may use different approaches to local and regional water supplies, potentially resulting in different types of impacts. For example, the RDPEIR notes that recycled water projects are more likely than groundwater projects in some Delta watershed areas (see, e.g., RDEIR, p. 11-2). Please see response to comment ROR007-69 and Master Response 5.

transfers, and protect groundwater quality." There should be a full description of the groundwater use, relevant policies and status in each of these counties.

There is no substantiation for the conclusion that impacts would be greater under the Revised Project because of the new storm water and wastewater recycling projects. There should also be an inclusion of impacts associated with reservoir construction and expansion.

The discussion regarding leakage from possible canals that would transfer water requires evidentiary substantiation. Describe and quantify these assertions regarding how leaky canals will help restore groundwater levels.

ROR007-74

Section 3.4.1 – Assessment Methods.

The RDPEIR states, "The precise magnitude and extent of project-specific impacts on the physical environment would depend on the type of action or project, its specific location, its total size, and a variety of project-and site-specific factors that are undefined at the time of preparation of this program-level study. Project-specific impacts would be addressed to project-specific environmental studies conducted by the lead agency at the time the projects are proposed for implementation."

This conclusion is copied and pasted through the DEIR and RDPEIR. This approach violates CEQA. A lead agency need not just look at direct impacts of a project, it must also look at the reasonably foreseeable indirect impacts. This analysis cannot be deferred to an indefinite time because the approval of the Delta Plan will encourage certain projects to move forward and indeed may create an irreversible momentum for the approval of these projects.

This chapter fails to provide descriptions of the McCloud, Pit and Trinity Rivers, all part of the Sacramento River watershed. This oversight should be fixed.

ROR007-75

Section 3.4.3.1.1. Impact 3-1a: Violate Any Water Quality Standards or Waste Discharge Requirements or Substantially Degrade Water Quality.

The RDPEIR states: "Water transfers to facilitate water supply reliability could influence water quality by producing temporary changes in flow that could affect the concentrations of regulated water quality constituents, including water temperature within the Delta watershed tributaries. However, as described in Section 3.4.3.1, Reliable Water Supply, of the Draft PEIR, those impacts would be less than significant following implementation of mitigation measures by the water purchasers to purchase additional transfer water that would be released from upstream reservoirs during drier periods to mitigate water quality impacts."

With respect to water transfers being ameliorated due to releases from upstream reservoirs, the RDPPEIR fails to include a description of the multitude of impacts that will result from this drawdown. Lead agencies must analyze not only the impacts of their proposed projects, but also of their proposed mitigation measures if such measures may have a significant effect on the environment. (CEQA Guidelines, § 15126.4; *Save Our Peninsula Committee v. Monterey County Bd. Of Supervisors* (6th Dist. 2001) 87 Cal.App.4th 99.)

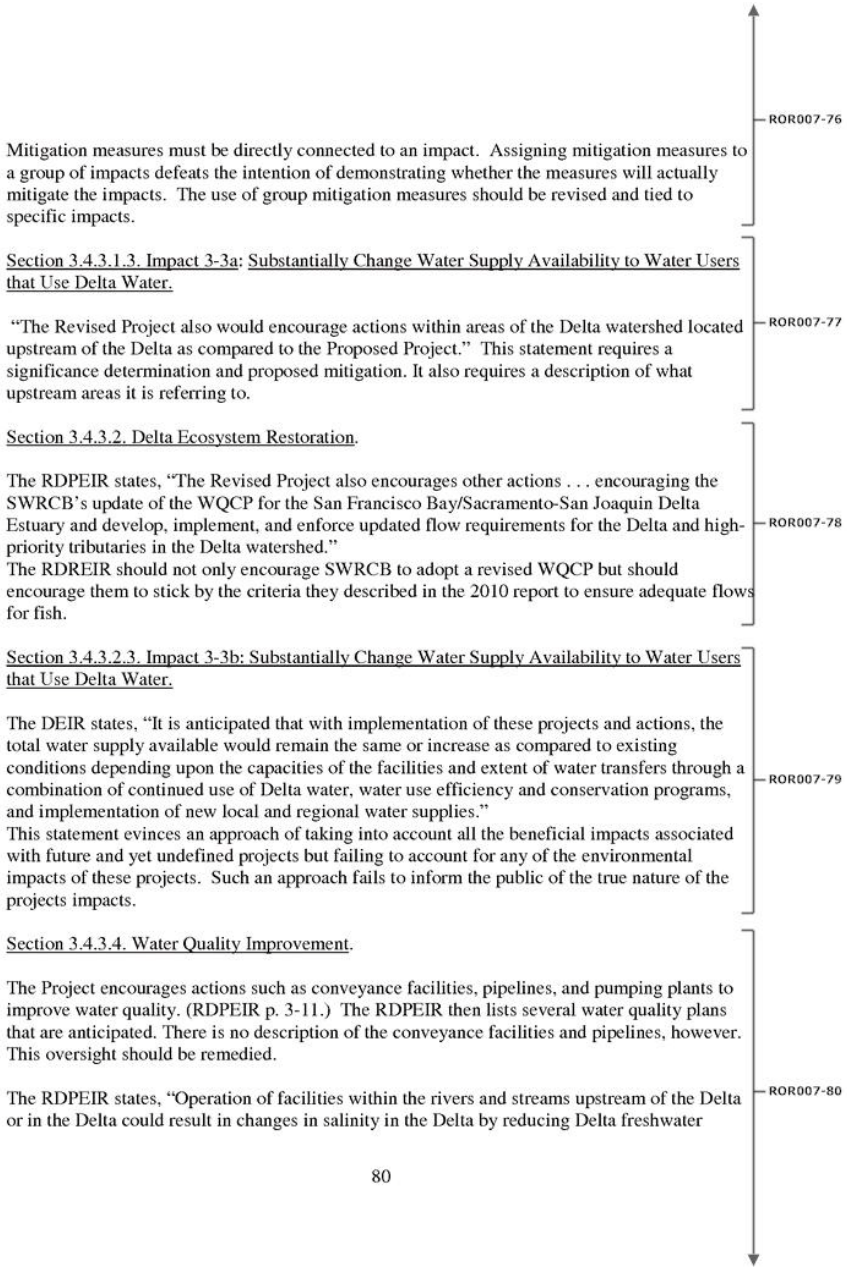
ROR007-76

Response to comment ROR007-75

Please see responses to comments ROR007-69 and ROR007-70. The Trinity River watershed is included in the study area for this EIR because it provides water to the Delta through the CVP operations. The Delta Plan does not directly affect actions that occur in the Trinity River watershed, and no significant adverse impacts would occur due to implementation of the Delta Plan. The Trinity River and its connection to the Sacramento River are discussed on page 3-4 of the DEIR. Figure 3-1 and associated text under Section 3.3.2, Overview of California Water Resources, is intended to provide an overview of the major elements of the statewide water supply infrastructure. Not all tributaries to the major rivers within the system are specifically identified. Please also see Master Response 5.

Response to comment ROR007-76

Please see Master Responses 4 and 5.



Mitigation measures must be directly connected to an impact. Assigning mitigation measures to a group of impacts defeats the intention of demonstrating whether the measures will actually mitigate the impacts. The use of group mitigation measures should be revised and tied to specific impacts.

ROR007-76

Section 3.4.3.1.3. Impact 3-3a: Substantially Change Water Supply Availability to Water Users that Use Delta Water.

"The Revised Project also would encourage actions within areas of the Delta watershed located upstream of the Delta as compared to the Proposed Project." This statement requires a significance determination and proposed mitigation. It also requires a description of what upstream areas it is referring to.

ROR007-77

Section 3.4.3.2. Delta Ecosystem Restoration.

The RDPEIR states, "The Revised Project also encourages other actions . . . encouraging the SWRCB's update of the WQCP for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary and develop, implement, and enforce updated flow requirements for the Delta and high-priority tributaries in the Delta watershed."
The RDREIR should not only encourage SWRCB to adopt a revised WQCP but should encourage them to stick by the criteria they described in the 2010 report to ensure adequate flows for fish.

ROR007-78

Section 3.4.3.2.3. Impact 3-3b: Substantially Change Water Supply Availability to Water Users that Use Delta Water.

The DEIR states, "It is anticipated that with implementation of these projects and actions, the total water supply available would remain the same or increase as compared to existing conditions depending upon the capacities of the facilities and extent of water transfers through a combination of continued use of Delta water, water use efficiency and conservation programs, and implementation of new local and regional water supplies."
This statement evinces an approach of taking into account all the beneficial impacts associated with future and yet undefined projects but failing to account for any of the environmental impacts of these projects. Such an approach fails to inform the public of the true nature of the projects impacts.

ROR007-79

Section 3.4.3.4. Water Quality Improvement.

The Project encourages actions such as conveyance facilities, pipelines, and pumping plants to improve water quality. (RDPEIR p. 3-11.) The RDPEIR then lists several water quality plans that are anticipated. There is no description of the conveyance facilities and pipelines, however. This oversight should be remedied.

The RDPEIR states, "Operation of facilities within the rivers and streams upstream of the Delta or in the Delta could result in changes in salinity in the Delta by reducing Delta freshwater

ROR007-80

80

Response to comment ROR007-77

Please see responses to comments ROR007-66 and ROR007-69. Like the Proposed Project Alternative, this impact would be beneficial. See Section 3.4.3.1.3, DEIR, p. 3-82, and RDEIR, p. 3-5.

Response to comment ROR007-78

Please see response to comment ROR007-53.

Response to comment ROR007-79

Please refer to Master Response 2. As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR.

Response to comment ROR007-80

Please see the response to comment ROR007-69 and Master Response 5.

inflows during some periods of the year." (p. 3-13.) This section should include a section on the impacts of these facilities to the upstream areas, not just the Delta. ROR007-80

Section 3.4.3.4.2: Impact 3-3d- Substantially Change Water Supply Availability to Water Users That Use Delta Water.

The RDPEIR states, "Because of the availability of alternative water supplies and continued availability of Delta water supplies, . . . there is substantial evidence that this impact would not be significant."

This statement and others like it throughout the RDPEIR contradicts CEQA's definition of "substantial evidence." CEQA Guidelines section 15384 defines substantial evidence as "enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached. Whether a fair argument can be made that the project may have a significant effect on the environment is to be determined by examining the whole record before the lead agency. *Argument, speculation, unsubstantiated opinion or narrative*, evidence which is clearly erroneous or inaccurate, or evidence of social or economic impacts which do not contribute to or are not caused by physical impacts on the environment does not constitute substantial evidence. Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts. (Subds. (a) and (b), emphasis added.) ROR007-81

The RDPEIR has admitted that no details are known about most of its encouraged projects, and yet claims that it has substantial evidence to supports its conclusions. This constitutes mere speculation in violation of the statute. With no quantification, there is no substantial evidence to justify this conclusion.

Section 3.4.3.6. Mitigation Measures

It is misleading and ineffective to do a general section on mitigation measures, rather than showing how each mitigation measure mitigates each impact. Given the lack of any specifics, it is impossible to determine that the measures listed in MM 3-1 will actually mitigate the impacts to a less than significant level. It is not clear whether these are enforceable mitigation measures or merely suggestions, nor is it clear how the local agencies will carry out the measures. This vague description fails to foster informed decision-making. ROR007-82

SECTION 4 – BIOLOGICAL RESOURCES

Sections 4.2—4.3. One of the differences between the Revised Project and the other Alternatives is that the Revised Project considers upstream areas. The Regulatory Framework and Environmental Setting should be revised to include the pertinent information for upstream impacts. ROR007-83

Section 4.4.3.1. The RDPEIR states "In most of the upstream area, groundwater supplies are not substantial, especially in the foothills and mountains that surround the Sacramento and San Joaquin Valleys. In these areas, it is anticipated that project to recycle wastewater and ROR007-84

Response to comment ROR007-81

Please see response to comment ROR007-21, and Master Responses 2 and 5.

Response to comment ROR007-82

Please see response to comment ROR007-66.

Response to comment ROR007-83

Please see response to comment ROR007-69.

Response to comment ROR007-84

Figure 3-3 in the EIR, adapted from DWR's Bulletin 118-2003, illustrates the absence of groundwater basins in the foothills and upstream mountain areas of the Sacramento and San Joaquin watersheds.

stormwater would predominate over groundwater projects." Need a citation or some substantiation of the conclusions made in this Section.

ROR007-84

Section 4.4.3.1.1- Impact 4-1a: Substantial Adverse Effects on Sensitive Natural Communities, including Wetlands and Riparian Habitat. Effects of Project Construction.

The RDPEIR states, "In addition to the types of potential impacts described above for reliable water supply projects, the large surface storage reservoirs encouraged by the Revised Project could result in the inundation of thousands of acres of habitat used by wildlife and the loss of sensitive natural communities. The impacts of these types of projects could depend on the ultimate location of the reservoirs and their proximity to sensitive natural communities. These projects would occur mostly outside of the Delta."

ROR007-85

While outside of the Delta, these are the species that are also in the Delta, so to hurt their habitat is to also harm the Delta. The RDPEIR erred in failing to provide a broad and general analysis of the projects that have been specifically named, in addition to a full description of the Shasta Lake Water Resources Study.

Effects of Project Operations. "Water transferred from north of the Delta could result in a temporary increase in water in the rivers flowing into the Delta, which could provide benefits to adjacent wetlands and riparian communities…" This discussion fails to note how altered reservoir operations could affect the temperature of stored water in the upstream areas and how the upstream environment would suffer. Rather, it focuses on the Delta impacts. The Delta Reform Act does not encourage the DSC to trade Delta impacts for upstream impacts. Even if that were a responsible strategy, it would be ineffective because upstream areas are intimately connected to the Delta.

The RDPEIR states, "In most cases, compliance with required permits and approvals and implementation of mitigation measures would reduce impacts to a less than significant level." There is no justification for this statement, as the types of permits and approvals have not been described. This is especially true for upstream areas. One cannot merely assume that future agencies will comply with all pertinent regulations without any analysis of those regulations and an assessment of whether those regulations have been complied with in the past. There is no assurance or even description of whether it is even feasible to meet regulatory requirements while also delivering more water to Delta, as is contemplated by the BDCP. This oversight should be remedied.

ROR007-86

The RDPEIR states, "Water transfers to facilitate water supply reliability could influence water quality by producing temporary changes in flow that could affect the concentrations of regulated water quality constituents, including water temperature within the Delta watershed tributaries. However, as described in Section 3.4.3.1, Reliable Water Supply, of the RDPEIR, those impacts would be less than significant following implementation of mitigation measures by the water purchasers to purchase additional transfer water that would be released from upstream reservoirs during drier periods to mitigate water quality impacts. (Page 3-3). . . These changes could reduce the extent of brackish or freshwater marsh in the Delta. Changes in water operations in the CVP and SWP and other water systems also could alter the timing and magnitude of water

Response to comment ROR007-85

Please see response to comment ROR007-21.

Response to comment ROR007-86

Please see response to comment ROR007-21. As described on page 2B-3 of the Draft Program EIR, analogous information from referenced EIRs and EISs were used to provide information about potential impacts and mitigation measures.

fluctuations in the upstream reservoirs and adversely influence wetlands and riparian communities along the edges of the reservoirs. Other programs intended to improve water supply reliability, such as water conservation, could result in more water remaining in the rivers tributary to the Delta and less water removed from the Delta. This could potentially benefit wetlands and riparian communities along the rivers and Delta channels." (RDPEIR Page 4-4.) ROR007-86

We agree with these statements and believe the RDPEIR should explain how these impacts can be reconciled with the statutory objectives of the Delta Reform Act. This section should include fact-based information on the challenges of coordinating water delivery to the Delta and the water quality and ESA obligations for agencies involves in upstream reservoir operations. There should be more of a description of the types of impacts that will likely occur due to reservoir drawdown, particularly impacts related to coldwater fish habitat. The RDPEIR should offer at least broad level mitigation for such impacts. These obligations should have been enumerated in the regulatory setting chapter and analyzed in the impact analysis.

Impact 4-2a: Substantial Adverse Effects on Special-status Species.

The RDPEIR states, "Small storage reservoirs, regulating reservoirs, and groundwater percolation basins that might be constructed to improve water supply reliability could affect special-status species within the footprints of those facilities through disturbance, habitat loss, or direct injury. The extent of impact would be influenced by the size of the facility footprint and its location relative to populations of special-status species. Construction of large surface water storage reservoirs would largely occur outside the Delta. Disturbance and habitat loss associated with facilities construction might adversely affect terrestrial and aquatic special-status species if those species inhabit the affected areas. . ." Given these impacts, it is difficult to see how these projects and their associated impacts can be reconciled with the goals of the Delta Reform Act. The Final PEIR must explain how these projects achieve the statute's goals.

The RDPEIR states, "Changes in surface water storage operations could influence the timing and magnitude of flows and water temperature in downstream water bodies used by special status species, and temperature and salinity gradients in the Delta. These changes could reduce the quality and suitability of aquatic habitats for special-status fish species such as delta smelt." EWC agrees with this statement and thinks it merits a full discussion including the environmental setting of these areas in addition to an actual quantitative analysis that includes an analysis of all the pertinent fish species in the Delta and its tributaries and explanation of the optimal habitat for such species. ROR007-87

The RDPEIR states, "The details of many of the aspects of projects encouraged by the Revised Project are not currently known, however, and it is possible that significant and unavoidable biological resource impacts could occur. One or more of the reliable water supply projects encouraged by the Revised Project may result in significant and unavoidable biological resource impacts similar to the impacts described for the Proposed Project . . ." The prediction of significant and unavoidable impacts is belied by the fact that the impacts have associated with specific projects have not been identified and feasibility of potential mitigation measures have not been investigated. These whether significant impacts are "unavoidable" under CEQA will be entirely determined by local project lead agencies. To make any conclusions regarding

Response to comment ROR007-87

Please see response to comment ROR007-21.

significance and efficacy of mitigation is misleading, as future projects may rely on these statements. This type of statement appears through the RDPEIR and all should be removed in the Final PEIR. ROR007-87

The impact on the CVPIA goal of the doubling of salmon populations must be considered as a part of this section.

Impact 4-3a: Substantial Adverse Effects on Fish or Wildlife Species Habitat

There is no justification for the conclusion that compliance with permits and mitigation measures would reduce to a less than significant level. This conclusion and those like it throughout the RDPEIR should be removed. ROR007-88

Impact 4-4a: Interfere Substantially with the Movement of Any Native Resident or Migratory Fish or Wildlife Species or with Established Native Resident or Migratory Wildlife Corridors.

The RDPEIR errs in discussing impacts of project operation on upstream tributaries to the Delta while failing to discuss the types of species that in these areas and the nature of the impacts. It also does not explain how can these impacts be reconciled with the goals with Delta Reform Act. ROR007-89

Impact 4-5a: Conflict with Any Local Policies or Ordinances Protecting Biological Resources or the Provisions of an Adopted Habitat Conservation Plan, Natural community Conservation Plan, or Other Approved Local, Regional, or State Habitat Protection Plan.

The RDPEIR should describe the local policies and regulations that apply to its anticipated projects and ways that those policies can be reconciled with the Policies and Recommendations in the Delta Plan. In doing so, the RDPEIR should have listed the parameters of the type of project the Delta Plan is encouraging. The RDPEIR errs in failing to provide any guide posts as to what types of projects Delta Plan would encourage. ROR007-90

Section 4.4.3.4. Water Quality Improvement.

Impact 4-5d: Conflict with Any Local Policies or Ordinances…
"Although projects encouraged by the Revised Project would not likely conflict with adopted HCPs, and NCCP's in the Delta, they could conflict with HDCPs and NCCPs in other areas of the Study Area as well as with local policies or ordinances. ROR007-91

The RDPEIR should have provided some description of the Plans and policies in upstream areas and how to reconcile this likely impact with the goals of the Delta Reform Act. This information should not be buried in an Appendix (and it doesn't appear to be in the Appendix either.)

Impacts 4-1e: Substantial Adverse Effects on Sensitive Natural Communities, Including Wetlands and Riparian Habitat.

"Impacts of levee modification and floodplain enhancement actions would result primarily in temporary, construction-related impacts. Reservoir reoperation, however, could result in long- ROR007-92

Response to comment ROR007-88

Notwithstanding the need to comply with all environmental laws and required permits, this impact was determined to be significant. RDEIR, Section 4.4.3.1.3, page 4-7. Furthermore, for projects and actions that are not covered actions, this impact would be significant an unavoidable because the mitigation measures identified in the EIR would within the responsibility and jurisdiction of agencies other than the Delta Stewardship Council. RDEIR, Section 4.4.3.6, p. 4-34.

Response to comment ROR007-89

Please see response to comment ROR007-69 and Master Response 5. The project area considered in the EIR is defined by the purposes and uses of the Delta Plan. The project area, shown in Figure 1-1, includes the Delta, the Delta watershed that contributes water to the Delta, and areas outside of the Delta that use Delta water. This area was defined to include the areas of possible impacts of each alternative, as described in Section 2A, Introduction to Resource Sections. The EIR's analysis of impacts to biological resources includes discussion of impacts upstream of major dams, when such impacts are foreseeable results of projects encouraged under the Delta Plan. For example, on page 4-62 the Draft PEIR discusses the impacts of reoperation on "wetlands and riparian communities along the edges of [upstream] reservoirs."

Response to comment ROR007-90

As described in Section 4 of the EIR, although projects encouraged by the Delta Plan are not likely to conflict with adopted HCPs, NCCPs, or other conservation plans, they could conflict with local policies or ordinances, and are thus considered significant. Future site-specific environmental analyses conducted at the time specific projects are proposed by lead agencies will address those impacts, once sufficient information is available to support such an analysis. HCP/NCCPs being developed are considered in the cumulative impacts analysis in Section 22 of the EIR. As specified in the Delta Reform Act, the Delta Plan does not retroactively affect previously approved plans, programs or projects (Water Code §§ 85057.5(b)(6)-(7), 85057.5(c)). However, future projects that fit the definition of covered actions must be carried out consistent with the Delta Plan. Please see Master Response 1.

Response to comment ROR007-91

Please see the response to comments ROR007-69 and ROR007-89.

Response to comment ROR007-92

Please see response to comment ROR007-21.

term impacts if the changes in operation to facilitate flood control adversely affect sensitive wetland and riparian habitats by altering the magnitude, duration and timing of flows."

The RDPEIR errs in failing to provide a broad analysis of these impacts and failing to reconcile this long-term impact with the goals of the Reform Act. ROR007-92

Impact 4-2e: Substantial Adverse Effects on Special-Status Species. "Reoperation of reservoirs to support flood risk reduction could adversely affect special-status species, such as Chinook salmon, if the flow changes scour or dewater spawning areas or lead to stranding of juvenile fish. Reoperation also could impact special-status fish if the flow changes adversely influence water temperatures."

EWC agrees with this conclusion and believe it merits more of a discussion. The RDPEIR should describe prime temperature ranges for endangered species in all Delta tributaries and as well as other prime habitat characteristics and how changed reservoir operations could impact that habitat. As discussed above, the RDPEIR erred in failing to include the reasonably foreseeable impacts for projects that are already in the pipeline. ROR007-93

Impact 4-3e: Substantial Adverse Effects on Fish or Wildlife Species Habitat.

The RDPEIR states, "The nature and severity of construction-related biological resources impacts for the project encouraged by the Revised Project will depend on the specific location and characteristics of the project at the time they are implemented, and the specific mitigation measures adopted by the implementing agencies. In most cases, compliance with required permits and approvals and implementation of mitigation measures would reduce impacts associated with projects to a less than significant level. In some cases, the potential for biological resource impacts could result in a significant, unavoidable impact. This situation is most likely to occur during construction and may be temporary in nature."

It is unclear what value this type of conclusion offers. It is essentially stating that any impact conclusion can be anticipated and makes general predictions with no factual substance. The RDPEIR has no way to substantiate the statement that most impacts would occur during construction because it has not done any analysis of operational impacts. The RDPEIR has no way to substantiate its claim that compliance with permits and mitigation measures would likely reduce impacts to a less than significant level because it has not evaluated those permits, nor how those permits interrelate with the Delta, nor whether it is even feasible to comply with local water quality and species protection regulations while also attaining Delta water supply goals. Without looking at specific impacts and specific mitigation measures, it is impossible to make any type of significance determination. To do so misleads the public and encourages superficial analysis by later agencies. These statements and others like it throughout the RDPEIR should be removed in the Final PEIR. ROR007-94

Impact 4-5e: Conflict with Any Local Policies or Ordinances Protecting Biological Resources. . .

This section fails to discuss Habitat Conservation Plans and other water quality regulations of upstream areas. The RDPEIR fails to convey how this Plan would comport with restrictions ROR007-95

Response to comment ROR007-93

Please see the response to comment ROR007-21.

Response to comment ROR007-94

Please see the response to comment ROR007-21.

Response to comment ROR007-95

Please see response to comment ROR007-90.

upstream and how operations could be modified to ensure that upstream regulations are complied with.

ROR007-95

Mitigation Measure 4-14.5
These mitigation measures are grouped together to address a series of impacts which is an inexact approach. One proposal includes, "Selecting project sites that would avoid sensitive and natural communities, including jurisdictional wetlands and other waters, vernal pools, alkali seasonal wetlands, riparian habitats, and inland dune scrub." How can this type of mitigation measure be offered when the RDPEIR itself notes that many of the proposals, such as new pipelines and new and expanded reservoirs would inevitably involve destruction of riparian habitats and wetlands. This measure also proposes compensating for impacts by purchasing in-kind preservation or restoration credits. The RDPEIR should have conducted a basic analysis to determine the availability of such credits and the cost to help later project lead agencies determine whether such a mitigation measures would be feasible. These mitigation measures offer suggestions including, "Select[ing] project sites that would avoid habitats of special-status species . . . The RDPEIR admits that most of its encouraged projects would harm the habitat of various endangered species; thus, this proposed mitigation offers little value. Because all the local ordinances and endangered species protection plans have not been evaluated it is possible to tell whether this mitigation would actually be effective at mitigating for potentially significant impacts.

ROR007-96

SECTION 5 – DELTA FLOOD RISK

(Section 5.4.3.1, line 31) We strongly disagree with the statement "In most of this upstream area, groundwater supplies are not substantial…" The groundwater supplies of the Tuscan Aquifer underlying portions of the Sacramento Valley contain millions of acre-feet of water. Throughout this document, there is a failure to acknowledge the Tuscan Aquifer and what result the Delta Plan will have on this important resource.

ROR007-97

Section 5.2, 5.3 As noted in the other chapters, these sections should have been revised to include the regulatory setting and environmental setting of upstream areas that this Revised Project allegedly includes

ROR007-98

Section 5.4.3.1. Reliable Water Supply. "The number and location of most potential projects that would be implemented are not known at this time. However, the Revised Project like the Proposed Project, specifically names the Department of Water Resources (DWR) Surface Water Storage Investigation, which includes the North-of-Delta Offstream Storage Investigation, Los Vaqueros Reservoir Project (Phase 2), and the Upper San Joaquin River Basin Storage Investigation Plan as potential projects to be implemented. Both the Revised Project and the Proposed Project encourage the update of Bulletin 118 which could lead to improvements in groundwater management."
The DSC is on the right track by broadening the scope of its analysis to include these projects but such inclusion lacks meaningful value unless there is a full description of the projects, their habitat areas, and their likely impacts on these habitat areas. As noted above, there is quite a bit of information already available on Los Vaqueros Expansion Investigation, North-of-Delta Offstream Storage Investigation (Sites Reservoir), Temperance Flat Reservoir and the Shasta

ROR007-99

Response to comment ROR007-96

Please refer to RDPEIR, Section 4, Biological Resources, subsection 4.4.3.6, Mitigation Measures (pp. 4-33 to 4-37). Regarding the enforceability and specificity of the EIR's mitigation measures, please refer to Master Response 4.

Response to comment ROR007-97

Section 3.3.4.1.3 of the DEIR acknowledges that the Sacramento Valley overlies one of the largest groundwater basins in the State. However, the EIR also discusses that some locales show the early signs of persistent drawdown, including the northern Sacramento County area, areas near Chico, and on the far west side of the Sacramento Valley in Glenn County where water demands are met primarily, and in some locales exclusively, by groundwater. These could be early signs that the limits of sustainable groundwater use have been reached in these areas. The proposed Delta Plan includes policies (WR P1) and recommendations (WR R9, WR R10, and WR R11) to sustainably use groundwater and to reduce groundwater overdraft situations. As described in Section 2A of the Draft Program EIR and Section 2 of the RDEIR, it is anticipated that under the proposed Delta Plan, water users would develop other local and regional water supplies in accordance with Delta Plan policies and recommendations.

Response to comment ROR007-98

Please see response to comment ROR007-69.

Response to comment ROR007-99

Please see response to comment ROR007-21. As described on page 2B-3 of the Draft Program EIR, analogous information from referenced EIRs and EISs were used to provide information about potential impacts and mitigation measures.

Dam Water Storage Investigation. A comprehensive description of these projects should have been included in this RDPEIR. ROR007-99

Section 5.4.3.1. Reliable Water Supply

"The Revised Project would apply to areas of the Delta watershed located upstream of the Delta unlike the Proposed Project. . . . Thus, impacts related to the construction and operation of reliable water supply projects under the Revised Project would be greater than under the Proposed Project because of the upstream area; these increased impacts would largely be the result of the new storm water and wastewater recycling projects, while impacts related to groundwater projects would not increase over the Proposed Project." ROR007-100

There is no substantiation provided for this conclusion. The RDPEIR should be revised to include an analysis that compares potential impacts of each type of flood control project, discussing the types of impacts typical of such projects before it can reach such a conclusion.

Impact 5-1a: Substantially Alter the Existing Drainage Pattern of the Site or Area, Including Through the Alteration of the Course of a Stream or River, or Substantially Increase the Rate or Amount of Surface Runoff in a Manner which Would Result in Flooding On or Offsite. The Discussion of "Effects of Project Operation" mentions that modification of water supply flows through the Delta could result in upstream reservoir operation changes. This section could be greatly improved by an application of the facts that are known about the projects that currently exist. This section fails to describe any of the relevant permits or applicable mitigation measures; thus, it cannot reasonably state that compliance with such permits and measure would likely reduce impacts to a less than significant level. ROR007-101

Mitigation Measures 5-15-5

The RDPEIR states, "Design subsequent mitigation measures in accordance with the final study and with the applicable standards of FEMA, USACE, DWR, and CVFPB. The study would identify potential increase in flood risks, including those that may result from new facilities." This mitigation measure fails to include a performance measure and impermissibly defers any specific mitigation measures to a later time. While these measures would very like ameliorate the impacts discussed, there is no quantification of impacts, nor performance measures used, thus it is an error to say that "In many cases, they reduce significant construction-related flood management impacts to less than significant levels." These errors apply to Mitigation Measures 5-15-5. ROR007-102

SECTION 6 – LAND USE AND PLANNING

Regulatory Framework. 6.2

Local Land Use Plans. 6.2.1
The RDPEIR still does not mention local habitat conservation plans such as the Yolo Natural Heritage Program, a county-wide NCCP/HCP, and the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan. As previously stated in the RDPEIR, this omission ROR007-103

Response to comment ROR007-100

Please see responses to comment ROR007-21 and ROR007-69.

Response to comment ROR007-101

Please see responses to comments ROR007-21 and ROR007-69.

Response to comment ROR007-102

Please see response to comment ROR007-66.

Response to comment ROR007-103

Please see response to comment ROR007-90 and Master Response 1. The Yolo Natural Heritage Program is described on page D-37 of Appendix D of the DEIR. The San Joaquin County Multi-Species Habitat Conservation and Open Space Plan is described on page D-35 of Appendix D.

gives the impression that local government has been negligent in dealing with habitat conservation issues and that plans put forward by outside interests should therefore take precedence. In fact, it is essential that local planning efforts of this kind be respected and taken into account in any project planning going forward for the Delta region. ROR007-103

Also missing is any mention of Delta reclamation, water, and levee districts. This document needs to recognize these local authorities and incorporate maintenance and other plans on an island-by-island basis.

6.4.3 Revised Project

The RDPEIR is incorrect that there are not substantial groundwater supplies within the Delta watershed upstream of the Delta. (RDPEIR, p. 6-2; cf. http://www.water.ca.gov/groundwater/bulletin118/sacramento_river.cfm, http://www.water.ca.gov/groundwater/bulletin118/san_joaquin_river.cfm (groundwater basin information).) ROR007-104

SECTION 7 – AGRICULTURAL AND FORESTRY RESOURCES

The RDPEIR's analysis of impacts to agricultural resources and mitigation for farmland conversion is inadequate. The RDPEIR fails to describe the impacts of the continuation of supplying water to farms with selenium laden soils in the San Joaquin Valley and conversion of productive Delta farmland to water infrastructure, habitat, and other projects promoted by the Plan.

Due to the scale of impacts on agricultural resources on the Delta that would occur as a result of implementation of the Plan, additional detail should be developed in the agricultural resource mitigation measures. In particular, other tools besides easements are available that may provide mitigation for agricultural impacts. There are also some opportunities to maintain productive crops at the same time as providing wildlife habitat. The Department of Water Resources has developed a white paper discussing other options for mitigation of large scale agricultural impacts on Delta. The white paper includes additional potential mitigation measures that should be considered and potentially adopted. In addition to considering a wide array of mitigation options, further consultation with local agencies and farmers should accompany the development and implementation of agricultural mitigation measures. ROR007-105

The RDPEIR includes a mitigation measure requiring easements when agricultural land is converted, to mitigate for loss of high value farmland in the Delta due to creation of habitat or other projects, the mitigation ratio must be higher than 1:1. At a 1:1 mitigation ratio, a net loss of farmland is still occurring. The mitigation ratio for conversion of agricultural land should be at least 2:1 for prime farmland in the Delta; mitigation properties should also be located within the Delta to ensure that the Delta's agricultural productivity maintained.

Response to comment ROR007-104

The proposed Delta Plan includes policies (WR P1) and recommendations (WR R9, WR R10, and WR R11) to sustainably use groundwater and to reduce groundwater overdraft situations. As described in Section 2A of the Draft Program EIR and Section 2 of the RDEIR, it is anticipated that under the proposed Delta Plan, water users would develop other local and regional water supplies in accordance with Delta Plan policies and recommendations. Impacts on depletion and recharge of groundwater due to construction of reliable water supply projects would be less-than-significant because groundwater use would be temporary, and there would be no impact from operation of reliable water supply projects. As described on page 2A-39, Lines 38 through 40, of the Draft Program EIR and Master Response 5, it is anticipated that implementation of updated water quality and flow objectives by the State Water Resources Control Board (SWRCB) could increase Delta outflow, reduce current reverse flow conditions in the south Delta, increase flows in restored Delta floodplains, and result in a more "natural flow regime" in the Delta. Neither the Delta Plan nor the SWRCB's flow objectives will affect water rights. Following the adoption of its flow objectives, the SWRCB will engage in a further public proceeding, including complete environmental review, concerning implementation of the objectives, which may include altering water rights. Please see Master Response 5 for further discussion of the EIR's analysis of the updated flow objectives and the protections for exiting water uses and users. The Delta Plan and alternatives do not contemplate changes in existing water rights or new water rights. The Revised Project does recommend, in WR R3, that the State Water Resources Control Board evaluate all applications and petitions for a new water right or a new or changed point of diversion, place of use, or purpose of use that would result in new or increased long-term average use of water from the Delta watershed for consistency with the constitutional principle of reasonable and beneficial use and other provisions of California law, including completion of applicable urban water management plans, agricultural water management plans, and environmental documents.

Response to comment ROR007-105

The EIR determined that there is no feasible mitigation to reduce to a less-than-significant level the impacts of reduced water supplies in some portions of the agricultural areas in the San Joaquin Valley that could be

fallowed or retired due to the lack of other water supplies; therefore, these impacts would remain significant. Please see Master Response 4.

SECTION 11 – GEOLOGY AND SOILS

The evaluation of impacts in Chapter 11 is inconsequential. If a project were to be built, the geology is not going to change. Major impacts would be on the ecosystem, water supply, and disease vectors while impact rates of erosion could possibly be mitigated.

Regional and Local Seismicity. 11.3.2.2
Previously mentioned in this section of the RDPEIR are three earthquakes of magnitude 6.5 or greater. Despite the devastation caused by these earthquakes in the Bay Area and along the coast, there is no record of any levee failure in the Delta associated with these or other seismic events. This fact should be stated clearly. "A moderate, or moment magnitude 6.5 or greater earthquake on the major seismic sources in the San Francisco Bay region would affect the Delta with moderate to strong ground shaking and could potentially induce damage in these areas." There is no historic evidence to suggest that this ground shaking and damage would have more than local consequences. ROR007-106

Figure 11-3 in the RDPEIR shows hundreds of seismic events occurring along faults extending south from the San Francisco Bay Region. The California Aqueduct runs down the coast range parallel to the San Andreas Fault, and geologists predict the existence of many blind thrust faults along the east side of the coast range. This document considers blind thrust faults underlying the Delta with the idea that a seismic event could disrupt water deliveries. The analysis should be extended to the potential vulnerability of the California Aqueduct and the San Luis Reservoir, where damage could be equally disruptive of water supply.

SECTION 14 – HAZARDS AND HAZARDOUS MATERIALS

Overall, this chapter overestimates the hazmat impacts from Alternative 2 under the incorrect assumption that the EWC alternative includes increased construction and use of ocean desalinization and agricultural drainage treatment facilities and therefore greater exposure to hazardous materials (greater impacts) compared to the Proposed Project. Alternative 2's reduction in selenium, salt, and boron production and elimination of the need for agricultural pollution treatment facilities more than offsets hazmat impacts from increased recycling and sewage treatment facilities compared to the Proposed Project. Using information from the Broadview Contract Assignment Draft Environmental Assessment (Reclamation, 2004)[15], and extrapolating the savings from retirement of 380,000 acres of drainage impaired lands in the San Luis Unit would result in the reduction of 98,800 AF/year of contaminated agricultural drainage to surface water and groundwater, including a reduction of 646,000 tons of salt, 57,000 pounds of selenium and 1.976 million pounds of boron. Clearly, Alternative 2 cleans up significant sources of surface and groundwater pollution for the Delta and San Joaquin/Tulare basins and is by far superior to any other alternative in this regard. The RDPEIR does not disclose the magnitude of this improvement in hazardous material production, storage, transport, and disposal, as a result of Alternative 2 because it lacks any quantitative analysis. Alternative 2 is environmentally superior for Hazards and Hazardous Materials. ROR007-107

[15] See http://www.c-win.org/webfm_send/195, page 4-2

Response to comment ROR007-106

As indicated in Section 11.3.1 of the EIR, the information on geology provided in this section is based on existing information from published sources, including maps and reports prepared by the California Department of Water Resources (DWR), such as the Delta Risk Management Strategy (DRMS) Technical Memorandum (DWR 2007a), and maps and reports prepared by the CALFED Bay-Delta Program (CALFED), the U.S. Army Corps of Engineers (USACE), the U.S. Geological Survey (USGS), and the California Geological Survey (CGS). The EIR addresses changes in existing environmental conditions due to the proposed Delta Plan and the alternatives. If those changes in existing physical conditions are significant and adverse ("significant impacts"), feasible mitigation measures are required. CEQA does not require mitigation of existing conditions.

Response to comment ROR007-107

Alternative 2 was informed by comments to the Delta Stewardship Council from several environmental groups and does not represent one specific proposal. Alternative 2 included the assumption that water users located in the area outside of the Delta that use Delta water would replace the loss of Delta exports with water use efficiency and conservation actions, water transfers, and development of local and regional water supplies including recycled water, groundwater treatment, ocean desalination, and/or local storage facilities. Alternative 2 reduces reliance on Delta water supplies as compared to the Delta Plan. However, reduced reliance on Delta water supplies could increase the need for implementation of new and/or expanded local and regional water supplies to serve agricultural and municipal and industrial water users in the San Joaquin Valley, San Francisco Bay Area, Central Coast, and Southern California areas. Alternative 2 would place more emphasis than the Delta Plan on development of water quality objectives and Total Maximum Daily Loads, which could result in an increased level of construction of facilities to meet the developed water quality objectives. Alternative 2 could result in less levee construction due to floodplain expansion than the Delta Plan, but more construction activities in the Delta to relocate structures from the floodplain. Please refer to Master Response 3.

SECTION 21 – CLIMATE CHANGE AND GREENHOUSE GAS EMISSIONS

21.4.3.1 Reliable Water Supply

The Recirculated Draft PEIR states that "there is no reasonably plausible scenario in which a potential significant impact would occur. It is therefore concluded that this impact would be less than significant. Future project-specific analyses may develop adequate information to arrive a different conclusion; however for purposes of this program-level analysis, there is no available information to indicate that another finding is warranted or supported by substantial evidence."

Previous DEIR comments by the EWC noted a plausible scenario in which a potentially significant impact could occur. Those comments were:

> "There are potentially significant statewide, cumulative impacts to the [BDCP] Proposed Project, which could increase exports of water from the Sacramento Valley watershed through the Delta to Southern California. Because water supply ultimately drives growth, one of the biggest impacts would be a shift in growth from the Sacramento Valley watershed, which includes the western Sierras as well as the Sacramento Valley, to the San Joaquin Valley, the Inland Empire, and coastal southern California. Temperature projections from the state's Climate Adaptation strategy show that inland Southern California regions will be some of the hottest areas in the state, with mean peak daily temperatures in July as high as 110 degrees by 2070.[16]
>
> "No analysis has been done of the increased greenhouse gas emissions from shifting development to these regions, or of the increased GHG emissions from an increase in demand for air conditioning. For this and other reasons, we disagree with the conclusion that projects implemented under the Delta plan would not conflict with other plans adopted by the state for the purpose of reducing GHG emissions, as long as the individual projects were evaluated for conformance to statewide and regional policies."

ROR007-108

The initial economic analysis performed by David Sundig for BDCP also specifically referenced the assumption that the state should attempt to sustain the explosive mid-2000s level of growth in inland Southern California, and to provide water for lawns in the resulting subdivisions in the desert. The economic analysis did not look at GHG impacts of subsidizing the use of fossil fuels to ship water 400 miles south to water lawns in the desert, and such an analysis would not be done in determining consistency with local GHG emission reduction plans. The state needs to perform a top-level evaluation of whether constructing a large project to meet such needs are consistent with AB 32,[17] or with optimal allocation of increasingly scarce water supplies.

These are plausible scenarios that show a significant impact of the proposed BDCP project on GHG emissions that could be in conflict with existing state policies. For this reason, the

[16] 2009 California Climate Change Adaptation Strategy, California Natural Resources Agency, p i. Available at http://resources.ca.gov/climate_adaptation/docs/Statewide_Adaptation_Strategy.pdf. Incorporated by reference.
[17] PPIC report lawns

Response to comment ROR007-108

Please see Master Response 2 regarding the commenter's' proposed scenario approach.

conclusion that this impact is less than significant is not correct. This impact must be reclassified to significant for this RDPEIR to be valid. ROR007-108

21.4.3.2 Delta Ecosystem Restoration

With respect to habitat restoration projects, the RDPEIR again states "substantial evidence that there is no reasonably plausible scenario in which a potential significant impact would occur."

In the EWC comments on the Fifth Staff Draft Delta Plan, we stated:

> "…This analysis fails to take into account the cumulative impact of ending agricultural production in an area with moderate rainfall and proximity to a water supply needed for irrigation. Production could be shifted to regions within California that are heavily dependent on imported water supplies, and that will be subject to large temperature shifts, or there could be an increase in imports from out of state. We believe a cumulative analysis of GHG emission impacts is required." ROR007-109

This is a plausible scenario that shows a significant impact of the proposed BDCP project on GHG emissions that could be in conflict with existing state policies. It is not enough simply to consider consistency with local land use plans. There must be explicit, top-level consideration of the GHG impacts of the proposed shift in crop production.

For this reason, the conclusion that this impact is less than significant is not correct. This impact must be reclassified to significant for this RDPEIR to be valid.

The Delta Plan Must Ensure Adequate Analysis Of Climate Change Impacts

The Delta Reform Act specifically mandates a comprehensive review and analysis of the impacts of "possible changes in total precipitation and runoff patterns" due to climate change on the Proposed Project before incorporation into the Delta Plan:

> b) The BDCP shall not be incorporated into the Delta Plan and the public benefits associated with the BDCP shall not be eligible for state funding, unless the BDCP does all of the following:
>
> …(2) Complies with Division 13 (commencing with Section 21000) of the Public Resources Code, including a comprehensive review and analysis of all of the following:
>
> .. (C) The potential effects of climate change, possible sea level rise up to 55 inches, and possible changes in total precipitation and runoff patterns on the conveyance alternatives and habitat restoration activities considered in the environmental impact report. ROR007-110

The Delta Plan must specifically address these requirements of the Delta Reform Act, and must describe a review process that will ensure that the Bay Delta Conservation Plan takes a sufficiently comprehensive look at how shifts in precipitation and runoff from climate change could affect the planned project and operations, as well as the environment. The Delta Plan

Response to comment ROR007-109

Please see the response to comment ROR007-108 and Master Response 2.

Response to comment ROR007-110

Please see response to comment ROR007-11.

must clearly and specifically address how the Delta Stewardship Council will ensure adequate review of the BDCP climate change analysis prior to incorporation of BDCP into the Delta Plan. This is an essential duty of the Delta Stewardship Council as an independent agency and should not be delegated to the Department of Water Resources or any other agency.

Recent experience with a prolonged, severe drought in the Southwest has shown the importance of preparing for mega droughts that have occurred historically.[18] A 2010 analysis of modeling of climate change in DWR planning studies, noted:

> "there is a lack of analysis of potential drought conditions that are more extreme than have been seen in our relatively short hydrologic record. There is significant evidence to suggest that California has historically been subject to very severe droughts and that climate change could result in droughts being more common, longer, or more severe. However, most current DWR approaches rely on an 82-year historical hydrologic record (1922–2003) on which GCM-generated future climate changed-hydrologic conditions are superposed. This record is likely too short to incorporate the possibility of a low frequency, but extreme, drought."[19]

The Bay Delta Conservation Plan modeling currently relies on mapping onto the 82 year historic record.[20] This loses a great deal of information from global climate models on the structure and persistence of droughts. In DWR's 2009 report, "Using Future Climate Projections to Support Water Resources Decision Making in California,[21]"the authors stated:

In water resources planning, it is often assumed that future hydrologic variability will be similar to historical variability, which is an assumption of a statistically stationary hydrology. This assumption no longer holds true under climate change where the hydrological variability is non-stationary. Recent scientific research indicates that future hydrologic patterns are likely to be significantly different from historical patterns, which is also described as an assumption of a statistically non-stationary hydrology. In an article in *Science*, Milly et al. (2008) stated that "Stationarity is dead" and that "finding a suitable successor is crucial for human adaptation to

ROR007-110

[18] Five Key Lessons (and Challenges) from the Great Texas Drought, University of Texas, September 9, 2012. Available at http://www.utexas.edu/know/2012/09/10/great-texas-drought/

[19] Climate Change Characterization and Analysis in California Water Resources Planning Studies, Final Report, Abdul Khan and Andrew Schwarz. Department of Water Resources December 2010, p. xvi. Available at http://www.water.ca.gov/climatechange/docs/DWR_CCCStudy_FinalReport_Dec23.pdf Incorporated by reference.

[20] Comparison of CAT and CVP IRP Scenarios, Department of Water Resources. Presentation to Climate Change Technical Advisory Group meeting, May 11, 2012. Available at http://www.water.ca.gov/climatechange/docs/ClimateChangeModelingCAT-BDCP-CVP-IRP_Approaches.pdf. Incorporated by reference.

[21] Using Future Climate Projections to Support Water Resources Decision Making in California, Francis Chung et. al., California Climate Center, Final Report, May 2009. Available at http://www.water.ca.gov/pubs/climate/using_future_climate_projections_to_support_water_resources_decision_making_in_california/usingfutureclimateprojtosuppwater_jun09_web.pdf Incorporated by reference.

changing climate."

A growing number of climate change studies have projected an increase in the frequency and severity of droughts in the Sierras and the Central Valley, and particularly under the higher greenhouse gas emissions scenarios. The following section describes some key papers.

Several independent studies have been done using the climate change scenarios in the California Climate Change Scenarios Assessment. A 2012 study by Josh Viers and Sarah Null found a mean increase of dry and critically dry years in the Sacramento Valley Index to 23% of all years in the current period, and to 38% of all years by the latter half of the century, under the A2 scenario.[22] Dry and critically dry years in the San Joaquin Valley Index increased to 53% of all years in the current period, and to 69% of all years by the end of the century.

The US Geological Survey released a paper in February 2012 with a very detailed simulation using the A2 GHG scenario with the Global Fluid Dynamics Lab (GFDL) climate model.[23] The modeling projected a decrease of 16-17% in Sacramento River flows from 2020-2030 and 2040-2050, and a 34% reduction by 2080-2090. While the GFDL model is one of the drier climate change models, it should also be noted that the model projections in the Southwest were consistent with the recent mega drought.[24]

The U.S. Bureau of Reclamation did a much larger study for the 2011 Westwide Climate Risk Assessment, used an ensemble of 112 Global Climate Model / scenario combinations.[25] The ensemble median projected drying in Southern California and the Central Sierras by mid-century, as well as drying across the Southwest. By the 2070s, the ensemble median projected — ROR007-110

[22] Water and Energy Sector Vulnerability to Climate Warming in the Sierra Nevada: Water Year Classification in Non-Stationary Climates, Sarah Null and Josh Viers, California Climate Change Center, July 31, 2012, p. 15. Available at http://www.energy.ca.gov/2012publications/CEC-500-2012-015/CEC-500-2012-015.pdf. Incorporated by reference.

[23] R.T. Hanson et. al., "A method for physically based model analysis of conjunctive use in response to potential climate changes," Feb 4, 2012. Available at http://ca.water.usgs.gov/projects/cvhm/Hanson_etal_2012_WRR.pdf. Incorporated by reference.

[24] Model Projections of an Imminent Transition to a More Arid Climate in Southwestern North America, Richard Seager, Mingfang Ting, Isaac Held, et. al., Science, Vol 316 no. 5828 p. 1181-1184, May 25, 2007. Available at http://www.sciencemag.org/content/316/5828/1181.short. Incorporated by reference.

[25] West-Wide Climate Risk Assessments: Bias-Corrected and Spatially Downscaled Surface Water Projections, U.S. Department of the Interior Bureau of Reclamation Technical Memorandum No. 86-68210-2011-01, March 2011. Available at http://www.usbr.gov/WaterSMART/docs/west-wide-climate-risk-assessments.pdf

drying throughout California.[26] The ensemble median projections are in agreement with regional trends in precipitation in the state. [27],[28]

Such major shifts in precipitation and runoff could have huge impacts on yields of proposed storage and conveyance projects, as well as huge environmental impacts. It is essential that information on potential flows and diversions under drier climate change scenarios be made available so that the risk can be evaluated by the public trust agencies, NMFS, USFWS, and DFG, as well as the Department of Interior, and water agencies in both areas of origin and export areas. The potential environmental impacts under these scenarios should also be available to stakeholders, including fishermen, Indian tribes, and NGOs.

ROR007-110

Unfortunately, the Bay Delta Conservation Plan currently provides no analysis of the potential impacts of such major shifts in climate. The modeling also uses a non-peer reviewed technique to aggregate predictions from lower and higher GHG emissions scenarios, and wetter and drier climate change models into a single "Central Tendency" projection.[29] This projection masks the risks to both water supply and the environment under the drier climate change model/scenario combinations.[30]

The Delta Stewardship Council must ensure that these deficiencies are remedied, prior to incorporation of the Bay Delta Conservation Plan into the Delta Plan, and should ensure that adequate analysis of potential drought impacts of climate change is done for all projects incorporated into the Delta Plan. Addressing the risk of an increase in the frequency and severity of droughts in the Sacramento and San Joaquin River watersheds is essential to meeting the co-equal goals of "providing for a more reliable water supply for California" and "protecting and enhancing the Delta ecosystem."

[26] Ibid.

[27] Killam, D., A. Bui, S. LaDochy, P. Ramirez, W. Patzert and J. Willis. 2011. Precipitation trends in California: Northern and central regions wetter, southern regions drier. Unpublished. Cited in Temperature and precipitation trends in California: Global warming and Pacific Ocean influences, LaDochy and Ramirez et. al.

[28] Regional precipitation data with linear trends also available from Western Regional Climate Center, California Climate Tracker. Available at http://www.wrcc.dri.edu/monitor/cal-mon/frames_version.html

[29] Jamie Anderson, presentation on Climate Change Approaches, Department of Water Resources, March 2012. Available at http://www.water.ca.gov/climatechange/docs/CCTAG_climate_change_approaches%20final_3-28-12_Jamie%20Anderson_with%20extra%20slides.pdf

[30] Incorporating Drought Risk From Climate Change Into California Water Planning, comments on Department of Water Resources Draft Climate Change Adaptation Strategy, California Water Research, August 2012. Incorporated by reference.

SECTION 22 – CUMULATIVE IMPACT ASSESSMENT

CEQA Requirements

Although the evaluation of economic effects is optional under CEQA Guidelines (15131), the economics and social effects of the differing alternatives is so significantly different, and the economic balancing of public trust values so important, that they should not be optional for this RDPEIR. The possible elimination of a $12 to $15 billion expenditure, by not investing in a canal or tunnel around the Delta as anticipated with BDCP, is so significant to the environment of the Bay-Delta and the balancing of the public trust, that it must be considered. The longstanding constitutional principles of reasonable use and the public trust doctrine, which are foundational to state water management policy, are particularly important and applicable to the Delta (Water Code Section 85023).

The Treatment Of Cumulative Impacts By The RDPEIR Is Inadequate And Fails To Comply With CEQA

CEQA defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Guideline § 15355. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project "when added to other closely related past, present, and reasonably foreseeable probable future projects." Guideline § 15355(b). ROR007-111

The discussion of cumulative impacts in an EIR is required to reflect "the severity of the impacts and their likelihood of occurrence." Guideline § 15130(b). Required contents include either a list of past, present, and probable future projects producing related or cumulative impacts, or a summary of projections that describe and evaluate the conditions contributing to the cumulative effect. Guideline § 15130(b)(A), (B). It is clear that all projects within the watershed must be assessed, given that the Guideline section uses as an example: "Location may be important, for example, when water quality impacts are at issue since projects outside the watershed would probably not contribute to a cumulative effect." Guideline § 15130(b)(2).

The decision in *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, held an EIR insufficient to comply with CEQA in analyzing cumulative impacts with respect to a proposed increase in an agency's withdrawal of water from the Russian River. By failing to consider possible curtailment in obtaining water from another River, the EIR failed to alert decision-makers and the public "to the possibility that the Agency will not be able to supply water to its customers in an environmentally sound way." 108 Cal.App.4th at 871.

Failure To Assess The Impacts Of The BDCP Project Either Directly Or As A Cumulative Project

Other portions of these comments have demonstrated that there has been a complete failure to provide an accurate, stable, and finite description of the true project, and there has been a failure to identify and evaluate the environmental impacts of that project. As explained there, after release of the Draft EIR and prior to the release of the RDPEIR, the Deputy Director of DWR declared in June 2012 that the BDCP project is the Delta Tunnels that would have the capacity to divert 15,000 cfs from the Sacramento River near Clarksburg for delivery to the pumping plants ROR007-112

Response to comment ROR007-111

Please see responses to comments ROR007-4, ROR007-56 and ROR007-111. Section 22 of the EIR assesses the cumulative impacts of the Delta Plan and alternatives in combination with past projects, other current projects, and probable future projects. CEQA Guidelines § 15065(a)(3); Public Resources Code § 21083(b)(2). This does not require the EIR to speculate about all future projects, but rather that it address those that are reasonably foreseeable. The cumulative projects analyzed in this EIR are listed in Table 22-1 of the DEIR. As discussed in Master Response 4, the EIR considers the impacts of, and identifies mitigation for, all of the different types of projects encouraged by the Delta Plan: water supply reliability projects, Delta ecosystem restoration projects, water quality improvement projects, flood risk reduction projects, and projects to protect and enhance the Delta as an evolving place. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in DEIR and RDEIR Sections 22 and 23.

Response to comment ROR007-112

Please see the response to comment ROR007-11 and Master Response 1.

near Tracy for export south. The Governor confirmed that at his special press conference in July 2012. The EWC position is that the BDCP project ***is*** the Delta Plan project, and ***not*** a different, "cumulative" project. You, however, seek to minimize the dominating status of the BDCP by referring to it as a "cumulative project". (Draft EIR 23-28).

Either way, there has been complete failure to identify and evaluate the impacts of the BDCP Delta Tunnels which would have the capacity to divert 15,000 cfs of water from the Sacramento River upstream from the Delta. Only the vaguest generality has been mentioned in several words in the "Cumulative Impact Assessment" of the RDPEIR. The BDCP is mentioned in a sentence including 11 other items under the Water Resources portion of the Cumulative Impact Assessment. (RDPEIR 22-2). The sum total of information provided in this regard is that "examples of potential projects include the construction and operation of water and wastewater treatment plants; *water conveyance facilities, including pumping plants*; surface water or groundwater storage facilities; ecosystem restoration projects; flood control levees; or recreation facilities. *Implementation of these types of projects and construction and operation of these types of facilities could result in significant environmental impacts." (RDPEIR 22-1)* (emphasis added). An additional sentence then states: "Physical improvements associated with the Revised Project in combination with other water supply, ecosystem restoration, water quality, flood control, and Delta enhancement projects could violate water quality standards or waste discharge requirements, or otherwise degrade water quality." (RDPEIR 22-1). ROR007-112

With respect to another critical environmental issue related to water resources, similar vague generalities are provided with respect to "Biological Resources". The only information provided is that "changes in instream flow or water quality conditions" could result from construction and operation of projects including the BDCP. (RDPEIR 22-3, 4). The only cumulative impact information about the BDCP project is provided in the Cumulative Impact Assessment in the Draft EIR. There, a brief description in a table states that the BDCP permits and related EIR/EIS were scheduled to be completed by December 2012. That, of course, has not happened. The only additional information provided in the table is "modify SWP and CVP Delta water conveyance facilities and operations in the Delta." (RDPEIR 22-24).
The RPDEIR has failed to take into account the impact of diverting 15,000 cfs upstream from the Delta on whether existing and future water supplies and minimum stream flow requirements can be satisfied, and has failed to evaluate the environmental impacts of diverting 15,000 cfs. Having claimed that the BDCP project is a cumulative project, the Council must evaluate cumulative impacts including those caused by the cumulative project. Moreover, this is *not* a defect that can be cured by responses to comments in a Final EIR. There has been a complete failure to include sufficient description of the project and analysis of the cumulative impacts in the RPDEIR, and Draft EIR. No useful environmental document has been circulated to allow informed public review and informed decision-making. It will be necessary to prepare and recirculate a Draft EIR that meets requirements of CEQA to allow for informed public review.

<u>Failure to Identify, List, and Analyze the Cumulative Impacts of the Revised Project and Related Projects</u>
The project in terms of modifying "Delta water conveyance facilities and operations in the Delta" is, again, creation of the capacity to divert 15,000 cfs out of and away from the Sacramento River upstream from the Delta. Pursuant to Guideline § 15130(b)(1)(A), what is ROR007-113

Response to comment ROR007-113

Please see responses to comments ROR007-4, ROR00711, ROR007-53, ROR007-56, and ROR007-59.

required under CEQA is to assess the changing environment resulting from the incremental impacts of the project "when added to other closely related past, present, and reasonably foreseeable probable future projects." "The Agency must interpret this requirement in such a way as to 'afford the fullest possible protection of the environment.'" *Friends of the Eel River,* 108 Cal.App.4th 859, 868. The other related projects are the past, present, and reasonably foreseeable probable future diversions from the rivers reaching the Delta, including the Sacramento and San Joaquin rivers and their tributaries. In flagrant violation of the requirements of Guideline § 15130(b)(1), there is neither a list nor summary of projections of past, present, and reasonably foreseeable probable future diversions in the RPDEIR or Draft EIR. Consequently, neither the public nor the decision-makers have before them basic, foundational information on which to enable one to even start in evaluating the cumulative impacts of this project together with other related projects.

In addition, the upcoming proceedings before the SWRCB also constitute a related project because water availability may be curtailed in order to attempt to maintain or restore the Delta pursuant to the public trust doctrine. The court held in *Friends of the Eel River,* 108 Cal.App.4th 859, 869-872 that administrative proceedings that might lead to reducing diversions to protect fish constitute a related project that must be considered in cumulative impacts analysis. The upcoming Board proceedings to adopt updated flow objectives for the Delta and to develop flow criteria for high-priority tributaries in the Delta watershed (SWRCB comment letter, February 2, 2012 pp. 20-21) are related projects that could lead to curtailing diversions and should in any event serve to establish how much water is actually available for diversion, and can be diverted consistent with maintaining flows pursuant to the public trust doctrine. These proceedings also must be included in cumulative impacts analysis. ROR007-113

EWC has consistently throughout this process been calling on the Council to perform the essential water availability analysis, cost-benefit analysis, and public trust doctrine analysis before calling for new or "modified" conveyance. If the Council is unable or unwilling to do this work, it is necessary for the Council to await the performance of this work by the SWRCB or by the BDCP process. At this time, the necessary information has not been obtained and the analysis has not been done. The DSC's existing environmental documents have provided no cumulative impact information or analysis at all. Again, this is not a deficiency that can be corrected simply by responding to comments in a final EIR. In order to comply with CEQA you must prepare a new Draft EIR that includes the necessary information and analysis to allow the public and decision-makers to conduct informed review of the cumulative impacts of this project and other related projects.

Failure To Perform Any Real Cumulative Impact Analysis

The environmental documents provided so far contain no real cumulative impact analysis. All that is given is general, boilerplate information such as "Implementation of these types of projects and construction and operation of these types of facilities could result in significant environmental impacts." (RPDEIR 22-1). Also, "Physical improvements associated with the Revised Project. . .could violate water quality standards or waste discharge requirements, or otherwise degrade water quality." (RPDEIR 22-1). This type of information is vague, general, and unhelpful; it is questionable whether it would suffice to constitute an adequate Initial Study, which is a document prepared early in a CEQA process in order to determine what ROR007-114

Response to comment ROR007-114

Please see the response to comment ROR007-55, ROR007-63, and ROR007-111.

environmental issues might exist and whether an EIR should be required. The most this work can be called is it has been an attempt to spot a few issues. More is required of an EIR. An EIR must identify, disclose, and evaluate the environmental impacts of the proposed project. No cumulative impact analysis has been prepared and circulated pertaining to developing new conveyance including operating facilities diverting 15,000 cfs of water upstream from the Delta. The Council needs to prepare and circulate a Draft EIR that furnishes information and analysis worthy of being called an EIR. As of now, that has not been done. ROR007-114

Failure to Evaluate Cumulative Impacts Upstream

As set forth in more detail elsewhere in these comments, as a result of climate change, sea level rise as much as 55 inches will result in high salinity levels in the Delta, degrading water quality for agriculture and municipal uses and changing habitat for fish species. (DP 80). Maintaining anything resembling freshwater conditions in the Delta, dewatered by the new diversion for the Revised Project, will likely require releases of water from storage reducing available water supplies for fish, and also for exports. (DP 80, 91). The massive new diversion for the BDCP project would thus cause change in storage and releases from upstream reservoirs such as Shasta, Trinity, Oroville, and Folsom, and affect and imperil all provisions already in place designed to maintain cold water storage and minimum flows upstream for fishery and other purposes. There would be dewatering not only in the Delta, but also upstream to meet the demands of the Revised Project and related projects. There is also the developing reality that climate change will increase dry and critically dry years while decreasing wet and above normal years as the century goes on. This development is reflected in the studies sponsored by the California Climate Change Center released in support of the 2012 and 2009 California Climate Change Assessments. There is a complete absence of any cumulative impact information and analysis of how the Revised Project together with related projects would affect water availability, environmental conditions, and fisheries throughout the Sacramento River and San Joaquin River watersheds upstream from the Delta. These climate change projections need to be an essential part of cumulative impact evaluation of the Revised Project, together with other diversions and with actions to maintain sufficient flows to protect the Delta as well as upstream waters under the public trust doctrine. ROR007-115

There is no *quantification* with respect to cumulative impacts. No information or analysis is provided as to the effect of the Revised Project and its "new conveyance" together with the related projects, with respect to water quality and water quality issues in the watershed. There is no *quantification* with respect to Delta outflows, instream flows, water quality standards, and other water resource and quality information. There will be enormous impacts given change in points of diversion, and new diversion with a capacity of 15,000 cfs. Moreover, the capacity for the new diversion is known, so that it is possible to provide *quantification*. There has been no compliance in the Delta Plan EIR process with the CEQA duty for the agency to find out and disclose all that it reasonably can about the project, related projects, and their cumulative impacts.

Creation of Political Pressure to Un-designate Wild and Scenic Rivers

The cumulative impacts of the Revised Project and related projects will create political pressure to un-designate the Trinity, Eel, Klamath, and Smith Rivers from Wild and Scenic River protections. The SWP was originally premised on damming the Eel River and diverting it to a peripheral canal. Originally it was presumed that after 1981, water would have to be imported ROR007-116

Response to comment ROR007-115

Please see the response to comment ROR007-11, ROR007-55, and ROR007-57.

Response to comment ROR007-116

Comment noted.

from North coastal streams to maintain an acceptable level of freshwater in the Delta if the peripheral canal were to be developed. Those prospective diversions were renounced and the northern rivers were included as Wild and Scenic Rivers. With the protection of those rivers, there is nowhere near enough water to develop the current version of the peripheral canal—the Delta Tunnels— and maintain sufficient freshwater in the Delta and maintain upstream cold water storage and minimum flows. Pressure to remove northern rivers from Wild and Scenic Rivers Act designation and protection must be assessed as a cumulative catalyst impact resulting from the Revised Project and related projects. ROR007-116

Groundwater Resource Impacts

The Delta region includes the severely depleted groundwater basin. The aquifer is critically over drafted including a cone of depression with a depth of 60 to 80 feet below sea level. The void pulls in sea water from the Bay in an easterly direction. Water levels are declining and chloride concentrations are increasing in water from wells in the Eastern San Joaquin Ground-Water Sub-basin caused by excess pumping and saline intrusion. Wells in Stockton have been abandoned. The new diversion would reduce the natural flushing of the Delta region and barrier to salinity intrusion which is created by freshwater inflows into the Delta. Reduction or elimination of this flushing and barrier will cause increased migration and intrusion of brackish water in the groundwater basin. The cumulative impacts of the diversion for the Revised Project, and other activities affecting groundwater including over drafting must be addressed in the EIR. ROR007-117

Summary

The RPDEIR and Draft EIR are so fundamentally and basically inadequate and conclusory in nature with respect to disclosure and analysis of cumulative impacts that meaningful public review and comment have been precluded. You must prepare and circulate a new Draft EIR so that the public and decision-makers are afforded the information and analysis with respect to cumulative impacts that they must have pursuant to CEQA. ROR007-118

SECTION 23 – BAY DELTA CONSERVATION PLAN

It is unclear why there is a separate chapter in the RDEIR regarding the BDCP. The BDCP is not an impact area and would have a broad array of its own environmental impacts. Since the Delta Plan encourages completion and implementation of the BDCP (WR R12), and the BDCP is a defined project, the RDEIR should include consideration of BDCP impacts within each resource area section.

The basin components of BDCP are currently known and must be analyzed in this RDEIR. Inexplicably, the description of the BDCP in section 23.3 was not updated with readily available information regarding the BDCP preferred project released in July 2012.[31] BDCP is clearly a defined project for which applications have been submitted; the Plan moreover promotes completion of the BDCP through WR R12 and other Plan policies/recommendations. Thus, the RDEIR must analyze the BDCP as a cumulative project. The cursory stand-alone analysis of BDCP in Section 23 is patently inadequate in this regard. ROR007-119

[31] http://baydeltaconservationplan.com/news/news/12-07-25/Governor_Brown_and_Obama_Administration_Outline_Path_Forward_for_BDCP.aspx

Response to comment ROR007-117

Please see responses to comments ROR007-11, ROR007-57, ROR007-74, and ROR007-104, and Master Response 1.

Response to comment ROR007-118

Please see responses to comments ROR007-11, ROR007-55, ROR007-63, and ROR007-111.

Response to comment ROR007-119

Please see the response to comment ROR007-11 and Master Response 1. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP and other cumulative projects, are described in Section 22 (Cumulative Impact Assessment) of the EIR. The BDCP is discussed in more detail in EIR Section 23.

The inconsistency in approach to the BDCP – to encourage its completion and at the same time never provide any guidance to BDCP regarding conveyance is a stark omission, which is contrary to the Delta Reform Act.

If the RDPEIR is correct that the BDCP is not yet a defined project, then the Council should not encourage completion and implementation of it in WR R12. Striking WR R12 and any other provisions that explicitly promote the project known as BDCP from the Plan would cure this defect.

Alternatively, policies on what the coequal goals require with respect to new SWP/BOR diversions in the Delta could be developed, as the Plan does for habitat and various other types of projects within the Plan area. For the Council to provide no guidance on arguably the most important part of BDCP – massive new diversions from the Sacramento River – shows a disregard for sound water supply planning. While the Council is not the lead agency for BDCP, as lead agency for the Delta Plan, the Council has the duty to disclose all it reasonably can about the impacts of implementation of the Delta Plan, which explicitly promotes the BDCP. This RDEIR fails to do so with respect to the reasonably foreseeable effects of the BDCP as currently proposed.

A few specific examples are provided below.

23.6.5 Agriculture and Forestry Resources

ROR007-119

The RDEIR assumes without justification that construction impacts on agriculture from the BDCP would not be significant. In fact, the decade or more of construction required to complete the BDCP conveyance facilities would lead to significant interference with agricultural operations in the Delta and should be disclosed as such.

23.6.13 Noise

The RDEIR does not disclose the potential noise impacts of BDCP on biological resources, such as fish. Construction of the BDCP diversion intakes would include years of in-River construction and noise. Noise from construction could cause significant disturbance to listed fish species. (See, e.g., http://www.dot.ca.gov/hq/env/bio/files/Guidance_Manual_2_09.pdf.)

23.6.16 Recreation

The RDEIR does not address the potential of the major new diversions on the Sacramento River to interfere with recreation, both during and after construction. These impacts are potentially significant. Chapter 15 of the February 2012 Administrative Draft BDCP EIR/EIS discussed severe interference with recreational uses of the Sacramento River during the multi-year construction period. Also, after construction, BDCP conveyance facilities such as the intakes

and forebays, would continue to interfere with recreational uses such as bird watching. The RDEIR incorrectly focuses only on impacts from BDCP habitat projects on recreation to the exclusion of impacts from BDCP conveyance.

ROR007-119

RULEMAKING PACKAGE COMMENTS

The Environmental Water Caucus provides the following comments for the planned review of the Rulemaking Package dated November 16, 2012.

Standard of Review

Under the state administrative procedure act, all regulations proposed by an agency must satisfy authority and reference standards. (Cal. Gov't Code 11349.) Each regulation to be adopted must be within the scope of authority conferred. (Cal. Gov't Code 11342.1) A regulation that is not within the scope of an agency's express or implied rulemaking authority is void and cannot become effective.

The proposed Delta Plan regulation exceeds these authority and reference standards by including regulatory provisions which exceed the statutory authority provided to the Delta Stewardship Council. As the title "Consistency with Regulatory Policies in the Delta Plan" suggests, the Proposed Regulation is to provide only the specific legal underpinnings to determine if "state and local land use actions identified as "covered actions" [...are] consistent with the Delta Plan." (Water Code § 85022(a).)

The legislature envisioned a two-step decision-making process, which the Proposed Regulation facilitates:

(1) Determine whether proposed actions are "covered actions" under the Delta Plan (Article 1);
(2) determine whether "covered actions" are consistent with the Delta Plan (Articles 2 and 3).

ROR007-120

In practice, the November 16, 2012 Proposed Regulation both excludes actions that should be classified as "covered," and seeks to enshrine regulatory policies that plainly fall outside of the scope of determining whether covered actions are consistent with the Delta Plan.

(§ 5001) Definitions:

"Significant impact": this term is inappropriately defined as a "change in baseline conditions." Baseline is not defined, however, so this term is ambiguous and requires clarification to be legally valid. What are "baseline conditions"? If baseline conditions are the same as existing conditions, then a significant impact from a proposed covered action is possible even with no change in baseline conditions – if the action itself is considered part of the baseline. For example, a permit renewal would not be considered a significant impact under this definition because its impacts would be incorporated into baseline conditions, even though such a permit renewal would in fact have a measurable impact on one or more of the co-equal goals. The definition should be revised so that "significant impact" is measured on an absolute scale, so that its overall impact can be determined independently of its incorporation into baseline conditions. The result of limiting "significant impact" to a change in baseline conditions is to severely limit

Response to comment ROR007-120

This is a comment on the project, not on the EIR.

the scope of actions considered covered by the Delta Plan under Section 5003(a)(4). This limitation does not appear anywhere in the Delta Reform Act, and exceeds that act's statutory authority.

An anticipated response to this criticism is that there is a baseline consideration made when considering CEQA projects. However, the use of baseline in CEQA is distinguishable from the proposed use in the Draft Regulation, because CEQA considers only environmental impacts, while the Delta Plan includes additional, non-environmental considerations.

(§§ 5002, 5003) Exemptions to Delta Plan exceed statutory authority.

The Delta Reform Act contains only four criteria to determine whether an action is covered by the Delta Plan: (1) It will occur in the boundaries of the Delta or Suisun Marsh; (2) Will be carried out, approved or funded by the state or a local public agency; (3) Is covered by one or more provisions of the Delta Plan; and (4) Will have a significant impact on achievement of one or both of the co-equal goals. (Cal. Water Code 85057.5(a).) The exemptions to actions covered by the Delta Plan are then enumerated in Water Code section 85057.5 (b).

These exemptions are also included in the draft regulation at § 5003(b)(1), but they are improperly expanded upon in (b)(2):

(§§ 5003(b)(2)(B) and(D)) Use of CEQA Exemptions.

The Draft Regulation adopts much of the same exemption criteria as CEQA, but without CEQA's statutory basis for those exemptions – an impermissible conflating of the two statutes. ROR007-120

The statutory basis for the emergency exemption (§ 5003(b)(2)(B)) is not contained within the Delta Plan statute, though there in such an exemption in CEQA. But because the two statutes are not synonymous, and each has different goals, this provision should be removed from the regulation as it lacks statutory basis. There should be no emergency exemption for compliance with the Delta Plan without adequate statutory basis.

Likewise, the general exemption corresponding to CEQA exemptions (§ 5003(b)(2)(D)) should be removed from the Proposed Regulation, as it provides too much leeway for projects to claim CEQA exemption as the basis for exclusion from the Delta Plan. The Delta Plan does not stand as a proxy for CEQA; the two use different measures of impacts, with the Delta Plan's impacts going beyond those considered environmental, and it is reasonable to expect many projects to be covered by the Delta Plan but excluded from CEQA, and vice-versa. This provision lacks a proper statutory basis and should be removed.

(§5003(b)(2)(C)) Exclusion of Temporary Water Transfers.

It is not stated why these transfers are excluded, as they would otherwise be included as covered actions under the Delta Plan. The Proposed Regulation clearly anticipates problems with this provision as it sunsets after one year (unless renewed). The provision cites to the Delta Plan's Water Resource Recommendation No.15, but this recommendation simply re-states the need to

address the policy problem of temporary water transfers by other state agencies, which neither the Delta Stewardship Council nor the Delta Plan's enabling statute control. Temporary transfers can be very large, at least 100,000 acre-feet, and they can re-occur for many consecutive years, giving them the magnitude and effect of a permanent transfer. Were it not for this exclusionary provision, temporary transfers would be considered covered actions under Section 5005(c) of the Delta Plan; the change in ownership of the use rights of water, even though temporary, may have a significant economic and/or environmental impact on one or more of the co-equal goals. The exemption for temporary transfers exceeds the statutory authority for the Delta Plan, and should be removed.

(§ 5004) Certification of Consistent Actions
Judicial Review and Administrative Appeal

The Proposed Regulation allows, but does not provide specifics, as to how determinations by state agencies and the Council under the Delta Plan may be challenged through administrative appeal and judicial review. These details regarding appeal of a consistency determination, both to the Council and to court, should be explained in this section of the Proposed Regulation.

(§ 5005) Reduced Reliance on the Delta.
Inclusion of Performance Measures

Throughout the Proposed Regulation, but particularly in regards to reducing reliance on the Delta, a lack of measureable results (i.e. performance measures) undermine the legitimacy of consistency determinations with the Delta Plan. ROR007-120

The Delta Reform Act requires that the Delta Plan is "legally enforceable" (WC § 85001), and that the Plan include "performance measures that will enable the council to track progress in meeting the objectives of the Delta Plan," and "shall" include "quantifiable or otherwise measureable assessments" of improvements in the Delta ecosystem and water reliability. (WC § 85212.) If legal enforceability *and* performance objectives are required by the Delta Reform Act, then meeting these measureable objectives must be considered as criteria for consistency with the Delta Plan. In other words, the only practical means for the Plan to react to or promote measureable improvements is to make them conditions for consistency determinations by state and local agencies—so these conditions should be described in detail in the Proposed Regulation. Without such quantifiable assessments in the consistency determinations, the Plan will be neither legally enforceable nor will its consistency determinations be tied to achieving measureable results for the co-equal goals.

In order to fulfill the statutory mandates of the Delta Reform Act, the Delta Plan itself must contain suitable metrics, and the Proposed Regulation must contain provisions for how a project will meet these performance measures as a condition of a successful consistency determination. If the project does not make a quantifiable improvement in achieving the co-equal goals, then it simply should not receive a consistency determination from a local agency. These performance measures should be incorporated into §§ 5005, 5008, and 5009, and should be added as a requirement to make a consistency determination in § 5004.

(§ 5005(c)) Certifying "Reduced Reliance" on Delta Water Exports.

Reducing reliance on the Delta is one of the co-equal goals, and Section 5005 of the Draft Regulation explains that the intent of this policy is to make sure water suppliers are "taking appropriate actions to contribute to the achievement of reduced reliance on the Delta." This goal is fulfilled in part by Section 5005(C), which prohibits exports from or through the Delta unless certain conditions are met.

However, the prohibition on water exports contains two inappropriate clauses: for the prohibition on export to be triggered, not only must a water supplied have not adequately contributed to reduced reliance on the Delta (§ 5005(c)(1)), but the failure must have "significantly caused the need for the export, transfer or use" and the "export, transfer or use would have a significant adverse impact in the Delta." (§ 5005(c)(2) and (3).) These two limits on the export prohibitions make it difficult, if not impossible, to limit exports based on a demonstration (or failure thereof) to reduce reliance on the Delta.

First and foremost, there should be no express connection required for the failure to reduce reliance on the Delta to have actually caused the export or transfer of water to occur. As a policy matter, exports should not be allowed if the exporting agency has not reduced reliance on the Delta, *regardless* of whether a particular export was made necessary by this failure. Further, this requirement will be next to impossible, because a certifying agency will be unable to prove that the reduced reliance *caused* the export. This requirement at §5005(c)(2) is both unnecessary and destructive to the overall policy, and should be removed.

ROR007-120

Second, the requirement at §5005(c)(3) that the export would have a significant impact on the *environment* is wrongly limited to environmental impacts, when the Delta Plan is supposed to consider economic and cultural impacts as well. This section should remove the term "environmental" so that it reads the export, transfer or use would have a significant adverse impact in the Delta on an absolute scale." As explained elsewhere, the "absolute scale" modifier is necessary because "significant impact" has been improperly defined as a change in baseline conditions, when an export to be considered under §5005 could have been incorporated into baseline conditions and would therefore not register as "significant" under this definition.

The regulation is also internally inconsistent: it states that the measurement of success of this provision is to achieve "a significant reduction in the amount of water used, or in the percentage of water used, from the Delta watershed."

(§5005(e)) Inadequate Demonstration of Reduced Reliance on Delta.

As explained above, the section on reduced reliance should contain more detailed metrics in subdivision (e)(1)(C). In particular, these metrics must go beyond reviewing whether there is an adequate Urban Water Management Plan, with a clear, measureable standard, so that an agency's consistency determination also certifies a project will actually reduce reliance on the Delta by a given percent. In contrast, the current phrasing "the expected outcome for measureable reduction in Delta reliance and regional self reliance" is ambiguous and confusing – what

measureable reduction is this provision referring to, and more importantly, *what measure* is considered an acceptable "measurable reduction"?

The requirement of §5005(e) (1) that agencies demonstrate reduced reliance on the Delta is good in theory, but practically accomplished nothing. What is the use of requiring that an Urban Water Management Plan comply with laws that it already must comply with—except if those plans *had* to reduce Delta exports, but UWMP's do not. In fact, there is no guarantee that a completed Urban Water Management Plan, even if reviewed by DWR, will in fact contain measures that reduce reliance *on the Delta,* because there is no necessary connection between reduced self-reliance and reduced exports from the Delta; the contracting agency could meet its conservation requirement and merely reduce its supply from, say, groundwater supplies instead. For this subsection to be effective, this subsection should be revised to require that the UWMP's conservation measures are being met *and* that these measures have, in fact, reduced reliance *on exports from the Delta, and* certify by what measure such deliveries have been reduced. Then, if an agency's reduction in actual, measured, Delta exports are commensurate with the metrics required to be created by the Council, then an action cannot be deemed consistent. Without such changes this section lacks measureable performance measures, and thus lacks the ability to ensure that covered actions are consistent with reductions in Delta exports mandated by the Delta Reform Act.

Finally, the delay in measuring reductions in Delta exports until 2015 is wholly without justification or any statutory basis in the Delta Reform Act. This provision exceeds the scope of the enabling statute and should be removed or altered so that the measurements become effective the same year the statute is enacted. ROR007-120

"(5005(E) Violations Of CEQA And Public Trust Doctrine And Conflicts With Substantive Laws.

The Regulations including calling for "improve Delta conveyance and operations", and "optimize diversions in wet years. . ." (5001)(e)(1)(A) and (C) cannot be lawfully adopted because there has been failure to comply with CEOA for all the reasons set forth in the portion of these comments pertaining to the RDPEIR. The Regulations calling for improved, meaning new, conveyance also cannot be lawfully adopted because there has been failure to perform cost benefit and public trust doctrine analysis to ensure protection of the Delta as set forth in other portions, including the RDPEIR portions of these comments. All portions of these comments pertaining to the Delta Plan and the RDPEIR are incorporated herein by this reference as reasons why Regulations 5001(e)(1)(A) and (C) cannot be lawfully adopted. Consideration for adoption must be deferred until there has been CEQA compliance including circulation of a Revised Draft EIR and completion of cost benefit and public trust doctrine analysis. Moreover, these Regulations cannot be adopted because they conflict with governing law as set forth elsewhere in these comments, including but not limited to, increasing rather than reducing reliance on the Delta in meeting California's future water supply needs and failing to develop a governing definition of "more reliable water supply" supported by substantial evidence and adequate findings."

(§ 5006) Transparency in Water Contracting.

This section calls for "improved transparency in water contracting." However, the stated requirements of this section only mandate compliance with already-existing requirements for contracting for water with the state Department of Water Resources and the Bureau of Recreation. The usefulness of this provision can be expressed as follows: if the DWR or USBR assert that a project meets their respective transparency measures, could the Council nonetheless declare an action inconsistent with the Plan on these grounds? On the one hand, there is no measure of "improvement" in achieving the status quo. But on the other hand, none of the statutory provisions cited by the Proposed Regulation actually discuss transparency in water contracting. The purpose of this provision is unclear and should either be strengthened or removed.

(§ 5007) Updated Flow Objectives.

The Delta Reform Act does not require that Delta flow objectives be updated as part of the Delta Plan, or that the Delta Stewardship Council direct, manage, or provide guidance for the State Water Board's setting of Delta flow requirements. Rather, the Delta Reform Act requires that the State Water Board update Delta flow objectives consistent with the public trust doctrine, based on recommendations from the Department of Fish and Game. (Water Code § 85086.) To emphasize this point, the Delta Reform Act clearly states that "nothing in this division expands or otherwise alters the State Water Board's existing authority to regulate the diversion and use of water" (Water Code § 85031), and furthermore, the Act "does not affect" the public trust doctrine. (Water Code § 85032(i).) As a result, the Council has no authority to propose a regulation that guides or places any conditions on the State Water Board's setting of Delta flow requirements. Instead, the State Water Board is required to "submit its flow criteria determinations pursuant to this section to the council." ROR007-120

Further, to the extent that this section of the Proposed Regulation purports to set out criteria to determine whether the Board's delta flow requirements are consistent with the regulatory policies of the Delta Plan, it is plainly contrary to the scope of the Act: the flow determination is a regulatory action excluded under Section 85057.5(b)(1). This section exceeds the scope of the enabling statute and should be removed.

Perhaps most critically, the Delta Reform Act does not permit the Board to set Delta flows that are "necessary to achieve the co-equal goals," as stated in § 5007(a)(1) and (2), because the Delta Reform Act and judicial precedent require the Board to set such goals consistent with the *Public Trust doctrine,* and the co-equal goals are *not* synonymous with the protection of Public Trust resources. Rather, the public trust doctrine protects traditionally navigable waters, related habitat, and dependent wildlife, which is why the Board is required by the Act to set flow requirements after consultation with the Department of Fish and Game, and not the Delta Stewardship Council. As written, this section perverts the express language of the Delta Reform Act regarding the Board's duty to abide by the public trust doctrine when setting Delta flows, and should be either removed or modified to read "necessary to protect Public Trust resources" in order to be in compliance with the Act.

Summary.

As explained above, the two central problems with the Proposed Regulation concern whether an action is considered a "covered" action, and whether a covered action is "consistent" with the Delta Plan. As mentioned in the cover letter to the EWC comments for the Final Delta Plan, covered actions must include a Water Supply Analysis for each certified project in order to insure the availability of adequate water for the restoration of the Delta; such an analysis must in turn require a detailed Cost-Benefit Analysis in order to assure the financial viability of a covered project, and; it must include a Public Trust Analysis as indicated in the Delta Reform Act which cites the Public Trust as the foundation of California water policy. We therefore recommend that an additional regulatory policy be incorporated into Section 5005 of the Delta Plan Proposed Regulation which require these three actions be accomplished prior to the certification of consistency for any Delta Plan project or the approval of this Rulemaking Package. ROR007-120

These three analytical actions are necessary in order to assure that: 1. Adequate water is actually available for the recovery of the Delta as well as other beneficial uses (Water Supply Analysis); 2. That each major project undertaken as part of the Delta Plan is a cost-effective activity for the state (Cost-Benefit Analysis) and; 3. That Public Trust values are considered and compared with other beneficial uses of water (Public Trust Analysis).

* * * * * * * * * * * *

The Environmental Water Caucus would like to thank the following members of the Document Response Committee who participated in creating and assembling the comments contained in the above Final Draft Plan comments, the Recirculated Draft PEIR comments, and the Rulemaking Package comments: Katy Cotter (Friends of the River); Dierdre Des Jardins (California Water Research); Marty Dunlap (Citizens Water Watch); Mike Jackson (C-WIN); Bill Jennings (CSPA); Adam Lazar (Center for Biological Diversity); Mark Rockwell (Northern California Council Federation of Fly Fishers); Linda Sheehan (Earth Law Center); Tom Stokely (C-WIN); Bob Wright (Friends of the River).

* * * * * * * * * * * *

The following Environmental Water Caucus affiliated organizations support the findings and recommendations shown in the attached comment letters dated January 14, 2013.
The corresponding logos are shown at the front of this document.

Gary Adams
California Striped Bass Association

Sara Aminzadeh
Policy Director
California Coastkeeper

Dan Bacher
Editor
Fish Sniffer

Colin Bailey
Executive Director
Environmental Justice Coalition for Water

Barbara Barrigan-Parrilla
Executive Director
Restore the Delta

Lloyd Carter
President
California Save Our Streams Council

Jennifer Clary
Water Policy Analyst
Clean Water Action

Joan Clayburg
Executive Director
Sierra Nevada Alliance

Deirdre Des Jardins
California Water Research

Robyn DiFalco
Executive Director
Butte Environmental Council

Siobahn Dolan
Director
Desal Response Group

Marty Dunlap
Citizens Water Watch

Conner Everts
Executive Director
Southern California Watershed Alliance

Zeke Grader
President
Pacific Coast Federation of Fisherman's Associations
President
Institute for Fisheries Resources

Bill Jennings
Executive Director
California Sportfishing Protection Alliance

Carolee Krieger
Executive Director
California Water Impact Network

Adam Lazar
Staff Attorney
Center for Biological Diversity

Richard Lucas
President of the Board
Mt. Shasta Bioregional Ecology Center

Roger Mammon
President
Lower Sherman Island Duck Club

No comments

- n/a -

John Merz
President
Sacramento River Preservation Trust

Jonas Minton
Senior Water Policy Advisor
Planning and Conservation League

Lynne Plambeck
Executive Director Santa Clarita for
Planning and the Environment

Louie Rocha
Commodore
Sportsmen Yacht Club

Mark Rockwell
Co-Conservation Director
Northern California Council Federation
of Fly Fishers

Adam Scow
California Campaign Director
Food and Water Watch

Linda Sheehan
Executive Director
Earth Law Center

Caleen Sisk-Franco
Spirtual Leader & Traditional Chief
Winnemen Wintu Tribe

Esmeralda Soria
Legislative Advocate
California Rural Legal Assistance
Foundation

Craig Tucker
Karuk Tribe

Barbara Vlamis
Executive Director
AquAlliance

Eric Wesselman
Executive Director
Tuolumne River Trust

Bill Wells
Executive Director
California Delta Chambers & Visitor's
Bureau

Bob Wright
Senior Counsel
Friends of the River

Chris Wright
Executive Director
Foothill Conservancy

No comments

- n/a -

No comments

- n/a -

ROR008 Farm Bureau Delta Caucus

DELTA CAUCUS

CONTRA COSTA - SACRAMENTO - SAN JOAQUIN - SOLANO - YOLO

November 28, 2012

Phil Isenberg, Chairman, and Council Members
Delta Stewardship Council
Attn: Re-circulated Draft PEIR Comments
980 Ninth Street, Suite 1500
Sacramento, California 95814

Sent Via Email: recirculateddpeircomments@deltacouncil.ca.gov

RE: REQUEST FOR TIME EXTENSION TO COMMENT PERIODS ON THE FINAL DELTA PLAN, SUPPLEMENT TO DRAFT PROGRAM EIR, AND DRAFT REGULATIONS FOR FINAL DELTA PLAN

At your meeting of November 15, 2012, the Delta Stewardship Council (DSC) announced that the concurrent public review periods for the DSC's Final Delta Plan (FDP), the Supplement to the Draft Program Environmental Impact Report for the Final Delta Plan (SPEIR), and the corresponding Draft Regulations (DR) released by the California Office of Administrative Law will run for 45 days, from November 30, 2012 through January 14, 2013.

The Farm Bureau's Delta Caucus (Delta Caucus) intends to thoroughly review and comment on the above-referenced documents. However, due to the complexity, importance, and significance of these documents on the five-county agricultural region, and the fact that the review periods fall during a major holiday season, the Delta Caucus is respectfully and officially requesting that the DSC extend the concurrent public review periods for an additional 90 days, ending on April 15, 2013. Also, as a nonprofit, we are limited in our staff resources and need to coordinate with external legal professionals and consultants to facilitate an meaningful review and response; therefore we are in need of an extension. ROR008-1

The Delta Caucus looks forward to your favorable response to our time extension request and is committed to our continued coordination with the DSC members and DSC staff in the review of these documents and the future adoption and implementation of the Delta Plan. Should you have any questions or wish to discuss this request, please contact Delta Caucus representatives Katie Patterson (209) 931-4931or Charlotte Mitchell at (916) 685-6958.

Respectfully,

Russell E. van Löben Sels
Chairman

Response to comment ROR008-1

As the commenter noted, the review period for the Recirculated Draft PEIR began on November 30, 2012 and ended on January 14, 2013. CEQA guidelines, Section 15105 requires that review periods for draft EIRs should not be less than 30 days, and no longer than 60 days. The 45-day comment period is sufficient under CEQA statute and will not be extended.

ROR010 FOTR

From: Bob Wright [mailto:BWright@friendsoftheriver.org]
Sent: Monday, January 14, 2013 11:26 AM
To: comment, rulemakingprocess@DeltaCouncil; comments, recirculateddpeir@DeltaCouncil
Cc: Katy Cotter; troutnk@aol.com
Subject: recirculated Draft PEIR

Cindy Messer
Delta Plan Program Manager
Delta Stewardship Council

Dear Ms Messer and Council Members:

Attached please find 3 items I will identify, that are objections to project approval and comments to be entered into the Record on behalf of Friends of the River for ***both*** your Rulemaking Process, and your proceedings on the Draft EIR and Recirculated Draft Program EIR. I have included the email addresses for ***both*** the Rulemaking Process and the Recirculated Draft Program EIR proceedings in the address line of this email:

Our January 11, 2013 seven page Comment letter including new Alternatives 2A and 2B. I provided this same comment letter to Angela for the Record at the public Hearing on January 11, 2013.

Our January 11, 2013 two page letter identifying three of the Exhibits I provided to Angela for the Record at the January 11, 2013 public Hearing.

Our new January 14, 2013 six page Comment letter which follows up on some of the comments I made orally at the public Hearing on January 11, 2013, and also confirms my providing the three exhibits referred to above and confirms my having provided a fourth exhibit for the Record to Angela at the public Hearing, not mentioned in the Exhibit letter above: the lengthy document and appendices entitled Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay, Contra Costa Water District Technical Memorandum WR 10-001 (February 2010). I have not previously provided a hard copy of this letter to you, and will bring a copy of it, as well as a copy of the 111 page Environmental Water Caucus comment letter dated today, to you in person later today.

Please call if you have questions about our comments. Also, please call if you have misplaced any of our comment letters or exhibits, and I will be happy to provide you with duplicates.

ROR010-1

Bob Wright
Senior Counsel
Friends of the River
Sacramento, CA
(916) 442-3155 x207

Response to comment ROR010-1

Comment noted.

To protect and restore California Rivers by influencing public policy and inspiring citizen action.

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January 11, 2013

Cindy Messer
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: Comments on Final Draft Delta Plan (DP), Recirculated Draft Programmatic Environmental Impact Report (RDPEIR) and Proposed Delta Plan Rulemaking Package (Regulations) **including Presentation of New Alternatives 2A and 2B**

Dear Ms. Messer and Council Members:

This organization, Friends of the River, objects to approval of the Delta Plan (DP), RDPEIR, and Regulations. This organization is included as a commenter in the detailed comments submitted by the Environmental Water Caucus (EWC). These brief additional comments are submitted solely on behalf of this organization. A fundamental threshold CEQA violation carried out by the Delta Plan, RDPEIR and Regulations is that they call for carrying out the "alternative" of developing new conveyance facilities to divert huge quantities of freshwater from the Sacramento River upstream from the Delta for the benefit of exporters south of the Delta. These documents call for that even though no true alternative to developing new conveyance has ever been considered by either the Council or by the exporters creating the BDCP project. This failure to consider an alternative that would avoid or substantially lessen the massive environmental impacts that would occur with construction and operation of new water delivery conveyance must be remedied by full consideration of a reasonable range of alternatives in a recirculated Draft EIR.

ROR010-2

ROR010-3

Response to comment ROR010-2

Comment noted.

Response to comment ROR010-3

The range of alternatives analyzed in the EIR is a reasonable range of alternatives based on thorough consideration of public input and the requirements of CEQA. The Delta Plan does not include a Delta conveyance facility of the type described in the comment, and thus the EIR neither analyzes the impacts of such a facility nor considers alternatives to one. Regarding the relationship of BDCP and the Delta Plan, please see Master Response 1. Regarding the development and selection of the range of alternatives considered in the EIR, please refer to Master Response 3.

The Council Process Violates CEQA by Failing to Develop and Consider a Range of Reasonable Alternatives to Developing New Conveyance

Close to two years ago, the National Academy of Sciences declared in reviewing the draft BDCP that: "[c]hoosing the alternative project before evaluating alternative ways to reach a preferred outcome would be post hoc rationalization— in other words, putting the cart before the horse. Scientific reasons for not considering alternative actions are not presented in the plan." (National Academy of Sciences, Report in Brief at p. 2, May 5, 2011).

In all that time, nothing has changed in this regard. The Council is still succumbing to the will of exporters who still want a conveyance that will take 15,000 cfs of freshwater out of the Sacramento River upstream from the Delta. The Delta would be left to face ever worsening salinity intrusion from the Bay due to a projected rise in the sea level by as much as 55" by 2100 (DP 80, 91) while the Revised Project further worsens salinity intrusion by taking out massive quantities of freshwater before it even reaches the Delta.

Conclusions in an EIR must be supported by substantial evidence. CEQA Guidelines section 15384 defines substantial evidence as "enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached." "Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts." "Argument, speculation, unsubstantiated opinion or narrative, evidence which is clearly erroneous or inaccurate, or evidence of social or economic impacts which do not contribute to or are not caused by physical impacts on the environment does not constitute substantial evidence." ROR010-4

All that the subject documents contain to support the Revised Project alternative and the call for improved, meaning new conveyance, is argument, speculation, and unsubstantiated opinion and narrative. A new Draft EIR must be prepared and recirculated because "the draft EIR [and RPDEIR] was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded." (CEQA Guidelines, § 15088.5 (a)(4).) This entire process has been permeated from the outset with pre-decisional bias to develop the massive new conveyance capacity. As set forth in detail in the EWC comments there has been incomplete compliance with CEQA and there has been no public trust doctrine analysis performed.

We strongly support the EWC alternative which has been labeled Alternative 2. However, we present two additional alternatives in an attempt to help the Council and its EIR preparers to start down the road finally, of complying with CEQA and satisfying the obligations created by the public trust doctrine. These two alternatives are set forth below. Because the Council has been presented with three alternatives that substantially lessen significant and unavoidable impacts identified in the Draft Plan, recirculation of a new Draft EIR is now

Response to comment ROR010-4

Please refer to response to comment ROR010-3.

required. CEQA Guidelines section 15088.5(a)(3) requires recirculation when a feasible project alternative considerably different from others previously analyzed would clearly lessen significant environmental impacts of the project, but the project's proponents decline to adopt it. Alternative 2, 2A, and 2B are feasible alternatives that must be analyzed in a recirculated Draft EIR. ROR010-4

New Alternatives 2A and 2B Would Avoid the Adverse Impacts of the Revised Project

Alternative 2A: This alternative can be thought of as "think before you act." Under Alternative 2A, the Delta Plan and the Regulations would not encourage or recommend new or improved conveyance, water intakes, conveyance facilities, exporting more water in the wet years, optimizing diversions in wet years, and the like at this time. The decision whether to call for new conveyance would await the determination of such fundamental issues as water supply availability and the environmental impacts of supplying the water under CEQA including a helpful guide as to what is necessary, set forth in the California Supreme Court's decision in Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova (2007) 40 Cal.4th 412. The decision whether to call for new conveyance would also await your determination that would take into consideration a cost-benefit analysis and public trust doctrine analysis. The decision would also await the Council's preparation and circulation of a new Draft EIR so that the decision-making public agencies, and the public itself, would have the benefit of full environmental disclosure, consideration of the true project and its environmental impacts, and thus the ability to make an informed choice among reasonable alternatives.

The RDPEIR demonstrates the lengths the EIR preparers are willing to go to in order to reach the desired pre-decisional conclusion that the Revised Project is environmentally superior. They may assert that the detailed CEQA analysis, water availability determinations, and public trust doctrine analysis will and/or should be made by other agencies such as the BDCP lead and responsible agencies and/or the State Water Resources Control Board (SWRCB). On the contrary, in order to proceed in a manner required by law **some** public agency must make these critical determinations **before** the threshold choice of alternatives is made to call for new conveyance. If the Council is unable or unwilling to do this work, a policy or recommendation calling for new conveyance cannot lawfully be adopted unless and until the CEQA and public trust doctrine analysis has been done in the BDCP process and/or the SWRCB process. ROR010-5

We maintain that Alternative 2 is the environmentally superior alternative that should be adopted at this time. If, however, the Council does not do that, Alternative 2A must be adopted if any alternative is adopted because there has not been sufficient CEQA analysis and compliance or any cost-benefit and public trust doctrine analysis to support calling for, encouraging, or recommending new conveyance at this time. Alternative 2A would lessen the significant environmental impacts of the project by not calling for new conveyance and diversion of significant quantities of freshwater upstream from the Delta.

Response to comment ROR010-5

Regarding BDCP and potential alternatives thereto, please refer to response to comment ROR010-3. Regarding the selection of the environmentally superior alternative, please refer to Master Response 3.

Alternative 2B ("Phased Reduced Exports Alternative"): Alternative 2B is also similar to Alternative 2 in that no new conveyance would be recommended prior to a robust CEQA, water supply and public trust doctrine analysis. This Alternative, however, lowers reduction in exports compared with Alternative 2, and/or, phases in reductions in exports over time by phasing out exports to impaired agricultural lands that will or should eventually cease production. This Alternative eases the practical constraints involved in reducing exports within a reasonable amount of time, given that any new conveyance would not be projected to be in operation before about 2026.

Analysis of these additional Alternatives would help the Council achieve its legal obligation to consider a reasonable range of alternatives. Thus far, the Council has failed to develop any reasonable alternatives to have more conveyance to export more water. Alternative 2 was presented to the Council by the EWC. As a public agency responsible for complying with CEQA, it is the Council that has the responsibility to **develop a reasonable range of alternatives**. The Council should not simply reject Alternative 2 by characterizing the export reductions as being too severe. Rather, the Council should undertake to develop an alternative that on the one hand, like Alternative 2 does not call for new conveyance, but on the other hand, does not reduce exports to as great a degree as is done by Alternative 2. For example, Alternative 2B could include assessing limitations of exports to a maximum of 3,500,000 acre-feet/year which is more than the exports under Alternative 2.

An EIR must "describe **a range** of reasonable alternatives to the project, . . which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." CEQA Guidelines, § 15126.6(a) (emphasis added). "Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Public Resources Code Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." CEQA Guidelines, § 15126.6, subd. (b). The Council has not described **a range** of reasonable alternatives to the project which would avoid the adverse impacts of adding large new diversions of freshwater upstream from the Delta even though these alternatives would not reduce exports as much as would be accomplished by Alternative 2. This deficiency in the CEQA process is so profound that a new Draft EIR describing and considering new alternatives 2A and 2B must be prepared and circulated. Adopting the Delta Plan, Regulations, and certifying a Final EIR without doing so would be failure to proceed in a manner required by CEQA. These are not violations that can be cured simply by responding to comments in a Final EIR.

ROR010-6

Response to comment ROR010-6

The range of alternatives analyzed in the EIR is a reasonable range of alternatives based on thorough consideration of public input and the requirements of CEQA. Please see response to comment ROR010-3 above as well as Master Response 3.

Finally, the Council may continue to make the lulling statements already made in the subject CEQA documents claiming, so to speak, that the Council is not really doing anything now in terms of developing new conveyance and that environmental impact analysis will take place in the future. It appears that the Council is trying to mislead the public into believing that the Delta Plan is not a real threat to the Delta, but that later on, the BDCP preparers will jump up and say that the Delta Tunnels are consistent with the Delta Plan call for new conveyance and that the threshold decision to develop new conveyance was made in the Delta Plan. Unless the Council eliminates the call for improved, new, conveyance and the like from the Delta Plan and Regulations, it will be necessary to challenge the Delta Plan, RDPEIR, and Regulations if approved and adopted, in court to prevent that "not now, not ever" unlawful end run on CEQA from being successful. Approval of any calls for new conveyance, optimizing diversions in the wet years and the like must be deferred until CEQA has been complied with and the public trust doctrine analysis has been performed.

ROR010-6

Failure to Effectively Require Mitigation or Describe a Truly Environmentally Superior Alternative under CEQA and the Endangered Species Act

As pointed out in detail in the EWC comments, the RPDEIR concedes that the Revised Project would have significant and unavoidable environmental impacts including violation of water quality standards and adverse effects on special status species. (RPDEIR 24-10). Alternative 2 (and 2A and 2B), however, would result in far fewer significant and unavoidable environmental impacts than any of the other alternatives analyzed in the PDEIR or RPEIR. The RPDEIR concedes that "Alternative 2 contributes more to improving conditions for biological resources and arresting ecosystem decline than the Revised Project." (RPDEIR 25-7). Alternative 2 clearly meets the project objectives reducing reliance on the Delta in meeting the state's future water needs through regional self-reliance, is consistent with the Delta Reform Act, is implementable in a comprehensive, concurrent, and interrelated fashion, and can be accomplished as rapidly as realistically possible without jeopardizing ultimate success. Under CEQA, if an alternative is presented that meets project objectives and can reduce significant impacts to a less than significant level, the lead agency must adopt this alternative if feasible. Mountain Lion Foundation v. Fish & Game Com. (1997) 16 Cal.4th 105, 134. "CEQA compels government first to identify the [significant] environmental effects of projects, and then to mitigate those adverse effects through the imposition of feasible mitigation measures or through the selection of feasible alternatives." Sierra Club v. State Board of Forestry (1994) 7 Cal.4th 1215, 1233, Pub. Resources Code, § 21002. To simply accept such significant impacts while ignoring viable alternatives violates CEQA.

ROR010-7

The proposed mitigation measures offered by the Plan also fail to meet CEQA's standards. Proposed mitigation is not sufficient unless such mitigation is implemented as a condition of future development. In its current state, there are no repercussions if subsequent

ROR010-8

Response to comment ROR010-7

As discussed in Master Response 4 and section 25 of the Recirculated Draft PEIR, Alternative 2 is not environmentally superior to the Revised Project (the Final Draft Delta Plan), because it would bring about more uncertainty regarding water supply and more conversion of agricultural land to non-agricultural uses than the Revised Project.

Response to comment ROR010-8

Mitigation Measures listed in the EIR are made enforceable through Delta Plan policy G P1, which makes mitigation a requirement of Delta Plan consistency, as further explained in Master Response 3. Equally effective measures may be substituted by future lead agencies, but these would remain mandatory. Moreover, future lead agencies will have the obligation under CEQA to mitigate the significant impacts of projects regardless of bond measures or any other circumstances.

The EIR is not intended to, and could not, provide take authorization under the federal Endangered Species Act for the Delta Plan or for any project encouraged by the Delta Plan. The Delta Plan's significant adverse impacts related to biological resources, including special-status species, are discussed in Section 4 of the EIR. Regarding the EIR's analysis of alternatives to the Delta Plan, please see Master Response 3.

project proponents choose to adopt some mitigation measures but not others or no mitigation measures at all. Proposed mitigation cannot be mere suggestions, and instead must be fully enforceable. Federation of Hillside & Canyon Assn. v. City of Los Angeles (2d Dist. 2000) 83 Cal.App.4th 1252, 1259.

The failure to require mitigation for endangered species impacts also violates the Federal Endangered Species Act. There is no discretion under the Endangered Species Act to authorize a project that would jeopardize survival of listed fish or adversely modify critical habitat. Center for Biological Diversity v. United States Bureau of Land Management(Ruby Pipeline Case), 698 F.3d 1101 (9th Cir. 2012). In the Ruby Pipeline case, the Fish and Wildlife Service's Biological Opinion analyzing the impacts of a natural gas pipeline incorporated voluntary conservation actions as mitigation measures which factored into its determination that the project would not jeopardize the continued existence of several endangered species and would not adversely affect critical habitat. The Ninth Circuit found the Service's determination to be arbitrary and capricious because the conservation measures were mislabeled and unenforceable. The Ruby Pipeline case confirms the standard that valid mitigation measures must be enforceable under the Endangered Species Act and may not be simply voluntary suggestions. ROR010-8

If the Fish and Wildlife Service concludes that jeopardy or adverse modification is likely, then any take resulting from the proposed action is subject to Section 9 liability. See Sierra Club v. Babbitt, 65 F.3d 1502, 1505 (9th Cir. 1995). In its discussion of section 7 of the ESA in TVA v. Hill, the Supreme Court made clear that "Congress considered and rejected language that would have permitted an agency to weigh the preservation of species against the agency's primary mission." Ctr. for Biological Diversity, supra, pp.1115-16, citing Sierra Club v. Marsh (1987) 816 F.2d 1376. Thus, the Council may not summarily reject alternatives and mitigation measures that would avoid impacts to endangered species simply because the Council would rather increase export conveyance capacity.

In addition, mitigation measures here are dependent on actions that may never come to pass. Bond measures that have already been pulled from the ballot twice and that may never pass are not the effective mitigation required under the Endangered Species Act. Mitigation measures must be an integrated part of the project, so that if a measure is not implemented, re-initiation of consultation under the Endangered Species Act is automatically triggered. Sierra Club v. Marsh (1987) 816 F.2d 1376. The Delta Plan allows exporters to avoid all costs of the worsening salinity intrusion in the Delta that will result from the BDCP and shifts those costs on to the taxpayers. The problem for the Council in that regard is that mitigation must be real and assured. In the words of the Ninth Circuit, "any risk to listed species thereby created [by the project] 'must be borne by the project, not by the endangered species.'" Center for Biological Diversity, 698 F.3d 1101, 1115.

No comments

- n/a -

The EIR Fails to Adequately Analyze the Impacts to Upstream Areas that Will Result from the Delta Plan Policies.

The EIR does not include an analysis of how the proposed BDCP conveyance will affect upstream reservoir operations, and how regulatory restrictions on these reservoirs will affect proposed project operations. Such an omission frustrates the public participation goals of CEQA. The decision in Friends of the Eel River v. Sonoma County Water Agency (2003) 108 Cal.App.4th 859, held an EIR insufficient to comply with CEQA in analyzing cumulative impacts with respect to a proposed increase in an agency's withdrawal of water from the Russian River. By failing to consider possible curtailment of water from the Eel River, the EIR failed to alert decision-makers and the public "to the possibility that the Agency will not be able to supply water to its customers in an environmentally sound way." 108 Cal.App.4th at 871. The failure to discuss the nature of altered reservoir operations and the related environmental impacts has frustrated the ability of public to understand the true nature of the Delta Plan, and has resulted in a failure to develop accurate mitigation measures and a reasonable range of alternatives. ROR010-9

Please call if you have any questions on our comments. ROR010-10

Sincerely,

/s/ E. Robert Wright

E. Robert Wright

Senior Counsel

/s/ Kathryn Cotter

Kathryn Cotter

Legal Counsel

Response to comment ROR010-9

Please refer to response to comment ROR010-3.

Response to comment ROR010-10

Comment noted.

To protect and restore California Rivers by influencing public policy and inspiring citizen action.

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January 11, 2012

Cindy Messer
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: Exhibits referred to in Comments on Recirculated Draft Programmatic Environmental Impact Report (RDPEIR)

Dear Ms. Messer and Council Members:

Please include the attached three documents in the Administrative Record in your CEQA proceedings on the Final Draft Delta Plan and RDPEIR. These three documents have been or are being referred to in the written comments of the Environmental Water Caucus and/or Friends of the River and are as follows:

Release and Report in Brief, National Academy of Sciences, A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan (May 5, 2011);

Eberhardt School of Business Forecasting Center, Benefit-Cost Analysis of Delta Water Conveyance Tunnels (July 12, 2012);

California Natural Resources Agency, Gov. Brown and Obama Administration Outline Path Forward for Bay Delta Conservation Plan, "The elements of a preferred proposal include the construction of water intake facilities with a

ROR010-11

Response to comment ROR010-11

The documents noted here are attachments to the letter submitted on the RDPEIR and do not require a response.

total capacity of 9000 cubic feet per second. . . and a conveyance designed to use gravity flow. . .” (July 25, 2012).

ROR010-11

Sincerely,

E. Robert Wright
Senior Counsel
Friends of the River

No comments

- n/a -

To protect and restore California Rivers by influencing public policy and inspiring citizen action.

FRIENDS OF THE RIVER

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January 14, 2013

Cindy Messer

Delta Stewardship Council

980 Ninth Street, Suite 1500

Sacramento, CA 95814

Re: Additional Comments on Final Draft Delta Plan (DP), Recirculated Draft Programmatic Environmental Impact Report (RDEIR) and Proposed Delta Plan Rulemaking Package (Regulations)

Dear Ms. Messer and Council Members:

As set forth in our letter of January 11, 2013, this organization, Friends of the River, objects to approval of the Delta Plan (DP), RDEIR, and Regulations. This organization is also included as a commenter for the detailed comments submitted by the Environmental Water Caucus (EWC), and I commented orally at the public hearing on January 11, 2013, on behalf of Friends of the River, Restore the Delta, and EWC. I submit this additional, supplemental letter on behalf of Friends of the River as it pertains to a critically important subject that I did not address or completely address at the Hearing.

The Delta Plan and Regulations adopt the Revised Project alternative, and call for, recommend, or encourage "improving Delta conveyance and operations" "improving conveyance in the Delta", "optimizing diversions in wet years when more water is available" and establishing new diversions upstream from the Delta to transport water around or under the Delta to the pumping plants in the south Delta and the exporters. The RDEIR and Draft EIR have failed to consider the whole of the action and its

ROR010-12

Response to comment ROR010-12

Comment noted.

impacts and the Delta Plan CEQA process has unlawfully segmented the project and conducted piecemeal environmental review.

ROR010-12

The RDEIR discloses that the Revised Project "seeks to improve water supply reliability by encouraging various actions which, if taken, could lead to construction and/or operation of projects that could provide a more reliable water supply." (RDEIR 2-5). Such projects could include "surface water projects (water intakes, treatment and conveyance facilities, reservoirs, hydroelectric facilities)." (RDEIR 2-5). The Executive Summary for the RDEIR refers to "improve management of Delta water supplies using increased storage and improved Delta conveyance." (ES-2).

The proposed regulations call for action to "improve Delta conveyance and operations" and states that "This will be done by improving conveyance in the Delta...to optimize diversions in wet years when more water is available". (§5001(e) (A),(C).

It is being pointed out in the extensive written comments this same date by EWC, that in view of the specifics of the BDCP Delta Tunnels project announced by both the Governor and the DWR Deputy Director during the summer of 2012, the Delta Plan CEQA process has failed to provide an accurate, stable and finite project description which is required by CEQA. In addition to that violation, CEQA is also violated by unlawfully segmenting, also referred to as piecemealing, project approval and environmental review.

The Draft EIR had anticipated that a public draft of the BDCP and the related EIR/EIS would be released by mid-2012. (Draft EIR 23-3). The Draft EIR had stated that the BDCP must comply with CEQA including "a comprehensive review and analysis" of critical issues including "a reasonable range of flow criteria, rates of diversion, and other operational criteria... and other operational requirements and flows necessary for recovering the Delta ecosystem and restoring fisheries under a reasonable range of hydrologic conditions, which will identify the remaining water available for export and other beneficial uses", "a reasonable range of Delta conveyance alternatives, including through-Delta", and "the potential effects of climate change, possible sea level rise up to 55 inches, and possible changes in total precipitation and runoff patterns on the conveyance alternatives and habitat restoration activities considered in the EIR. The potential effects on migratory fish and aquatic resources. The potential effects of each Delta conveyance alternative on Delta water quality". (Draft EIR 23-3, 4).

ROR010-13

The release of a public draft of the BDCP and its EIR/EIS did not happen in mid-2012 and still has not happened as of today. The DWR Deputy Director stated at the BDCP public meeting of December 18, 2012 that the public drafts will not be released before the late spring of 2013. Consequently, neither the decision-makers nor the public has had anything before them to allow informed evaluation of the pros and cons of creating a massive and expensive public works project to divert enormous quantities of water upstream from the Delta for export without first flowing through the Delta. That would be done even though the Delta is already undergoing significant environmental degradation including a trend of increasing diversions already, deteriorating water quality, increasing salinity intrusion, and declining fish populations including those of endangered fish species.

In addition to public and the decision makers not having had the benefit of whatever information and analysis that would have been included in the BDCP environmental documents, there has been no water supply availability analysis, quantification, or analysis of the environmental impacts of supplying specific quantities of water, in violation of the California Supreme Court's decision in *Vineyard Area*

Response to comment ROR010-13

The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1.

Citizens for Responsible Growth, Inc. v. City of Rancho Cordova (2007) 40 Cal.4th 412, 429, 430, 434, 440-441.

The Council's CEQA process has unlawfully segmented the threshold issue and alternative of ***whether to create new diversions and conveyance upstream from the Delta*** for the exporters from analysis and consideration of the water supply, water quality, endangered fish species, and other environmental issues arising from future operation of the facilities taking enormous quantities of freshwater away from the Delta.

These violations are fundamental and extremely serious. The CEQA Guidelines (14 Cal. Code Rags. 15000 et seq.) define a "project" to mean "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment. . ." Guideline § 15378 (all citations are to the CEQA Guidelines unless otherwise indicated). "All phases of a project must be considered when evaluating its impact on the environment: planning, acquisition, development, ***and operation***." (Guideline § 15126 (emphasis added). According to the Draft EIR, once adopted, the BDCP must be included in the Delta Plan. (Draft EIR 23-1). The Draft EIR declares that "it is anticipated that the BDCP will include actions to. . . modify SWP and CVP Delta water conveyance facilities and operations in the Delta. . . ." (Draft EIR 23-2). As set forth in detail in the EWC written comments, and my oral comments, there has been no detailed, comprehensive identification, let alone analysis of the environmental impacts of diverting massive quantities of water for the exporters, upstream from the Delta.

All the RDEIR does is concede that the Revised Project would have significant and unavoidable environmental impacts including "water resources, violate any water quality standards or waste discharge requirements or substantially degrade water quality." (RDEIR 24-10). Likewise, the RDEIR concedes that another significant and unavoidable environmental impact would be "substantial adverse effects on sensitive natural communities, substantial adverse effects on special-status species; substantial adverse effects on fish or wildlife species habitat; interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established natural resident or migratory wildlife corridors." (RDEIR 24-10). Similarly, the RDEIR admits that "operations of new water supply facilities whether in-stream, such as pipelines, tunnels, canals, pumping plants, water intakes or diversions may create long-term changes in local mixtures of source waters within water bodies." (RDEIR 3-3). — ROR010-13

Such admissions of the obvious are virtually useless vague generalities. There is a difference between catching a cold and developing a terminal illness. The point being that there is a difference between diverting a small amount of water from a healthy body of water, and taking an enormous quantity of water from a body of water that is already seriously degraded and is in crisis stage. Such vague, boilerplate statements might, arguably, constitute the start of an Initial Study under CEQA to begin identifying environmental impacts of a project for consideration. They most certainly do not constitute the kind of comprehensive environmental analysis required in a legally sufficient EIR. Moreover, these are the types of deficiencies that cannot be remedied simply by responding to comments in a Final EIR. Unless the Council drops the call for improved conveyance, new conveyance upstream from the Delta, optimizing diversions in the wet years, and so forth, it will be necessary for the Council to prepare and recirculate a new Draft EIR. That is because "The draft EIR [and RDEIR] was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded." Guideline § 15088.5(a)(4).

No comments

- n/a -

The RDEIR seeks to justify failure to perform any meaningful environmental analysis of the project by self-serving argument that "the Revised Project would not directly result in construction or operation of projects or facilities, and therefore would result in no direct impacts on many resources. The Revised Project could, however, result in or encourage implementation of actions or development of projects, including construction and operations of facilities or infrastructure. The severity and extent of project specific impacts on the physical environment would depend on the type of action or project being evaluated, its specific location, its size, and a variety of project and specific factors that are undefined at the time of preparation of this program-level study. Project-specific impacts would be addressed in project-specific environmental studies conducted by the lead agency at the time the projects are proposed for implementation." (RDEIR 2-26).

That statement is both false and constitutes erroneous interpretation of CEQA. The project was defined during the summer by both the DWR Deputy Director and the Governor as consisting of two 33 foot diameter tunnels 35 miles long with the capacity to convey 15,000cfs (cubic feet per second) under the Delta to the pumping plants at the south end of the Delta. The upstream diversion location would be near Clarksburg on the Sacramento River. Initially there would be three intakes with a capacity to divert 9000cfs though additional intakes could be added later to take the whole 15,000cfs. That is an enormous quantity of water, equivalent to the typical entire summer flow of the Sacramento River at that location. There is a difference between filling a water bottle in the River and diverting 15,000cfs.

As explained by the California Supreme Court more than 30 years ago, CEQA establishes a mandate "that environmental considerations do not become submerged by chopping a large project into many little ones-each with a minimal potential impact on the environment-which cumulatively may have disastrous consequences." *Bozung v. Local Agency Formation Com.* (1975) 13 Cal.3d 263, 283-4. What the Council's CEQA process has done is to segment, or piecemeal, the decision whether to establish new conveyance for the exporters, upstream from the Delta, from the analysis of the actual impacts of the actual diversions and conveyance of all that fresh water before it even reaches the Delta. "Doing so [segmenting environmental analysis] runs the risk that some environmental impacts produced by the way the two matters combine or interact might not be analyzed in the separate environmental reviews." *Tuolumne County Citizens for Responsible Growth, Inc. v. City of Sonora* (2007) 155Cal.App.4th 1214, 1230. The CEQA Guidelines provide that where individual projects or a phased project is to be undertaken the lead agency shall prepare a single program EIR for the ultimate project. And, "Where an individual project is a necessary precedent for action on a larger project, or commits the lead agency to a larger project, with significant environmental effects, an EIR must address itself to the scope of the larger project." Guideline § 15165. Section 15165 prescribes that the program EIR shall be prepared as described in Guideline § 15168, which explains how the program EIR can allow more exhaustive consideration of effects and alternatives and do so at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts.

The CEQA process followed by the Council has, instead of following the CEQA decisions and governing Guideline sections, unlawfully segmented the General Plan type fundamental decision to create new conveyance from analysis of the environmental consequences of diverting the enormous quantities of water upstream from the Delta in the course of operations of the conveyance facilities—Delta Tunnels— that are the centerpiece of the BDCP. "[P]ostponing environmental analysis can permit 'bureaucratic and financial momentum' to build irresistibly behind a proposed project,' thus providing a strong incentive to ignore environmental concerns.'" *Save Tara v. City of West Hollywood* (2008) 45

ROR010-13

No comments

- n/a -

Cal.4th 116, 135. "' The full consideration of environmental effects CEQA mandates must not be reduced to a process whose result will be largely to generate paper, to produce an EIR that describes a journey whose destination is already predetermined.'" *Save Tara*, 45 Cal.4th 116, 135-6. ROR010-13

"CEQA's informational purpose 'is not satisfied by simply stating information will be provided in the future.'" *Vineyard Area Citizens*, 40 Cal.4th 412, 441. Either the call for new conveyance, optimizing diversions in the wet years, and so forth must be dropped from the Delta Plan and the Proposed Regulations, or a new Draft EIR comprehensively addressing and analyzing water availability, water supply, and the environmental consequences of providing the quantity of water to be taken must be prepared and recirculated so that the decision-makers and the public have adequate information to evaluate the proposed project and to consider reasonable alternatives.

Finally, this confirms the items that I entered into the Record by supplying them to Angela D'Ambrosio, special assistant to the Executive Officer after concluding my oral comments at the public hearing on January 11, 2013. These items were as follows:

Friends of the River comment letter dated January 11, 2013, seven pages long, including submission of New Alternatives 2A and 2B.

Friends of the River letter dated January 11, 2013, and the three exhibits furnished therewith including *Release and Report in Brief*, National Academy of Sciences; *Eberhardt School of Business Forecasting Center*, Benefit-Cost Analysis of Delta Water Conveyance Tunnels; and *California Natural Resources Agency* "The elements of a preferred proposal include the construction of water intake facilities with a total capacity of 9000 cubic feet per second . . ." ROR010-14

I also entered into the Record the lengthy document and appendices entitled Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay, with a cover page reflecting Delta Flow Criteria Informational Proceeding, before the State Water Resources Control Board, Technical Memorandum WR10-001, Contra Costa Water District (February 2010).

Please call if any of the above six items have been misplaced or are not found in your Administrative Record, and I will be happy to furnish a duplicate.

CONCLUSION

The Council's CEQA process has placed the cart before the horse by calling for new conveyance of significant quantities of freshwater upstream from the Delta prior to the Council or any other public agency completing the CEQA process including preparation of a sufficient EIR identifying, disclosing, and analyzing the environmental consequences of doing so. That action violates CEQA. This placing the cart before the horse including being prior to the State Water Resources Control Board determining how much if any water is actually available for such diversions, and conducting cost-benefit analysis and performing its analytical responsibilities pursuant to the public trust doctrine to ensure protection of the Delta and the Delta watershed, also violates California's public trust doctrine as set forth by the California Supreme Court in the Mono Lake case, *National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419. ROR010-15

Response to comment ROR010-14

Comment noted.

Response to comment ROR010-15

Comment noted.

Sincerely,

/s/ E. Robert Wright

E. Robert Wright

Senior Counsel

No comments

- n/a -

ROR011 Friends of Clear Lake, Inc.

Friends of Clear Lake

John Zebelean, President
Ph.D. Physics, MS Metallurgy

P.O. Box 214, Lucerne, CA 95458
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Email: Dr.fixit@mediacombb.net

No comments

- n/a -

980 9th Street, Suite 1500
Sacramento, CA 95814

Delta Stewardship Council

January 10, 2013

Honorable Council: My name is John Zebelean Ph.D. I am the President of Friends of Clear Lake, Inc. a non-profit environmental Corporation established in 1993, Incorporated in 1995. We are located in Lake County; next to the most Mercury polluted lake in the World. ROR011-1

Clear Lake is the major polluter of Sacramento River, the Delta, and San Francisco Bay and beyond. We express interest to know, " how you would be able to provide safe and clean water to the public, prior to solving the problem of sources which pollutes our waters? I have been at Delta Council inauguration in 2009, and I regularly receive your information. Unless I have missed something, I have not seen you addressing the Clear Lake problem. If your findings and analysis confirms that a major source of the pollution is coming from Clear Lake, have you arrive at any recommendation to solving the problem? ROR011-2

On this day of January 11, 2013, I am providing the Council with two of my written articles published in local Lake County Magazine "lakecomagazine.com" and suggest to you reading two other articles written by Maurice Taylor, describing Clear Lake pollution problem as well "Political" pollution problem in Lake County.

My first article titled, "THE BLOOD and MONEY of CLEAR LAKE" (Quo Vadis Domino), was published December 10, 2012. It includes pages from the 1973 State of California Trust Agreement with Lake County on duties of maintaining the Lake.

ROR011-3

My second article, 'THE ANTHONY FARRINGTON LEGACY" was published January 3, 2013.

Maurice Taylor article, "Lake County Watershed Mismanagement" was published October 26, 2012.

Response to comment ROR011-1

Comment noted.

Response to comment ROR011-2

This is a comment on the Project, not on the EIR. Section 3, Water Resources describes Clear Lake as having a "profound influence on sediment transport throughout the river, Delta, and San Francisco Bay system with the Delta and Bay experiencing much reduced sediment flux as a result of the altered supply (Schoellhamer et al. 2007)" (DPEIR at p. 3-18).

Response to comment ROR011-3

Comment noted.

Second Mr. Taylor article, "BOS-MORE MANAGEMENT FAILURE" was published November 16, 2012. ROR011-3

These articles are self-explanatory. Our articles can be viewed on "lakecomagazine.com" by searching title names and CLICK on the TITLE.

All State and Federal departments mentioned in my articles will be provided with information and a request for intervention.

Sincerely,

Dr. John Zebelean, President
Friends of Clear Lake, Inc.
E-mail "fixitdr@yahoo.com"

No comments

- n/a -

Article "THE BLOOD and MONEY of CLEAR LAKE and BEYOND"

Author, Dr. John Zebelean

Was published in the Lake County Magazine, "lakecomagazine.com" on December 10, 2012.

No comments

- n/a -

THE BLOOD AND MONEY of CLEAR LAKE and BEYOND

QUO VADIS DOMINO
(WHERE ARE YOU GOING MY LORD)?

Clear Lake, once a jewel that pen could not describe, is today a swamp! It is a swamp potentially lethal to humans and animals. The human minds with bloody hands allowed the lake to be used as GUINEA PIG for research purposes from 1947 to present. Unless the federal and state government steps in to begin an investigation, and to protect the lake, it will continue to be used s guinea pig. What continually happens to this lake is a crime against humanity, and no one seems to care! Why?

DICTATORIAL DYNASTY, LOCAL POLITICS, " NONE DARE TELL US WHAT TO DO"

Beginning in 1949 and continuing until the present time, and without mercy, toxic chemicals have been dumped into this lake. There was a recent attempt to use the biological chemical AGENT ORANGE.
For Heaven's sake, have we forgotten the damaged done to our soldiers in Vietnam? How quickly we have forgotten Dr. Rachel Carson's book the "Silent Spring" (1962) which described Clear Lake as an Elixir of Death. Why are not agencies like State Department of Water Resources, California Health Department, Environmental Protection Agencies (EPA) Center for Disease Control (CDC) on top of what chemicals are safe to be used in water meant for human contact and usage?

Are the above agencies employing chemical testing methods in bodies of water in non-populated areas before they are allowed for research purposes in Clear Lake?
If not, WHY NOT? Isn't there a law that prohibits any toxic chemicals to be used in any drinking water sources? Why are these practices not prosecuted for violation against Clear Lake?

No comments

- n/a -

Are we inhumane and used as GUINEA PIGS for research purposes? IT INDICATES SO. Massive amounts of TOXIC chemicals were dumped in Clear Lake, Lake County, a place which was envisioned even by the State of California Legislators to be a place of recreation under 1973, CHAPTER 639 granted TRUST of Clear Lake, to Lake County. In that TRUST it states as follow: For the protection of wildlife habitats, the improvement, and conservation of the wildlife and fish resources and the ecology of the area, (Trust Agreement attached). They did not included humans as endangered specie in Lake County. Then in 2004, SB 1136 was signed. This is another 21st century disaster.

Why these Trust Agreements were issued to this rural people? They should of known that this lake is far beyond the knowledge, financial ability and capability to maintain this lake in healthy conditions. Now every body turns their heads. They SEE NOTHING, KNOW NOTHING AND DO NOTHING... I wonder if they knew at that time that Lake County was viewed by the outsiders as people from "eutrophic lake, they have the MIRACLE plant TULLE'S and will solve lake's pollution problem." This is how politicians have brain washed these people to the fullest extent to keep them under control.

Fortunately I met many wonderful people of quality and intellect. But, they have given-up on trying to guide local politicians in proper direction with regards to the lake. They have their own 'BLIND' agenda.

The Clear Lake Advisory Committee (CLAC), a group of very knowledgeable individuals, who attempted to guide them in a proper direction, is subject to disbandment. In November, 2012, the Chair of the BOARD walked out of meeting refusing to hear what CLAC had to say.

Even when Clear Lake is dangerously infested by Cyanobacteria toxins, there are no cautionary signs posted except in one place. When a member of the public posted a sign in one area of the lake, a county employee was dispatched to the area and pasted over that sign with the county's telephone number. When that number was called to find out why the sign was covered over, the caller was told that the county did not want to scare tourists away. WHAT TOURISTS??? Do they see GHOSTS and confuse with TOURISTS??? As I write, massive resorts are

No comments

- n/a -

taken over by the BANKS, property are foreclosed, and restaurants are forced to close their doors.
When media called regarding that particular sign, they were told that County have made many signs but decision was made by local Health Department, Environmental Department and Water Resources Department not to have them posted in order not to scare people. This is Lake County Dictatorial Dynasty, do not care if people are getting hurt or DIE. July 2009, at Board of Supervisors Meeting, decision was made not to declare Lake County as disaster area. Reason for decision was given that Bay Area Media will come back and will hurt tourist. Take a close look at the state of economy in Lake County and tell me what tourists do you see.

On July 26, 2012, Dr. Tait, from local Health Department went to city Council in Clearlake and advise them that CDC from Atlanta, Georgia, is coming to city of Clearlake to investigate something. Why CDC did not come in August or September to see the mess of Clear Lake? Were they told not to come until Clear Lake looks better?
I would not be surprised...

The same agencies that suppose to prosecute polluters are issuing permits knowing that those chemicals are toxic to humans, animals and aquatic creatures alike, it is printed on the label as precautionary disclosure.

Thanks to State Department of Water Resources for rescinding a Research Authorization permit application on Clear Lake to use Agent Orange after it was issued.
Please, State Department, if you have some left over SANITY pills, granular or in liquid form, give it to Lake County POLITICIANS, they could use a few TONS. Do people of Lake County knows that they are subject of use, and exposed to unproved and possible unlawful toxic chemicals used in Clear Lake? SOME DO, and SOME DO NOT.

Does anybody in Sacramento, or Washington D.C, really knows what is happening in Lake County?

Does anyone in Sacramento, or Washington D.C, knows that Lake County is the highest in CANCER rate in the WORLD?

No comments

- n/a -

How about Diabetes, Cardiovascular, Obesity, Liver problems etc? Even DOGS and CATS over 50% are prematurely DYING of CANCER in Lake County. Why nobody cares? This will be a wake-up call.

In 1997, Hydrila an aquatic plant in Clear Lake was sprayed on one section in the Soda Bay Area, with unknown chemical. In 2000, nine individuals were diagnosed with CANCER all within six months time frame. Every house in the area where they sprayed was diagnosed with CANCER, except, vacationer houses since no one was present at the time of spray.
Three individuals DIED during CANCER treatment process, two DIED two years after treatment, and four are still alive. In the Street behind more individual were diagnosed with CANCER, in the same time frame. This case yet to be fully investigated. This is something Lake County people did not know. When these people spoke with one of Lake County Attorney, they were told that statue of limitation passed and there is nothing they can do. Bad advice- statue of limitation begins from the time you become aware of the problem.

THE SERMON ON MOUNT KONOCTI

July 6, 2009, during massive Cyanobacteria infestation, Town Hall meeting was held at City Hall in Clearlake. One of chosen instructor raised his ARMS stating you can call me dirty IRISH, but I was swimming four times in this lake and see I am OK. Just spray water on Cyanobacteria mats, break it, sink it to the bottom of lake and it will be OK.
One week or so after that Town Hall Meeting, a young man went swimming in the infested area, (there were no sign posted at that time) and according to instruction it was safe to swim; a few minutes later that young man emerged from the lake, screaming his lungs out; he was burned allover his body and sought help at a store across the street; he was taken to the hospital for emergency treatment.

In August 2009, as boats were spraying water, breaking mats to sink them as they were told, an older lady in close proximity to these actions, who suffered with asthma, was transported by ambulance to the

No comments

- n/a -

hospital. I was told that within a few hours she had died. Her death was allegedly attributed to AEROSOL inhalation. Was her death due to activity in the area or due to asthma? We will never know. Cyanobacteria mats cannot be sunk.

They refuse to take my advice seriously to stay away from infested area and to stop spraying water or breaking mats as they may cause serious injury to people. In 2010, the same practice was used and five individuals ended in emergency hospital, two of them for the second time. There is more than sufficient scientific information on Internet advising bothers, and skiers to stay away from infested area in order to prevent AEROSOL from being carried into populated area and cause Health problems. I sharply contested to the Board of Supervisors, advise them that people have been hospitalized and told them that someone may get seriously hurt and possible die and they will be held responsible. Finally after my many contests they stopped with that practice.

In 2006, they sprayed again for weeds, and KILLED thousands and thousands of FISH of various species; article in the Newspaper stated that they do not know the cause; the cause may have been MERCURY or lack of OXYGEN. Catfish, Carp and other specie can survive for 20 days or more without OXYGEN. There was no lack of OXYGEN; there was a lack of healthy MINDS.

In 2007, over 2000 wild Ducks mysteriously died on the shore in Lakeport. The report claimed the deaths were due to an unknown Virus. No dead ducks in Blue Lake, no dead ducks in Lake Mendocino, no dead ducks on North shore, only in Lakeport.

In 2008, pellets were used on weeds and killed 10,000 Carps. According to the report this time fish died due to COI VIRUS, but the fish stomachs were full of pellets.

If there is anything that could go wrong, it will go wrong in Lake County.

Wake up AMERICA, before is too late; you do not solve Clear Lake problems with more TOXIC CHEMICALS, nor 176 square kilometers of

No comments

- n/a -

the lake's surface by planting tulles. Clear Lake pollution problem can be solved scientifically by utilizing modern technology only.

How about the damage cause to Cache Creek, the Delta, San Francisco Bay and beyond? Does any one knows that 60% of Mercury in the DELTA comes from Clear Lake? How about rice fields irrigated with water from Cache Creek, is Mercury contaminated rice, vegetables, fruits, sold to public for consumption? INDEED IT IS...

From 1949 to 1993, County knows they received 'grant monies', but do not know how much, and do not know how it was spend because records were not kept. It is known that they have paid Dr. Horne $ 875 thousands for his five years research of Clear Lake, from 1978-1983, the only records they have.

My advise to DYNASTY is; give Clear Lake back to its lawful owner, you are not capable to take care of once a JEWEL, now a swamp, you have breached every section of 1973, Trust Agreement. I have said once before, and shall say again, I am here to separate POLITICS from SCIENCE, and tell people the TRUTH, and to save LIVES.

Wake-up, the HEAVEN could open, and the echo of dead souls will curse us for prematurely taking many lives.

The warm sunny summer days, for some will be gone.

QUO VADIS DOMINO
(Where are you going my lord)?
The answer was
"ON THE ROAD TOWARDS SELF DISTRUCTION."

Lake County Government is not a"SAINT" and POLITICS is not "HOLY".

Remember President Reagan's QUOTE- "Government does not solves problems, the Government IS the PROBLEM"...

No comments

- n/a -

Article "THE ANTHONY FARRINGTON LEGACY".

Author, Dr. John Zebelean

Was published in the Lake County Magazine "lakecomagazine.com" on January 3, 2013.

No comments

- n/a -

THE ANTHONY FARRINGTON LEGACY

Mr. Farrington is a member of Lake County Board of Supervisors.

On October 24, 2012, at Board of Supervisors Chamber, a debate was held regarding County's MEASURE "E".

Mr. Anthony Farrington, at that debate, you made some controversial statements on which I expressed interest to have clarification.

Whatever happened to the $ 38 million in funds supposedly approved by Honorable Assemblymen Wesley Chesbro, to be used for the Middle Creek restoration project? Your response was that such funds were never approved.

In July of 2009, at Board of Supervisors meeting, Ms. Ruth Valenzuela, secretary to Mr. Chesbro, stated that Lake County would receive financial assistance.

In December of 2009, at the Board of Supervisors meeting, Ms. Pamela Francis, an employee at that time with Department of Water Resources, disclosed receiving the sum of $ 38 million for the restoration project. I personally asked Ms. Francis clarification as to the use of those funds. I never know when Lake County politicians tell the truth, half-truth or neither.

Further, you stated that from 2002-2003 and up to spring of 2011, the county received $ 12 million, out of which $ 6.25 million was used to purchase property in the restoration project area. What ever happened with the balance of $ 5.75 million?

Recently the Director of the Department of Water Resources asked the Board of Supervisors to advance over $ 200,000 to purchase more Middle Creek property on the bases that State of California is slow in releasing funds. What about the balance of $ 5.75 million noted above?

On one of your radio interviews at the end of September or early October 2012, you made a statement about how DYSFUNCTIONAL the STATE OF CALIFORNIA and FEDERAL GOVERNMENT are.
Mr. Farrington, can YOU tell us how FUNCTIONAL LAKE COUNTY GOVERNMENT is?

No comments

- n/a -

To some extent I could agree with your analogy, but not entirely.

After $ 46 million of the $ 8.9 billion allocated for the super fund on Sulfur Bank Mercury Mine had been spent, the USEPA project manager retired stating there was no more money!!! The project was abandoned and "HERMAN PIT" is subsurface leaching mercury contaminated water in the lake at the rate of 10-13 million gallons in 24 hours at present time as it has since 1957, when mining was ceased. What have you done about this, Mr. Farrington?

Recently, on the radio, I heard you stating how abundant fish was in this lake when you were a young boy; that you were catching fish on bare hook.
What ever happened to those fish? Did DINGOES eat all that fish, or were they KILLED by all those toxic chemicals dumped in this lake?

On several occasions, including at that debate on October 24, 2012, you stated that 70% of NUTRIENTS are coming from SCOTTS CREEK and MIDDLE CREEK into Clear Lake. When asked if you have records to prove, YOU stated that you TRUST people who provided you with this information. At the end of the debate I approached you and said that you have made a FRAUDULENT statement about 70% of the NUTRIENTS coming from SCOTTS CREEK and MIDDLE CREEK and asked you to provide me with WRITTEN DOCUMRNTS which will support your statement, as well as the other comments. You stated to my face "SUE ME" and "I WILL NEVER DREDGE CLEAR LAKE."

Mr. Farrington I am not here in Lake County to sue you or anyone for that matter, unless I have to. My reason for being here is to investigate Clear Lake POLLUTION PROBLEMS, possible misuse of GRANTS FUNDS, and to separate POLITICS from SCIENCE. And, to TRUTHFULLY inform Lake County citizens of solutions regarding Clear Lake problems and what legal options are available to CITIZENS. I hope you do not mind?

Whether Clear Lake will be dredged, or not dredged, is not of my concern. DREDGING is the only solution to Clear Lake's pollution problems, whether YOU accept the facts or deny them, is up to YOU. This will be a decision to be made by State of California and the Federal Government, and there is nothing YOU can do about it, Mr. Farrington.

Mr. Farrington, for your personal information, YOU should know that UC Davis scientists stated that Kelsey Creek, Scotts Creek and Middle Creek provide 50% of

No comments

- n/a -

the water and 50% of nutrients to Clear Lake. Kelsey Creek is NOT a part of Middle Creek restoration project. That leaves Scotts Creek and Middle Creek alone, as 30% maximum water provider to Clear Lake and hardly any NUTRIENTS come from these two sources. I have laboratory documents to prove my statement, and also, your County TMDL will support my findings.

One single source in Clearlake Oaks provides more NUTRIENTS to Clear Lake than Kelsey Creek, Scotts Creek and Middle Creek COMBINED. Why would you create another SWAMP in Lake County in the area where there is hardly any problem and neglect where the problem exists?

Mr. Farrington, you also stated in your October 24, 2012 debate that Clear Lake is not LAKE TAHOE, and Clear Lake is not a "SWIMMING POOL".
It is obvious Clear Lake is CLEAR LAKE, not TAHOE... Then, I assume you will be posting SIGNS around Clear Lake Stating: "THIS LAKE IS NOT A SWIMMING POOL."
And how about "CERCARIA" (swimmers itch). Don't you think you should educate children not to swim in this lake for health reasons?

How many children have to end up in hospital emergency room or doctor's offices?
How about CERCARIA of the genera Schistosoma, Chloronorchis, Paragonimus, Fasciolopsis, and Fasciola which are known to infect HUMANS, including internal human organs, not only the skin?

And how about educating people and specifically CHILDREN not to eat fish from this lake due to MERCURY CONTAMINATION?

How about 1988, Central for Disease Control suggested having WARNING SIGNS posted on every road leading to Clear Lake stating there is MERCURY in this LAKE?

Mr. Farrington, how about posting SIGNS, which state: "Children under age of 17 and pregnant women should only eat very limited amounts of mercury contaminated fish each year, as suggested by the health department"?

Mr. Farrington, YOU owe an explanation to the people of Lake County, and to the WORLD, for your behavior. And one more, but not last: How long do YOU wish to hold Lake County politics on WELFARE?

Mr. Farrington, you have been mislead about 70% NUTRIENTS. I would like to see YOU getting out of that ILLUSIONARY WORLD for the sake of Lake County's

No comments

- n/a -

CITIZENS. Also, please stop insulting Lake County with TULLES. We are not well respected by neighboring counties. You have used the wording "SAVE the LAKE" on Measure "E"- the same wording Friends of Clear Lake, Inc. a non-profit corporation, have used since 1992. NOT TOO NICE!!!

Good luck in; your endeavor to plant TULLES. And, thank you for the invitation to your CLUB, but NO THANKS. I am a SCIENTIST not a POLITICIANS!

Lake County Government is not a "SAINT" and politics is not "HOLY."

Remember President Ronald Reagan's quote: "Government does not solves problems, the Government IS the problem"...

No comments

- n/a -

CHAPTER 639

An act to convey in trust the submerged lands in Clear Lake to the County of Lake, and to its successors, in furtherance of navigation and commerce and the fisheries and to provide for the government, management and control thereof, and to reserve certain rights to the state.

(Approved by Governor September 21, 1973 filed with Secretary of State September 21, 1973)

The people of the State of California do enact as follows:

Section 1. There is hereby granted and conveyed in trust to the County of Lake, and to its successors, subject to the provisions of Section 16 of this act, all the right, title, and interest of the state held by the state by virtue of its sovereignty and in and to the submerged lands in Clear Lake. The low water mark for Clear Lake has not been determined, and such determination may have to be made by judicial adjudication. Subject to such later determination, and for the purpose of the administration of this grant only, the low water mark shall be considered by the parties to this grant as being zero on the Rumsey Gauge.

No comments

- n/a -

SEC. 2. The submerged lands granted and conveyed pursuant to this act shall be forever held by such county and by its successors in trust for the uses and purposes, and upon the express conditions following, to wit:

(a) That the lands shall be used by the county and its successors for purposes in which there is a general statewide interest as follows:

(1) For the protection of wildlife habitats, the improvement, protection, and conservation of the wildlife and fish resources and the ecology of the area, the providing of open-space areas and areas for recreational use with open access to the public, the enhancement of the aesthetic appearance of the lake and the area, control of dredging or filling of the lake, or both, and prevention of pollution of the lake.

(2) For the establishment, improvement and conduct of small boat harbors, marinas, aquatic playgrounds and similar recreational facilities, and for the construction, reconstruction, repair, maintenance and operation of all works, buildings, facilities, utilities, structures and appliances incidental, necessary or convenient for the promotion and accommodation of any of such uses, including but not limited to snackbars, cafes, restaurants, motels, launching ramps and hoists, storage sheds, boat repair facilities with cranes and marine ways, administration buildings, public restrooms, bait and tackle shops, chandleries, boat sales establishments, service stations and fuel docks, yacht club buildings, parking areas, roadways, pedestrian ways and landscaped areas.

(3) For the construction, reconstruction, repair, maintenance and operation of public buildings, public assembly and meeting places, convention centers, parks, playgrounds, bathhouses and bathing facilities, recreation and fishing piers, public recreation facilities, including but not limited to public golf courses, and for all works, buildings, facilities, utilities, structures and appliances incidental, necessary or convenient for the promotion and accommodation of any such uses.

(4) For the construction, reconstruction, repair and maintenance of highways, streets, roadways, bridges, belt line railroads, parking facilities, power, telephone, telegraph or cable lines or landings, water and gas pipelines, and all other transportation and utility facilities or betterments incidental, necessary or convenient for the promotion and accommodation of any of the uses set forth in this section.

(b) The county, or its successors, shall not at any time grant, convey, give or alienate such lands, or any part thereof, to any individual, firm or corporation for any purposes whatever; provided, that the county, or its successors, may grant franchises thereon for limited periods, not exceeding 66 years, for wharves and other public uses and purposes, and may lease the lands, or any part thereof, for limited periods, not exceeding 66 years, for purposes consistent with the trusts upon which the lands are held by the state, and with the requirements of commerce and navigation, and collect and retain

4 240 37 2 550 480

No comments

- n/a -

rents and other revenues from such leases, franchises and privileges. Such lease or leases, franchises and privileges may be for any and all purposes which shall not interfere with commerce and navigation. Nothing contained in this paragraph (b) shall be deemed to affect the validity or term of any franchise granted by said county under the Franchise Act of 1937, and any such franchise shall be effective with respect to the lands. Nothing contained in this act is intended to affect the rights, including riparian rights, of landowners adjacent to Clear Lake.

(c) Within 10 years from the effective date of this act, the lands shall be substantially improved within the meaning of subdivision (a) of this section by the county without expense to the state, and if the State Lands Commission determinates that the county has failed to improve the lands as herein required, all right, title, and interest of the county in and to all lands granted by this act shall cease and the lands shall revert and rest in the state.

Nothing contained in this act, however, shall preclude expenditures for the development of the lands for any public purpose not inconsistent with commerce, navigation and fishery, by the state, or any board, agency or commission thereof, when authorized or approved by the county, nor by the county of any funds received for such purpose from the state or any board, agency or commission thereof.

(d) In the management, conduct, operation and control of said lands or any improvements, betterments, or structures thereon, the county or its successors shall make no discrimination in rates, tolls or charges for any use or service in connection therewith.

(e) The state shall have the right to use without charge any transportation, landing or storage improvements, betterments or structures constructed upon the lands for any vessel or other watercraft, aircraft, or railroad owned or operated by the state.

(f) There is hereby reserved to the people of the state the right to fish in the waters on the lands with the right of convenient access to the water over the lands for such purpose.

(g) There is hereby excepted and reserved in the state all deposits of minerals, including oil and gas and geothermal resources, in the lands, and to the state, or persons authorized by the state, the right to prospect for, mine, and remove such deposits from the lands.

(h) Such lands are granted subject to the express reservation and condition that the state may at any time in the future use the lands or any portion thereof for highway purposes without compensation to the county, its successors or assigns, or any person, firm or public or private corporation claiming under it, except that in the event improvements, betterments or structures have been placed upon the property taken by the state for such purposes, compensation shall be made to the person entitled thereto for the value of his interest in the improvements, betterments or structures taken or the damages to such interest.

SEC. 3. The county shall establish a separate trust fund or funds

No comments

- n/a -

in such manner as may be approved by the State Lands Commission and the county shall deposit in the fund or funds all moneys received directly from, or indirectly attributable to, the granted lands. An annual statement of financial condition and operations, to conform with such requirements as the State Lands Commission may prescribe, shall be submitted to the State Lands Commission each year by the county on or before September 30th of each year for the preceding fiscal year.

SEC. 4. Notwithstanding any other provision of law to the contrary, the county, acting either alone or jointly with another local or state agency, may use revenues accruing from or out of the use of the granted lands for any or all of the following purposes; provided, that they comply with the terms of the trust and are matters of statewide, as distinguished from local or purely private, interest and benefit:

(a) For the protection of wildlife habitats, the improvement, protection, and conservation of the wildlife and fish resources and the ecology of the area, the providing of open-space areas and areas for recreational use with open access to the public, the enhancement of the aesthetic appearance of the lake and the area, control of dredging or filling of the lake, or both, and prevention of pollution of the lake

(b) For the establishment, improvement and conduct of small boat harbors, marinas, aquatic playgrounds and similar recreational facilities, and for the construction, reconstruction, repair, maintenance and operation of all works, buildings, facilities, utilities, structures and appliances incidental, necessary or convenient for the promotion and accommodation of any of such uses, including but not limited to snackbars, cafes, cocktail lounges, restaurants, motels, hotels, and other forms of transient living accommodations open to the public, launching ramps and hoists, storage sheds, boat repair facilities with cranes and marine ways, administration buildings, public restrooms, bait and tackle shops, chandleries, boat sales establishments, service stations and fuel docks, yacht club buildings, parking areas, roadways, pedestrian ways and landscaped areas and other compatible commercial and recreational activities and uses.

(c) For the construction, reconstruction, repair, maintenance and operation of public buildings, public assembly and meeting places, convention centers, public parks, public playgrounds, public bathhouses and public bathing facilities, public recreation and public fishing piers, public recreation facilities, including but not limited to public golf courses, and for all works, buildings, facilities, utilities, structures and appliances incidental, necessary or convenient for the promotion and accommodation of any such uses.

(d) For the construction, reconstruction, repair and maintenance of highways, streets, roadways, bridges, belt line railroads, parking facilities, power, telephone, telegraph or cable lines or landings, water and gas pipelines, and all other transportation and utility facilities or betterments incidental, necessary or convenient for the

No comments

- n/a -

promotion and accommodation of any of the uses set forth in this section.

(e) For the promotion, by advertising and such other means as may be reasonable and appropriate, of maximum public use of such granted lands or to encourage private investment in development of such granted lands for the highest and best use in the public interest.

(f) For any other uses or purposes of statewide, as distinguished from purely local or private, interest and benefit which are in fulfillment of those trust uses and purposes described in this act.

(g) For the acquisition of property and the rendition of services reasonably necessary to the carrying out of the uses and purposes described in this section, including the amortization or debt service of any capital improvement funding program which is consistent with the terms and conditions set forth in this act.

SEC. 5. Such revenues may be deposited in one or more reserve funds for use in accordance with the terms and conditions set forth in this act.

SEC. 6. As to the accumulation and expenditure of revenues for any single capital improvement on the granted lands involving an amount in excess of two hundred fifty thousand dollars ($250,000) in the aggregate, the county shall file with the State Lands Commission a detailed description of such capital improvement not less than 90 days prior to the time of any disbursement therefor or in connection therewith, excepting preliminary planning. The State Lands Commission may, within 90 days after the time of such filing, determine and notify the county that such capital improvement is not in the statewide interest and benefit or is not authorized by the provisions of Section 4 of this act. The State Lands Commission may request the opinion of the Attorney General on the matter, and if it does so, a copy of such opinion shall be delivered to the county with the notice of its determination. In the event the State Lands Commission notifies the county that such capital improvement is not authorized, the county shall not disburse any revenue for or in connection with such capital improvement, unless and until it is determined to be authorized by a final order or judgment of a court of competent jurisdiction. The county is authorized to bring suit against the state for the purpose of securing such an order or adjudication, which suit shall have priority over all other civil matters. Service shall be made upon the Executive Officer of the State Lands Commission and the Attorney General, and the Attorney General shall defend the state in such suit. If judgment be given against the state in such suit, no costs shall be recovered against it.

SEC. 7. At the end of every third fiscal year, beginning June 30, 1975, that portion of the county trust revenues in excess of two hundred fifty thousand dollars ($250,000) remaining after current and accrued operating costs and expenditures directly related to the operation or maintenance of trust activities have been made, shall be deemed excess revenues; provided, that any funds deposited in a

No comments

- n/a -

reserve fund for future capital expenditures or any funds used to retire bond issues for the improvement or operation of the granted lands shall not be deemed excess revenue. Capital improvements of the granted lands for purposes authorized by this act may be considered as expenditures for the purpose of determining net revenues; provided, however, that if made after the effective date of this act they may be so considered only if made in accordance with Section 6 of this act.

The excess revenue, as determined pursuant to this section, shall be divided as follows: 85 percent to the General Fund in the State Treasury, and 15 percent to the county to be deposited in the trust fund and used for any purpose authorized by Section 4 of this act; provided, however, that, of the first such excess revenues which would otherwise be allocated to the county, an amount equal to the cost of the State Lands Division survey conducted at Clear Lake during the period from November 5, 1962, to December 31, 1972, shall be deducted from the county's share and deposited in the General Fund in the State Treasury.

SEC. 8. The State Lands Commission, at the request of the county, shall grant an extension of time, not to exceed 30 calendar days, for filing any report or statement required by this act which was not filed due to mistake or inadvertence.

SEC. 9. In the event that the county fails or refuses to file with the State Lands Commission any report, statement, or document required by any provision of this act within the time period specified by this act, or any extension period granted pursuant to this act, or fails or refuses to carry out the terms of this act, the Attorney General shall, upon the request of the State Lands Commission, bring such judicial proceedings for correction and enforcement as are appropriate, and shall act to protect any improvements to, or assets situated upon, the granted lands or derived therefrom. The State Lands Commission shall notify the Chief Clerk of the Assembly and the Secretary of the Senate within 30 days of the occurrence of such failure or refusal and of actions taken as a result thereof.

SEC. 10. The County of Lake and the State Lands Commission, on behalf of the state, are authorized to enter into boundary agreements with private parties to settle existing boundary disputes. Any such agreement shall not be a precedent for the determination of any subsequent boundary line dispute; however, any subsequent survey shall incorporate the boundary agreement entered into by the commission, the county, and a private party.

SEC. 10.1. The County of Lake, with the approval of the State Lands Commission, is hereby authorized to settle, by agreement, exchange, or quitclaim, any dispute concerning whether or not particular land within the Clear Lake area constitutes land in private or proprietary ownership by reason of title traceable to a state or federal patent or other valid source, or rather constitutes lands granted by this act. In settlement of such disputes, the county, with approval of the State Lands Commission, may, by such agreement,

No comments

- n/a -

exchange or quitclaim, establish boundary or compromise boundary lines between the lands granted by this act and bordering private or proprietary lands.

SEC. 10.5. The county shall identify past and future trespasses upon the lands granted by this act and take appropriate steps to terminate such trespasses.

SEC. 11. The State Lands Commission shall, from time to time, recommend to the Legislature such amendments as it may deem necessary in the terms and conditions of this act.

SEC. 12. The State Lands Commission shall, from time to time, institute a formal inquiry to determine that the terms and conditions of this act, and amendments thereto, have been complied with, and that all other applicable provisions of law concerning these specific granted lands are being complied with in good faith.

SEC. 13. The State Lands Commission shall, on or before December 31st of each year, report to the Chief Clerk of the Assembly and to the Secretary of the Senate, the full details of any transaction or condition reported to the commission pursuant to this act which it deems in probable conflict with the requirements of this act, or with any other provision of law.

SEC. 14. The Legislature reserves the right to amend, modify, or revoke, in whole or in part, the submerged lands granted and conveyed in trust pursuant to this act; provided, that the state shall thereupon assume and be bound by all lawful transactions and obligations related to such lands entered into or created by the county during its holding of such lands.

SEC. 15. The Attorney General, on request by resolution of either house of the Legislature, or upon formal request of the State Lands Commission made only after a noticed public hearing at which the grantee has been given an opportunity to fully express any disagreement with the commission's findings or to describe any extenuating circumstances causing the violation, shall bring an action in the Superior Court in the County of Lake to declare that the grant under which the county holds such submerged lands is revoked for gross and willful violation of the provisions of this act or other legislative enactment, or to compel compliance with the terms and conditions of the grant and any other provision of law, including, but not limited to, this act.

SEC. 16. The grant and conveyance in trust of submerged lands to the county provided for by this act shall become effective only upon the written acceptance of such grant and conveyance by the county prior to September 1, 1974.

SEC. 17. If any provision of this act or the application thereof to any person or circumstances is held invalid, such invalidity shall not affect other provisions or applications of the act which can be given effect without the invalid provision or application, and to this end the provisions of this act are severable.

No comments

- n/a -

ROR012 Grupe

GRUPE

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2012 DEC -5 PM 2:04

December 4, 2012

Phil Isenberg, Chairman, and Council Members
Delta Stewardship Council
Attn: Christopher M. Knopp, Executive Officer
980 Ninth Street, Suite 1500
Sacramento, California 95814

REQUEST FOR TIME EXTENSION TO COMMENT PERIODS ON THE FINAL DELTA PLAN, SUPPLEMENT TO DRAFT PROGRAM EIR, AND DRAFT REGULATIONS FOR FINAL DELTA PLAN

At your meeting of November 15, 2012, the Delta Stewardship Council (DSC) announced that the concurrent public review periods for the DSC"s Final Delta Plan (FDP), the Supplement to the Draft Program Environmental Impact Report for the Final Delta Plan (SPEIR), and the corresponding Draft Regulations (DR) released by the California Office of Administrative Law will run for 45 days, from November 30, 2012 through January 14, 2013.

The Grupe Company ("Grupe") intends to thoroughly review and comment on the above-referenced documents. However, due to the complexity, importance, and significance of these documents on our company and the fact that the review periods fall during a major holiday season, Grupe is respectfully and officially requesting that the DSC extend the concurrent public review periods for an additional 90 days, ending on April 15, 2013. — ROR012-1

We look forward to your favorable response to our time extension request. Grupe is committed to our continued coordination with the DSC members and DSC staff in the review of these documents and the future adoption and implementation of the Delta Plan. Should you have any questions or wish to discuss this request, please contact me at (209) 473-6024.

Sincerely,

NELSON E. BAHLER
Executive Vice President
General Counsel

THE GRUPE COMPANY
3255 West March Lane, 4th Floor, Stockton, CA 95219 • P.O. Box 7576, Stockton, CA 95267-0576
{00005281.DOCX} 209/473-6000 • Fax 209/473-6187

Response to comment ROR012-1

The review period for the Recirculated Draft PEIR and the rulemaking began on November 30, 2012 and ended on January 14, 2013. Pursuant to CEQA Guidelines Section 15105, the review period for a draft EIR should not be less than 30 days and no longer than 60 days. Hence, the 45-day comment period was sufficient under CEQA statute. The review period for the rulemaking is 45 days pursuant to Calif Govt Code Section 11346.

cc: Senator Fran Pavley, Chair, Senate Natural Resources & Water Committee (SNR&WC)
Senator Doug La Malfa, Vice Chair, SNR&WC
Senator Anthony Cannella, SNR&WC
Senator Noreen Evans, SNR&WC
Senator Jean Fuller, SNR&WC
Senator Christine Kehoe, SNR&WC
Senator Alex Padilla, SNR&WC
Senator Joe Simitian, SNR&WC
Senator Lois Wolk, SNR&WC
The Honorable Joan Buchanan, Member of the Assembly
The Honorable Bill Berryhill, Member of the Assembly
The Honorable Cathleen Galgiani, Member of the Assembly
Secretary John Laird, CA Natural Resources Agency
Dan Ray, DSC Chief Deputy Executive Officer
Susanna Schlendorf, Chief of Staff for the Honorary Joan Buchanan, Member of the Assembly
Kevan Samsam, Delta Stewardship Council
Stockton City Council
John Luebberke, City Attorney
Delta Coalition
San Joaquin County Board of Supervisors
Stephen Qualls, League of California Cities
Barry Brokaw and Donne Brownsey, Sacramento Advocates, Inc.

No comments

- n/a -

ROR013 LAND

SOLURI MESERVE
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1010 F Street, Suite 100 · Sacramento, CA 95814

January 14, 2013

VIA EMAIL: recirculateddpeircomments@deltacouncil.ca.gov
rulemakingprocesscomment@deltacouncil.ca.gov

Ms. Cindy Messer, Delta Plan Program Manager
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: Comments on Final Draft Delta Plan, Delta Plan Recirculated Draft Program EIR and Proposed Rulemaking Package

Dear Ms. Messer:

These comments on the Final Draft Delta Plan, Recirculated Draft Delta Plan Program Environmental Impact Report ("RDEIR") and Proposed Rulemaking Package and are submitted on behalf of Local Agencies of the North Delta ("LAND"), which is a coalition comprised of reclamation and water districts covering about 90,000 acres in the northern geographic area of the Delta.[1] LAND participant agencies have concerns about how the Delta Plan ("Plan") will impact the reliability and quality of water supplies within the Delta, the provision of water according to established water rights, and/or, drainage and flood control services to landowners within their respective districts, and wish to consult with the Delta Stewardship Council ("Council") on these and related issues. (Water Code, § 85300, subd. (b).) ROR013-1

These comments are divided into three parts: (1) Comments on the Final Draft Plan; (2) a discussion of the adequacy of key aspects of the RDEIR in analyzing the Draft Plan, and (3) comments on the Proposed Rulemaking, including the economic analysis.

I. CONTINUING CONCERNS REGARDING FINAL DRAFT DELTA PLAN

A. General Comments

LAND has submitted comments on each of the prior drafts of the Delta Plan. While we appreciate the changes that were made to the draft plan to address the concerns

[1] LAND participants include: Reclamation Districts 3, 150, 307, 317, 407, 551, 554, 755, 813, 999, 1002, 2067 and the Brannon-Andrus Levee Maintenance District. Some of these agencies provide both water delivery and drainage services, while others only provide drainage services. These districts also assist in the maintenance of the levees that provide flood protection to homes and farms. ROR013-2

Response to comment ROR013-1

Comment noted.

Response to comment ROR013-2

This is a comment on the project, not on the EIR.

of LAND and other local stakeholders, there are still several areas in which the Delta Plan fails to comply with the statutory mandates of SB 7x1. Generally, we continue to be concerned about the following flaws in the Final Draft Plan:

- Overstatements of worst-case seismic risk as a justification for conveyance, and permanent restrictions on Delta development and agriculture;
- Severe development limits keyed off of unrealistic levee standards, even in agricultural areas and for levee repairs;
- Preference for setback levees, without adequate technical justification and mandating an overly burdensome review requirements when setback levees aren't used;
- Creation of an unnecessary new reclamation district ("RD") oversight entity that would assess fees and take over levee maintenance and repair funding with no local accountability;
- New water diversions for use *within the Delta* must inexplicably demonstrate the evaluation and implementation of all of other water supply alternatives even though surface water in the Delta is the only available local water supply;
- Failure to include incentives for sustainable agricultural practices that improve water quality and have species benefits;
- Failure to adequately protect and promote the sustainability of Delta Legacy towns, and agriculture, and precluding the flexibility to allow it to evolve;[2] ROR013-2
- Failure to require endowments for habitat projects to ensure long term management;
- Failure to require willing sellers for habitat land acquisitions;[3]
- Failure to acknowledge impacts on local communities and RDs from the Plan;
- Failure to objectively asses options other than new conveyance, and to provide general guidance regarding the types of conveyance options that would meet the co-equal goals; and,
- Failure to clearly define what constitutes a covered action and to provide a clear pathway for local governments and landowners to make consistency determinations where appropriate.

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[2] We do appreciate, however, the addition of several recommendations to promote Delta as a Place. (See, e.g., DP R4, DP R5, DP R8 - DP R12.)

[3] We do, however, appreciate the inclusion of DP R3/R4 encouraging willing seller purchases.

No comments

- n/a -

B. Comments on Delta Plan Appendix A: Adaptive Management and the Delta Plan

The Appendix to the Plan dedicated to Best Available Science fails to provide clear guidance supporting public participation. A robust dialogue on factual matters provides the best forum for developing solutions to complex social and environmental challenges. However, with respect to public comment, the proposed process only recommends, but does not require, opportunities for public participation. (Appendix A, Table A-1 p.A-2.) [4] In addition to being required, the opportunity for public comment on the use of science in proposed covered actions should always be properly noticed and available. Although the section is well-intentioned, it is not developed fully enough to be readily implemented. ROR013-2

The potential for conflicts of interest are also not properly accounted for in the Adaptive Management Appendix. In particular, none of the criteria identify potential financial conflicts of interest, such as grant funding from a particular agency or foundation with a stake in the outcome. (Appendix A, Table A-1, p. A-3.) This is clearly insufficient. It is important for the credibility of the scientific process that all potential conflicts are publicly disclosed prior to selection of a peer review panel.

II. COMMENTS ON RDEIR

A. Responses to Comments on the DEIR Should have been provided in Conjunction with Release of the RDEIR

Many stakeholders expended significant effort to comment on the DEIR in February 2012 as well as subsequent drafts of the Plan. Proceeding with the Final Draft Plan and the RDEIR without responding to comments on prior drafts of the Plan and the DEIR appears pre-decisional. If some of the concerns stated in prior public comments on the Plan and DEIR are addressed by the Final Draft Plan and the RDEIR, the Council should explain how they have been addressed to the public. The RDEIR also continues to suffer from an ill-defined project, in contravention to the requirements of CEQA. (See *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193; see also CEQA Guidelines, § 15124.) ROR013-3

B. The DEIR's Approach to Analysis of Impacts Associated with the BDCP is Flawed

As in prior drafts, the Final Draft Plan continues to blindly promote completion of the BDCP as a panacea for the problems of the Delta (WR R12). At the same time as the ROR013-4

[4] / With respect to transparency and openness: "…The opportunity for public comment on the use of science in proposed covered actions is recommended."

Response to comment ROR013-3

Responses to comments on the DEIR are provided in Section 3 of this FEIR, consistent with CEQA Guidelines Section 15088. Responses describe relevant changes to the project and/or the environmental analysis between the DEIR, RDEIR, and FEIR.

Response to comment ROR013-4

Please see response to commenter's prior letter, LO229. Please see Master Response 1 regarding the proposed BDCP.

Plan provides no guidance as to what BDCP should actually do to increase water supply reliability, the Plan includes specific policies and recommendations that directly guide the habitat creation-related conservation measures in the BDCP (see RDEIR, App. C, Table C-11, policies ER P1 to P5 and Table C-12, recommendations ER R1 to R7). However a full discussion of the BDCP continues to be relegated to its own stand-alone chapter and is not integrated into the RDEIR's project- and cumulative-level impact analyses. (RDEIR, Chapter 23.)

The Draft Plan inexplicably fails to include any policies or recommendations relating to the conveyance component of BDCP. Given the numerous policies relating to the habitat creation components of the BDCP (RDEIR, App. C, ER P1 to P5 and ER R1 to R8), it is untenable for the Council to avoid providing any guidance whatsoever on the issue of conveyance. As discussed in previous LAND comments, just like habitat, the Council should describe what type of conveyance projects would meet the statutory mandates of SB 7x1, and specifically, the coequal goals. ROR013-4

Moreover, with respect to the RDEIR's impact analysis, the conveyance component of the BDCP has more potential to cause significant impacts in the Delta than any other project mentioned in the RDEIR. Yet the analysis within the DEIR scarcely mentions the potential effects of BDCP conveyance, instead relegating details regarding BDCP to its own chapter that contains no discussion of the potential of the Delta Plan to result in environmental impacts associated with BDCP. The DEIR also carefully ignores the likely impacts of the BDCP and other likely early-term projects in each of the individual other chapters, biasing the analysis.

Each impact section misleadingly states that the Project "does not direct the construction of specific projects and would not directly result in construction or operation of projects or facilities; therefore, it would result in no direct impacts on any resources." Yet, WR R12 states that: "The relevant federal, State, and local agencies should complete the Bay Delta Conservation Plan, consistent with the provisions of the Delta Reform Act, and receive required incidental take permits by December 31, 2014." As is fully evident from records available to the Council and the numerous briefings provided to the Council by BDCP proponents, the BDCP is a specific project that proposes that specific diversion facilities and habitat be constructed. The BDCP will have many significant environmental effects and must be considered as a cumulative project. (CEQA Guidelines, § 15130, subd. (b) (referring to "probable future projects").)

C. Land Use Impacts are not Disclosed

Construction of new habitat projects supported by the Delta Plan would be inconsistent with local land use policies. The RDEIR wrongly concludes that this impact would be less than significant. (Impact 6-2b, RDEIR pp. 6-7 to 6-8.) Mitigation Measure 6-2 does nothing to reduce conflicts between local policies promoting ROR013-5

Response to comment ROR013-5

The analysis of Impact 6-2b concludes that the project would have significant impacts due to conflicts with local plans. The discussion in the RDPEIR further concludes that: "Under the Revised Project, the impacts associated with Delta ecosystem restoration projects would be greater than under the Proposed Project especially due to potential conflicts under ER P3..." Additionally, Mitigation Measure 6-2 states that significant impacts associated with Impacts 6-2a through e would remain significant, even after implementation of the mitigation. The Delta Stewardship Council will prepare a "Statement of Overriding Considerations" to address this and all remaining significant impacts associated with the project, consistent with Section 15093 of the CEQA Guidelines.

ROR013-5

agriculture and additional restrictions on siting of agricultural related facilities in the vast areas where habitat creation could one day occur. (RDEIR, pp. 6-17 to 6-18.)

D. Mitigation for Agricultural Resources is Inadequate

Mitigation for farmland conversion may be imposed under CEQA. (CEQA Guidelines, § 15370.) The DEIR includes a mitigation measure for agricultural land conversion. As commented previously, a higher than 1:1 mitigation ratio is appropriate given the high quality and productivity of Delta farmland. In addition to purchase of easements, other means are available to mitigate for impacts to agricultural resources, consistent with CEQA and with the Water Code. (See, e.g., Pub. Resources Code, § 21002; CEQA Guidelines, App. G, Section II; CEQA Guidelines, § 15370; Wat. Code, § 29702, subds. (b) and (c).) Other means to mitigate agricultural land impacts include:

- Promotion of special agricultural districts;
- Creation of a Delta and/or Legacy Community "brand" to enhance public awareness of Delta agricultural products and cultural experience opportunities;
- Development of measurable targets for reaching agricultural sustainability;
- Creating streamlining of local, state and federal permitting requirements for agriculture and related projects in the Delta (in fact the Delta Plan does just the opposite by creating a new and incomprehensible layer of regulation over agricultural activities in the Delta); and
- Limiting habitat creation/restoration projects to lands with willing sellers.

ROR013-6

The Department of Water Resources has developed a Draft Discussion Paper BDCP and Delta Farmland (October 15, 2012, attached as Exhibit A) attempting to further elaborate on the special challenges associated with adequately mitigating impacts to agriculture from planned projects in the Delta, including the BDCP. The RDEIR should include information about other feasible means to mitigate for agricultural impacts of implementing the Delta Plan and the main project it promotes, the BDCP.

III. COMMENTS ON PROPOSED RULEMAKING PACKAGE AND ECONOMIC IMPACTS

A. Rulemaking Package

As explained in more detail in other comments, the rulemaking package is confusing and seems to contradict other requirements of the Delta Reform Act as well as other statutes, such as CEQA. The lack of value of the Rulemaking is demonstrated by the attempt to discuss benefits of the Rulemaking in the Initial Statement of Reasons. There is no explanation of how the Proposed Regulations "provide the best means to

ROR013-7

Response to comment ROR013-6

Please see response to commenter's prior letter, LO229. CEQA Guidelines Section 15126.4(a)(4)(B) requires that mitigation be "roughly proportional" to the impact of the project. A blanket requirement mandating a mitigation ratio greater than 1:1 fails to establish proportionality.

Response to comment ROR013-7

This is a comment on the project, not on the EIR.

achieve the coequal goals and additional goals and objectives required by the Act." (Initial Statement of Reasons, p. 11.)

Additionally, many of the proposed regulations are inconsistent with Delta Plan previously developed Policies and Recommendations. For example, informative detail included in previous drafts of the Plan, such as the definitions of agricultural water suppliers and floodplains, is absent from or contradicted by the proposed Rulemaking.

§ 5001, subdivision (c) - Agricultural Water Supplier Definition

The broad definition of agricultural water supplier is inconsistent with the definition provided in the Final Draft Delta Plan, which correctly states that: "Agricultural water suppliers (those that provide water to 25,000 or more irrigated acres, or 10,000 irrigated acres and who receive State funding to implement the plan provisions) have a similar requirement similar to urban suppliers and must prepare Agricultural Water Management Plans." (Final Draft Delta Plan, p. 100.) The definition proposed in section 5001, subdivision (c) is inconsistent with statutory limitation on the requirement to submit Agricultural Water Management Plans applicable to agricultural water suppliers than provide water to less than 25,000 irrigated acres. Under Water Code section 10853, preparation of such plans is not required unless sufficient funding is provided to the supplier to implement these provisions. This definition must be corrected to be consistent with existing law. No authority is provided for use of a more expansive definition of agricultural water supplier for purposes of the Delta Plan than is already included in the Water Code. ROR013-7

§ 5001, subdivision (l) Floodplain Definition

The definition of floodplain is inconsistent with the FEMA definition of this term, which is typically an area flooded at a 100-year interval. The proposed definition is unreasonably broad and not defined scientifically. The definition should be revised to be consistent with an objective, scientific standard. No authority is cited for a more expansive definition of this term.

B. Economic Analysis of Rulemaking Does not Disclose the Total Number and Types of Businesses Impacted and the Number or Percentage of Total Businesses Impacted that are Small Businesses

The Cost Analysis for Proposed Delta Plan Regulations in Support of Economic and Fiscal Impact Statement Prepared for Delta Stewardship Council ("Cost Analysis") is incomplete and incorrect. Standard Form 399, Economic and Fiscal Impact Statement ("Form 399") identifies only a cursory analysis that fails to identify the number of

No comments

- n/a -

potential businesses or even industries negatively affected by the proposed regulations implementing the Plan. The economic cost and the resulting potential for direct and indirect injury to in-Delta communities, industries and individual interests is not disclosed. As explained below, there will be significant costs to local communities of this rulemaking, which is inconsistent with the mandate of the Delta Reform Act. (See Wat. Code, § 85020, subd. (b) ("Protect and enhance the unique cultural, recreational, and agricultural values of the California Delta as an evolving place.").)

According to Form 399:

"Plan policies and administrative requirements apply to State and local agencies. Private businesses and individuals are not directly affected by costs of Delta Plan policies or administrative requirements. However, private businesses and individuals could be affected indirectly in two ways. First, private businesses or individuals directly involved in the proposed action may incur costs to make the action consistent with the Delta Plan. Second, costs to the State or local agency proposing a covered action could be passed on to specific private businesses and individuals through assessments, rates, fees, or other charges. Even without a specific proposed action, local agencies may incur additional costs to be consistent with Delta Plan policies in anticipation of future proposed actions." (Section A.2.)

ROR013-7

"The number of businesses and jobs created or eliminated is uncertain. Delta Plan policies are expected to provide long-term benefits in protecting agriculture, restoring the Delta ecosystem, improving water supply reliability, maintaining and enhancing settings for outdoor recreation and tourism in the Delta, and improving flood protection." (Section A.3-5.)

"While the estimated reduction in business costs to produce goods and services is unknown, it is anticipated that this benefit could outweigh the indirect cost of assessments, rates, fees, or other charges used to recover the cost of certification of a proposed covered action and the steps necessary for a covered action to comply with Delta Plan policies." (Section A.6.)

The basic premise presented in Form 399 appears to be that "improved water reliability" and other Plan actions with "unknown benefits" somehow provided by the Plan outweigh any job losses and economic impact on in-Delta communities. But at the same time, the analysis in Form 399 describes an economic burden of $11.9-16.8 million dollars of new costs per year on in-Delta communities. (Section D2, p. 2.) **Yet, the analysis concludes that these costs will not lead to job losses or economic failures.**

No comments

- n/a -

The Delta Plan and its implementing regulations require an exceptionally costly, complex and uncertain analyses for consistency with the Delta Plan. This burden will likely be borne entirely by family farming operations, individual rural residents and others who comprise the funding base for Delta Reclamation Districts and levee maintenance districts. The cost of this newly required analysis will be dedicated to paperwork, not to critical infrastructure repair and maintenance, such as levees. As LAND and other local interests have repeatedly explained, onerous and contradictory levee standards will impair Delta agriculture and the local ability to meet residential needs for farming and recreation services. These additional costs are moreover not identified in the Cost Analysis.

While some costs are included in the Example Cost Analysis, they are not adequately estimated. (Cost Analysis, Appendix A, Example Cost Analysis, Table A-3.) There are approximately 177 special districts identified in this analysis (Cost Analysis, Appendix B), with the proposal in this Plan that special districts will simply pass the $11.9-16.8 million in new annual costs on to their members. What is likelier to happen, however, is that districts that can't afford the increased costs will not be able to continue to provide the services for which they were formed, and the service burden will be placed on the State.

In addition, the Example Cost Analysis identifies a new set of project costs for levee projects as a result of this Plan that are not disclosed in Form 399: ROR013-7

"…$1.5 million per mile of levee. Assuming that planning costs are 20 percent of the combined cost of planning, engineering, and design, the additional planning costs would be $300,000 per mile of levee." (Cost Analysis, Appendix A, p. A-1.)

"The total project cost of setback levees ranges from $31 to $68 million per mile, depending on local site conditions and costs of land acquisition. In contrast, the cost of levee rehabilitation in-place ranges from $4 to $15 million per mile. The cost of setback levees could therefore be two to eight times the cost to improve an existing levee in-place." (Cost Analysis, Appendix A, p. A-2.)

"Addition of water-side berms in setback levees to provide habitat would increase the cost by another 50 to 100 percent. The Administrative Draft Bay Delta Conservation Plan estimates the addition of setback levees, including riparian habitat provision, would increase costs by 93 to 150 percent." (Cost Analysis, Appendix A, p. A-3.)

Thus, by the Plan's own analysis, the cost per mile of levee would go from as low as $4 million per mile to as much as $68 million per mile, with additional habitat measures raising the cost to $136 million per mile, **an increased cost of 3,400 percent!**

No comments

- n/a -

The Plan proposes massive new expenses on levee and other projects without any consideration for the impacts on the ability of local districts to pay. If levee repair funding remained constant, a 200 to 800 percent increase in levee costs would result in a reduction in miles of levee repairs to one quarter to 1/16 of the current rate. This cost increase is unacceptable by any standard and isn't disclosed in Form 399 as required.

In addition the Example Cost Analysis fails to accurately compare future costs under the new regulations to current costs. In Table A-3, the ratio of costs for 200 year protection levees with and without setbacks is actually 970 percent, not the 800 percent increase described ($58 million and $7 million per mile). ROR013-7

As a result, the Plan places Delta communities in direct risk of flooding because of the unreasonable economic burden imposed by implementation of the Plan. This is a double injury, because the Plan also has required new levee standards that increase costs above the Department of Water Resources PL 84-99 standards. So, not only are planning costs to assess the Plan's requirements excessive, the implementation cost is monumental. This result conflicts with Goals and Policies in the Delta Plan that are ostensibly designed to reduce flooding risk.

IV. CONCLUSION

Thank you for considering these comments. Water, reclamation and levee districts in the Delta are among the local stakeholders most affected by changes to land and water management in the Delta. LAND encourages the Council to properly implement the intent of the Delta Reform Act, including protecting and enhancing the Delta as a Place in the Delta Plan, the Delta Plan RDEIR and in the Rulemaking Package. To the extent the Council is attempting to "establish a governance structure that will direct efforts across state agencies to develop a legally enforceable Delta Plan" – additional work is necessary. (See Wat. Code, § 85001, subd. (c).) Please feel free to contact me with any questions about these comments. ROR013-8

Very truly yours,

SOLURI MESERVE
A Law Corporation

By: Osha R. Meserve

Enclosure: Exhibit A: DWR Draft Discussion Paper: BDCP and Delta Farmland

Response to comment ROR013-8

Comment noted.

Exhibit A: Draft Discussion Paper BDCP and Delta Farmland (October 15, 2012)

No comments

- n/a -

DRAFT Discussion Paper
BDCP and Delta Farmland

I. Introduction[1]

The State is pursuing multiple activities in the Delta that could affect Delta Farmland. These include near-term projects of the state and federal water projects to meet current endangered species requirements and future projects under the Bay Delta Conservation Program (BDCP).

This discussion paper is intended to encourage a wide-ranging dialogue among many interested parties about issues and opportunities that may result from these projects and particularly their relationship to, and potential effect on, farmland and agriculture in the Delta. It does not commit any agency to the approach discussed in this paper, but it does provide an opportunity for all parties interested in this issue to discuss whether the approach is a good one and, if so, what should DWR and other agencies consider in going forward with regard to the approach

The approach outlined in this document seeks to maintain agricultural and economic viability in the Delta by encouraging strategies that help provide benefits such as:

- economic choices to manage land in a way that contributes to maintaining and improving the ecological health of the Bay-Delta system;
- ways to reverse subsidence;
- flood protection;
- groundwater seepage protection; and
- improved water quality

The approach supports local government and special districts planning and helps them stay fiscally sound by providing strategies that help provide benefits such as :

- opportunities to keep county revenue neutral or positive and
- ways to minimize potential land use conflicts with local plans,

This paper describes an integrated and collaborative approach using a variety of agricultural stewardship principles and strategies for addressing the conversion of farmland[2] to different uses, assuming the future implementation of a project. The discussion would explore a voluntary framework for the project proponents to pursue to develop working landscapes that provide environmental and habitat benefits. A critical objective of the framework would be that the project would have, at a minimum, a neutral economic effect on farmers farmland, and local government in the Delta, taking into consideration:

- the desire of individual Delta farmers to continue working on their land,
- the long-term viability of regional agricultural economies,
- the economic health of local governments and special districts, and
- the Delta as an evolving place.

[1] This is a draft paper prepared to encourage discussion regarding the issues raised in the paper. Any comments or requests to meet to discuss the issues should be sent to kspanos@water.ca.gov.

[2] When discussing farmland or agricultural land in general terms, we have used the term "farmland" throughout this paper.

No comments

- n/a -

This approach also recognizes that local interests, including Delta farmers, have unique and specialized knowledge and seeks to involve these interests in the process.

POTENTIAL IMPACT: The permanent footprint for the tunnel option for a conveyance facility component of BDCP would be around 5,000 acres of farmland (the footprint of the conveyance facility could range from 2500 18,000 acres depending on the alternative selected). Additional farmland may be affected temporarily during construction. Habitat restoration components of the BDCP include more than 100,000 acres of restored and protected habitat, a significant percentage of which is currently farmland. Much of this farmland provides habitat for native terrestrial species.

Habitat for species: A separate conservation strategy is currently being developed to address the effects of changes to habitat for species adversely affected by the conversion of farmland for BDCP project purposes. This strategy is likely to call for the permanent protection (through easements or other means) of other farmland to benefit the terrestrial species that depended on the converted lands for habitat.

MITIGATION FOR FARMLAND IMPACTS:

Conventional Mitigation Approach: The conventional approach for mitigation for potential significant adverse environmental effects relating to agricultural resources has generally been to purchase off-site agricultural conservation easements for land of similar agricultural quality in areas that are threatened with encroaching urban development. Aside from monetary compensation for the direct loss of land, the conventional approach does little to help the individual farmer whose land was converted or otherwise impacted by the project. In addition, given the lack of development pressure in the inner Delta due to regulatory restrictions, flood threats, and the large number of acres potentially planned for restoration by DWR and other public and private entities, it is possible that the conventional approach might look for off-site land outside the Delta.

Optional Agricultural Land Stewardship Approach: This paper proposes consideration of an optional approach that focuses on the effect of the projects on the landowner and the Delta. This approach is designed to encourage early planning that will result in multiple-benefits and long-term partnerships with local interests that result in sustainable projects that benefit both the environmental and social-economic communities in the Delta and would include the following considerations

- The approach suggests that the parties evaluate the extent to which the project can be part of or complement existing or planned land uses for the Delta. As a threshold issue, this means thinking about ways to prevent or avoid farmland loss.
- To the extent that farmland is part of the project, , consideration should be given to developing working landscapes[3] on project lands that recognize other land use

[3] The Cal-Fed Working Landscapes Subcommittee of the Bay Delta Public Advisory Committee defined a working landscape as "*a place where agriculture and other natural resource-based economic endeavors are conducted with the objective of maintaining the viability and integrity of its commercial and environmental values. On a working landscape, both private production, as well as public regulatory decisions account for the sustainability of families, businesses and communities, while protecting and enhancing the landscape's ecological health. The working landscape is readily adaptable to change according to economic and ecosystem needs. With respect to CALFED, a working landscape is both an objective and a means to achieve it. A working landscape is efficiently managed largely by private agricultural landowners and managers who are supported and encouraged to manage their lands in ways that fulfill CALFED goals, allowing them to pursue*

No comments

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activities taking place in the Delta. These activities include ones designed for mitigation and enhancement relating to aquatic and terrestrial habitat; agricultural use; recreation; agritourism; ecotourism; and flood management.

- This paper identifies a number of agricultural land stewardship strategies that could be considered with respect to project lands that could be integrated with project and other relevant land use strategies where appropriate.

- To the extent that there are still impacts to agriculture, the paper identifies other strategies to consider that may take place outside of the project property both within and outside of the Delta that could provide mitigation for impacts to the Delta.

Relationship to other programs: There are a number of other current and proposed activities and programs that affect Delta farmland and that are carried out by DWR and other entities. These activities are developed pursuant to legislative and administrative authorities that are different from those that guide BDCP. Although it is possible that this paper's approach or some aspects of it may be applicable to these other activities, the concepts in this discussion paper are not being considered for any activity other than those related to the BDCP.

Environmental and Economic Impacts: One of the key questions in approaching mitigation for conversion of farmland from one use to another for project purposes is whether the impacts identified are economic[4], environmental, or a mixture of the two. In general, it is not legally necessary to mitigate for purely economic impacts unless they lead to reasonably foreseeable secondary environmental impacts. However, because of the complex nature of farmland as a natural and economic resource, it is often difficult to determine when an impact is an economic impact and when it is an environmental impact. The framework proposed by this paper does not make an attempt to distinguish strategies based on whether they deal with environmental or economic effects, but instead considers whether they maintain the economic viability of Delta agriculture. Although these strategies are not focused on means of reducing environmental impacts on agricultural resources to a level of insignificance, these strategies may result in a substantial reduction of those environmental effects and a reduction or elimination of secondary environmental effects on Delta farmland. Nonetheless, the BDCP EIR/EIS may determine that even with these strategies in place, the potential environmental impact as a result of changing the current use of farmlands in the Delta is expected to be significant.

Relationship to other processes: This approach is not intended to take the place of other ongoing processes designed to achieve similar objectives, but rather to take advantage of processes proposed (or to be proposed) by the Delta Conservancy, the Delta Stewardship Council, the Delta Protection Commission, the California Water Plan, the California Department of Food and Agriculture's Environmental Farming Science Panel, local county, city and regional planning processes, and other conservancy programs. This approach builds upon "visioning" documents and plans that came before, such as those produced by CALFED, the Delta Vision process, the Delta Protection Commission Economic Sustainability Plan, the California Fish and Wildlife Strategic

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ecological health goals while yielding economic returns on investments, and generating tax revenues that support their local governments". (need citation)

[4] In this context, references to economic impacts may also include social or social/economic impacts.

No comments

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Vision, the Department of Food and Agriculture's Agriculture Vision, the California Water Plan Agricultural Land Stewardship Strategy, the Delta Conservancy's Strategic Plan, the Delta Stewardship Council's White Paper on Agriculture, the Department of Water Resources' Climate Change Strategies for California's Water, the California Natural Resources Agency's California Climate Adaptation Strategy, the California Roundtable on Ag and the Environment and the California Roundtable on Water and Food Supply, including recommendations regarding Agricultural Water Stewardship, and on local plans for agriculture and natural habitat.

II. Background

Within state government, different agencies have taken different and sometimes conflicting approaches in addressing conversion of farmlands for ecosystem improvements, based, in part, on their missions. However, in October 27, 2004, a memorandum from the Secretaries of the Resources Agency and the Department of Food and Agriculture committed the two agencies to work together in a complementary, rather than conflicting, approach on these issues. On May 4, 2005, the Secretary of the Resources Agency followed up with a directive that "in selecting and developing resources related projects, departments under the Resources agencies should incorporate, where appropriate, the strategies identified in the CALFED EIR to reduce the impact of the CALFED Ecosystem Restoration Program on agricultural land and water use." The Secretary recommended several steps that affected departments should take in cases involving agricultural lands, including the following: (1) projects should include both restoration and agricultural preservation efforts; (2) the lead agency should analyze each situation on a case-by-case basis; and (3) CEQA documents involving resource-related projects that involve agricultural land should include a separate section that describes the social and economic consequences of a conversion.

Separate from CEQA, the 2009 Delta Reform Act and related legislation on Delta activities contemplates that these activities will involve the conversion of agricultural land to other uses and requires consideration of the agricultural values of the Delta. Notably, in Public Resources Code section 29702, the Legislature declared that the "coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem . . . shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and *agricultural* values of the Delta as an evolving place." (Emphasis added.) [5] Echoing this concern for Delta agriculture, Public Resources Code section 32301[d] notes that "[t]he Delta contains more than 500,000 acres of agricultural land, with unique soils, and farmers who are creative and utilize innovative agriculture, such as carbon sequestration crops, subsidence reversal crops, wildlife-friendly crops, and crops direct for marketing to the large urban populations nearby."

Federal law, through the Farmland Protection Policy Act, recognizes that the Nation's farmland is a unique natural resource and provides food and fiber necessary for the continued welfare of the people of the United States; that each year, a large amount of the Nation's farmland is irrevocably converted from actual or potential agricultural use to nonagricultural use; that the extensive use of farmland for nonagricultural purposes undermines the economic base of many rural areas; and that Federal actions, in many cases, result in the conversion of farmland to nonagricultural uses where alternatives actions would be preferred.[6]

[5] Similar language is found in Water Code section 85020.
[6] 7 USC 4201, Section 2; For a link to the Farmland Protection Policy Act see http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1042432.pdf

No comments

- n/a -

Vision and Policy Documents: The paper will summarize positions, approaches, analyses and recommendations of related past and concurrent documents, including: CALFED; Delta Vision; CA Department of Conservation; CA Department of Food and Agriculture; CA Department of Fish and Game; Delta Protection Commission; Delta Stewardship Council; Delta Conservancy; the California Water Plan and local land use plans.

III. Basic Integrated Approach: Working Landscapes

This approach proposes a framework that would work on a case by case basis. Each project proponent would be encouraged to establish a working landscape for the project that integrates project activities with other uses. Properly structured, the affected landscape could produce multiple benefits and long-term partnerships among state and local interests in order not only to meet the conservation objectives and ecological benefits of the project, but also to result in more sustainable projects that also improve the social and economic basis of the Delta region.. This may be easier or more difficult depending on how the project area is defined. In some cases the project area may be all of a component such as the conveyance footprint or all of a BDCP habitat restoration area. In other cases it may a part of a component that is being developed sequentially. Each project would include an Agricultural Land Stewardship Plan (ALSP)[7] that discusses all the elements listed below. Although not the focus of this paper, it may be worthwhile to consider whether there would be a benefit to developing a overall agricultural land stewardship program for the entire Delta region that could provide a framework for individual ALSPs.

A. Describe area affected: After describing the project area, identify acreage of "Agricultural land" potentially affected. In this paper Agricultural land means prime farmland, farmland of statewide importance, or unique farmland, as defined by the United States Department of Agriculture land inventory and monitoring criteria as modified for California.[8]

B. Avoid agricultural land: Plan the project to avoid Agricultural land conversion where feasible; where choices are possible, avoid "highest quality" Agricultural land. This paper recognizes that "highest quality" may be a subjective term, but does not try to define it. This paper

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[7] The idea of an ASLP is not to have another layer of requirements that could delay implementation of the basic integrated approach, but rather to have some level of documentation that shows that all the elements have been considered. It could be a checklist or something more extensive. The scope and timing for an ASLP are several of the many items to be discussed and may change over time during implementation of the project.

[8] This definition comes from CEQA (Pub. Resources Code section 21060.1 (a)). Note also that in the Council on Environmental Quality regulations interpreting the National Environmental Quality Act (NEPA) that define the term "significantly", in the subsection that discusses the intensity or severity of impacts, there is a specific reference to prime farmland: "Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, **prime farmlands**, wetlands, wild and scenic rivers, or ecologically critical areas" (40 CFR 1508.27(b)(3)) and that the federal Farmland Protection Policy Act defines the term farmland, for the purposes of the act, to includes all land defined as follows: (A) prime farmland …, (B) unique farmland…, (C) farmland, other than prime or unique farmland, that is of statewide or local importance…." [7 USC 4201] Section 2 (c).

No comments

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assumes that if choices can be made regarding different locations for a project, and still achieve the project purposes, it may be possible to avoid the areas where the "quality" of the resource is higher. How such determinations could be made would be the subject of further discussion. **Determine amount of Agricultural land that will not continue to be farmed as a result of the project.**

C. Mitigate on-site: Plan the project to mitigate on-site if feasible. This could include converting areas currently not in agriculture to agriculture or making improvements to the land that result in higher quality farmland for the land that remains in agricultural production (e.g. , improved drainage)[9]. Some of this planning may overlap with the consideration of strategies discussed in Paragraph F below. **Determine amount of Agricultural land that will not continue to be farmed as a result of the project.**

D. Determine potential impact: Analyze the individual project and the affected land to determine whether there is a potential significant environmental impact that could be reduced by feasible mitigation requirements under CEQA. This is a multi-faceted analysis that focuses on Agricultural land that is currently farmed and can continue to be farmed economically and on a sustainable basis for an indefinite period of time absent a conversion to a different use under the project. In this paper this land is called **Important Farmland**. The analysis could look at factors such as the following: the LESA[10] score, if appropriate; the sustainability of agricultural farming (e.g., whether particular properties are subject to subsidence, have an adequate water supply, are economically viable, etc.); whether the impact is temporary and use of the land for agriculture can be restored or whether it is irreversible; whether the area is designated natural habitat in a local plan; and whether there are other benefits that help preserve agricultural resources on or near the project area (e.g., improved flood protection). As a result, in some cases, it may be determined that even though some Agricultural land will be converted, the environmental effect is not potentially significant. **Determine amount of Important Farmland that will be impacted and not continue to be farmed as a result of the project. This is land that is potentially subject to a CEQA mitigation feasibility analysis.**

E. Coordinate with off-site terrestrial mitigation: Some Important Farmland that may be converted to non-farm uses may currently serve as habitat for terrestrial species. Conservation strategies may propose to mitigate for loss of agricultural habitat for certain terrestrial species through protection of off-site lands that have similar habitat value as those being impacted . Conservation strategies may also require restrictive easements on such lands to maintain certain kinds of crops that provide the desired habitat value and, in some cases, may require land to be purchased in fee title. Determine the amount of off-site land to be protected for mitigation of terrestrial species and determine what amount of this off-site land will be Important Farmland. Subtract this amount from the Important Farmland in Paragraph D. **The**

[9] Although mitigation on site, such as conversions to agricultural use may be unlikely, this paper suggests exploring such options to the extent they are feasible. Such conversions might have other environmental impacts subject to mitigation requirements.

[10] LESA refers to the "land evaluation and site assessment" system developed by the Department of Conservation, in consultation with the United States Department of Agriculture, pursuant to Public Resources Code section 21095[b]. The project score can be part of the consideration when determining whether a project's potential impacts on agriculture are significant within the meaning of CEQA. ,

No comments

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remainder is the Important Farmland that is potentially subject to a CEQA mitigation feasibility analysis as described below in Paragraph F.

F. Optional mitigation approach: As described in the beginning of this paper, the conventional approach for mitigation for significant adverse environmental effects relating to agricultural resources does little to help the individual farmer whose land was converted or otherwise impacted by the project. This paper proposes an optional working landscapes approach that, although it might include aspects of the conventional approach, focuses on the effect of the project on the landowner, local governments and the Delta.

Mitigation Option 1 (Optional Agricultural Land Stewardship Approach). The Optional Agricultural Land Stewardship Approach would seek opportunities to protect and enhance agriculture in the Delta as part of the project landscape and focus on maintaining economic activity on farmlands. The project proponent would partner with the landowners, farmers, local government and other interests either directly or through third-parties (e.g., the Delta Conservancy or NGO land trusts) with relevant expertise to integrate project activities (including mitigation and restoration) with other uses such as agriculture[11], flood management, recreation, agritourism and ecotourism. The goal would be to incorporate farmers' diverse needs for maintaining agriculture and economic vitality in the Delta while carrying out the conservation components needed to achieve the project's goals and objectives. This would be carried out by considering different agricultural land stewardship strategies. The agricultural stewardship strategies proposed to be explored are discussed below in Section IV and may include some aspects of the Conventional Mitigation Approach discussed below. Some of the strategies would involve keeping the landowner/farmer on the land being affected in a way that would eliminate or reduce a potential conventional mitigation requirement. Others would consider mitigation elsewhere in the Delta (or outside the Delta if it provided a benefit to the Delta). The Optional Agricultural Land Stewardship Approach would include reporting and monitoring actions necessary to show that the actions agreed to were being carried out. Examples of the strategies being explored include:

- pay landowners to manage converted farmland as tidal wetlands
- define wetlands privately managed for profit as agriculture in order to gain benefits given to agricultural production
- work with counties to harmonize Williamson Act preserve designations to reflect more diverse uses
- provide additional support for levee improvements or sediment removal projects which benefit Delta agriculture
- provide financial incentives for farmers to manage subsided land as managed wetlands
- purchase permanent easements on some high quality agricultural land in and near the Delta
- work with counties in an effort to provide a neutral or positive effect on county revenues.

[11] Note that some of the strategies discussed later in the paper advance a broad view of "agricultural" activities.

No comments

- n/a -

Some of the strategies of the Optional Agricultural Land Stewardship Approach would help reduce or mitigate some of the direct and indirect environmental effects of the project on agricultural resources in the Delta. These strategies are likely to result in a reduction of potential environmental effects and in many cases further project objectives. Nonetheless, even with these strategies in place, it is possible that there could be a determination that the environmental impact on agricultural resources is still potentially significant; decision-making agencies will then have to determine whether there are additional feasible environmental mitigation measures and/or whether to go forward with the project despite a finding of significance.

The Optional Agricultural Land Stewardship Approach would seek to involve the local community in the planning process for the project along with state and federal agencies. At its core would be involvement of the landowner and the county where the property was located. If agreement cannot be reached on the optional stewardship approach, the conventional mitigation approach described below would be used.

Mitigation Option 2 (Conventional Mitigation Approach): Mitigation for agricultural resources would most likely be coordinated with requirements to protect farmland off-site for mitigation of terrestrial species displaced from converted farmland. Different farmland mitigation projects have taken different approaches to what is provided in the way of mitigation. Some projects have purchased easements at a 1:1 (or greater or smaller) ratio, some have used more qualitative measures, and some have found that the purchase is infeasible either because of cost or distance from project. The conventional approach usually has focused on protecting land in the path of urban development. This approach does not usually consider the impacts on the farmer displaced or the county where the displacement occurred since these are economic impacts.

The Conventional Mitigation Approach could lead to a determination that the conversion of farmland is potentially significant and that the purchase of easements for all significant and unavoidable impacts may not be feasible because of the cost or availability of appropriate farmland.

IV. Agricultural Land Stewardship Strategies

This is a list of strategies proposed by different vision and policy papers that could be part of an Agricultural Land Stewardship Plan under the Optional Agricultural Land Stewardship Approach. Strategies are included that are also applicable to the Conventional Mitigation Approach since those strategies may also have a role in the Optional Agricultural Stewardship Approach. As this paper is further developed, the discussion of each strategy will probably be expanded to1-3 pages. Each strategy will be examined for feasibility, difficulties, obstacles and other potential implementation issues. Each strategy, as implemented, would also have to align and be consistent with the project, including relevant conservation strategies. After further study, some may be found to not be feasible; some may be modified; and new ones may be identified. Many of the strategies have been used in other programs; a review or evaluation of projects that have used these strategies would not only help identify different types of strategies, but may also provide some insight as to whether

No comments

- n/a -

the strategies work. No effort has been made to prioritize or organize strategies with the exception that strategies to keep farmers[12] on farmland are generally earlier in the list while off –site strategies is later in the list. However, it should be kept in mind that many of the strategies may apply both on-site and off-site.

Each strategy will also need to be considered in the context of what kind of land is involved, such as for example: (a) project land that is a necessary part of the facilities footprint; (b) project land that is a necessary part of the habitat conservation measures footprint; (c) project land that is mitigation land required by a conservation strategy to preserve terrestrial species displaced because of facilities or habitat restoration measures; (d) non-project land that is not part of a conservation strategy but that is kept (or put in) agriculture as a result of agricultural land stewardship strategies; and (e) project or non-project land that is benefitted by strategies (such as flood protection or improving water reliability or quality) that do not change land use but could protect or improve agricultural productivity in the Delta. Some strategies may apply only to one kind of land; others to several.

A. Farmers manage habitat land for project purposes

In some cases, existing owners/operators would be compensated to manage restored or other conserved land consistent with easements that meet the project purposes. Another option would be to pay to maintain easements on land managed by other third parties (i.e., private or public land trusts or conservancies). Where agricultural use is consistent with the conservation purpose of the easement, it is possible that these lands could be leased to farmers, as a revenue source to the land trust or conservancy and to provide proper management of the conservation lands. This could allow farmland to remain privately owned by the farmer, bringing income to the farmer and keeping the farmland as part of the tax base.

B. Work with farmers, counties and other agencies to identify and incorporate recreational, agritourism, and ecotourism components and other potential new market products in ecosystem restoration projects that could bring income to the farmer.

This could allow some farmland to remain privately owned by the farmer, bringing in income to the farmer and keeping the farmland as part of the tax base.

C. Designate for-profit habitat protection as agricultural production for specifically defined purposes.

There may be instances where there is an economic value to a farmer if the land can be shown to be involved in specific kinds of agricultural production but the definition of agricultural production may not include habitat "production". This strategy would seek to change such designations if they are a barrier to habitat production. Federal conservation reserve programs may provide an opportunity or a model. An example where this has been done was state legislation enacted in 2008 that included biofuels as a compatible use under the Williamson Act.

[12] In this paper, farmer is used as a generic term that includes farmers, ranchers, landowners, or tenants if they are currently farming the land and want to continue managing the land if it is used for project purposes, The approach suggested in this paper would not prohibit farmers from selling or leasing their land for project purposes if they do not want to continue to farm the land themselves.

DRAFT

No comments

- n/a -

This could allow farmland to remain privately owned by the farm, bringing income to the farmer and keeping the farmland as part of the tax base.

D. If management by farmer or easements on farmer's land is not feasible, consider other options

Consider purchase by state government and transfer to private or public land trusts or conservancies or purchase by state government with an agreement to pay tax equivalent. This could allow farmland to still provide a tax benefit to the counties.

E. Work with counties to include habitat lands in Williamson Act preserves

Under current law, counties decide whether recreational and habitat lands are included in Williamson Act preserves, and can serve as a basis for local contracts. Many of the current Williamson Act preserve designations by counties with land in the Delta do not include recreational or habitat lands, as primary (as opposed to compatible) uses. This may discourage farmers from converting their land to habitat use because such a use might conflict with or lose the advantage of current Williamson Act designations. Working with counties to include habitat land covered under a Williamson Act preserve could allow farmland to remain privately owned by the famer, keeping the farmland as part of the tax base.

F. Re-invigorate Williamson Act Program

State funding of Open Space Subventions that offset local property tax losses has been greatly reduced or eliminated during the past several budget cycles, although the Open Space Subvention Act remains in statute. While this and the previous strategy deal with the Williamson Act, the previous strategy would involve working with the county to maintain a tax benefit for the landowner. This strategy would involve working with the counties and others to provide an improved economic base for the counties that implement the Williamson Act. Currently, local governments bear the loss of property tax revenues on contracted land. Under this strategy, the state would work with others to re-invigorate the State Williamson Act incentives. This would include considering ways to provide incentives for counties to continue to keep and place land under Williamson Act contracts, or to permit contracts to be rescinded and replaced with either Williamson Act Open Space contracts or open space easements in ways that might provide the county with additional funding.

Priorities could be focused on land that remains under Williamson Act in an Open Space Contract, land for which the contract is rescinded and replaced with a permanent open space easement, and land that is brought into new contracts as part of a mitigation strategy. This strategy could allow farmland to remain privately owned by the farmer, and on the tax rolls, and keep it in the Williamson Act or open space easements. At the same time, it could provide economic relief for counties currently faced with loss of Williamson Act subsidies unrelated to the project.

G. Provide technical and financial assistance to support stabilization or reversal of subsidence in the Delta

This could include farming of rice or other wetland vegetation and creation of permanently flooded wetlands and may provide a potential net sink for carbon and methyl-mercury

No comments

- n/a -

through particle settling and photodemethylation. This could allow farmland to remain privately owned by the farmer, bringing income to the farmer and keeping the farmland as part of the tax base.

H. Provide technical and financial assistance to support water supply reliability benefits to agricultural water users

Identify areas where water supply reliability is a concern to Delta farmers and look at ways to improve water reliability. This could allow farmland to remain privately owned by the farmer, adding value to the farmland and keeping it as part of the tax base.

I. Consider ways to improve water quality for Delta farmers.

Identify areas, both within and outside the Delta, where water quality is a concern to Delta farmers and look at ways to improve Delta water quality. This could allow farmland to be privately owned by the farmer, adding value to the farmland and keeping it as part of the tax base.

J. Provide technical and financial assistance for flood management activities which provide additional protection for agricultural activities

This could be used to provide additional funding for flood management activities proposed by local flood districts or by the state or federal government. This could allow farmland to remain privately owned by the farmer, keeping the farmland as part of the tax base, adding value to the farmland, reducing flood loss and lowering the costs of fighting floods

K. Provide technical and financial assistance for activities which prevent or reduce potential higher groundwater levels

This could be activities geared towards reducing potential seepage problems caused by project or non-project activities. This could allow farmland to remain privately owned by the farmer, keep the farmland as part of the tax base, add value to the farmland and reduce agricultural management costs.

L. Provide technical and financial assistance for sediment removal to improve agricultural diversions

In some areas sedimentation may have created problems for pumping water from the Delta. Assistance could be provided to help expedite the regulatory process and for sediment removal. This could allow farmland to remain privately owned by the farmer, keeping farmland as part of the tax base, adding value to the farmland and expediting potential regulatory measures that could reduce agricultural management costs.

M. Establish buffer zones as part of habitat restoration projects ensuring that vegetation will have minimal potential to harbor pests and diseases

This would provide assurances to owners or operators of neighboring properties that they will not be harmed by proposed projects. This could keep farmland as part of the tax base, add value to the farmland and expediting potential regulatory measures that could reduce agricultural management costs.

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No comments

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N. Off-site mitigation

To the extent that off-site mitigation, in addition to off-site mitigation for terrestrial species, is determined to be appropriate, efforts should first consider helping to maintain a large "sustainable" area of high quality farmland in the Delta. Even though parts of the Delta are not in the path of urban development, there may be reasons to preserve and enhance specific agricultural areas in those parts of the Delta. Those reasons include providing a firm basis for agricultural industries and businesses, and providing a bridge to preserving neighboring farmland outside of the Delta Primary (or even Secondary) zone. At least in the context of the BDCP, the conversion of farmland can be thought of in terms of its regional significance and it may be appropriate to go beyond the project's immediately surrounding area, including considering easements outside of the Delta that might provide benefits to the Delta.

O. Consider effects on agricultural infrastructure and/or concentric economic impacts

These would most likely be considered indirect economic impacts and are likely to be harder to quantify. One possibility would be to consider whether it makes sense to suggest limiting the percentage of change in farmland use in a specific area.

P. Consider opportunities to coordinate with others in helping to maintain a sustainable agricultural social and economic community in the Delta Region consistent with ecosystem conservation and restoration activities

There are state, local and non-profit efforts directed at conserving and restoring wetlands and/or farmland. There may be ways to coordinate and enhance such efforts,[13] such as through sharing information; developing common definitions; and identifying common objectives and goals.[14] Increased funding for law enforcement might be another activity that could benefit landowner, local government and resource agency interests.

Although not the focus of this paper, it may be helpful to develop a land stewardship program for the Delta region which looks at all land uses and would provide a framework for individual projects. A programmatic approach could be developed that recognizes the value of natural habitats with agricultural components or agricultural habitats with natural components rather than treat each land use independently. Some of the strategies identified might work better if there is a coordinated approach to the development of an overall restoration/land use strategy for the Delta. Thought could also be given to working

[13] An initial list would include the five Delta counties, Central Valley Flood Protection Program, the Delta Levees Program, the Regional Advance Mitigation Program, the DFG Environmental Restoration Program, the State Wildlife Action Plan, the California Water Plan, Department of Conservation and Food and Agriculture, Delta Protection Council, Delta Conservancy, existing and planned habitat conservation plans and natural community conservation plans, Natural Resources Conservation Service programs and other non-governmental conservation and restoration plans of agencies such as the Nature Conservancy, , Ducks Unlimited, Point Reyes Land Trust.

[14] One approach to consider is the Ramsar Convention for Wetlands that includes the concept of "wise use" of wetlands described as the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development. See http://www.ramsar.org/cda/en/ramsar-home/main/ramsar/1_4000_0_

DRAFT

No comments

- n/a -

with Delta counties to coordinate restoration and preservation activities in the context of creating and funding a Delta Economic Development Corporation that would help create jobs and income growth for the Delta[15].

Q. Consider timing of components and timing of mitigation measures

Include adaptive management principles with regard to farmer involvement to accommodate new agricultural stewardship practices that meet project performance standards, and comply with the regulatory authorizations..

R. Consider ways to provide incentives for farmers to participate in proposed projects and make the regulatory system work better for individual farmers participating in conservation and restoration actions.

Look at whether there is information that could help regulatory agencies do their job better and sooner.

Provide safe harbor agreements for farmers carrying out habitat conservation and restoration.

Look at ways to provide multiple benefits from mitigation actions.

Coordinate and align regulatory reviews and reduce duplication, where appropriate.

Consider possibility of Delta-wide (or sub-region) permits.

Other options.

V. Potential Sources of Funding

A. Use funds that would otherwise be used to purchase "conventional" easements.

B. Seek funding from Cap and Trade Funds to provide research and incentives for developing technologies and practices relating to carbon sequestration.

C. Work with CARB to provide funding for a carbon-offset program for property that supports wetlands.

D. Private and public funds for developing wetlands.

E. Seek additional bond funding.

[15] This kind of corporation works towards improving the regional economy by attracting new employers, promoting local markets, and promoting the formation of new businesses. (http://www.uwex.edu/ces/cced/economies/developmentorganizations/economic_dev_corp_steps.cfm

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No comments

- n/a -

F. Other

No comments

- n/a -

VI. References

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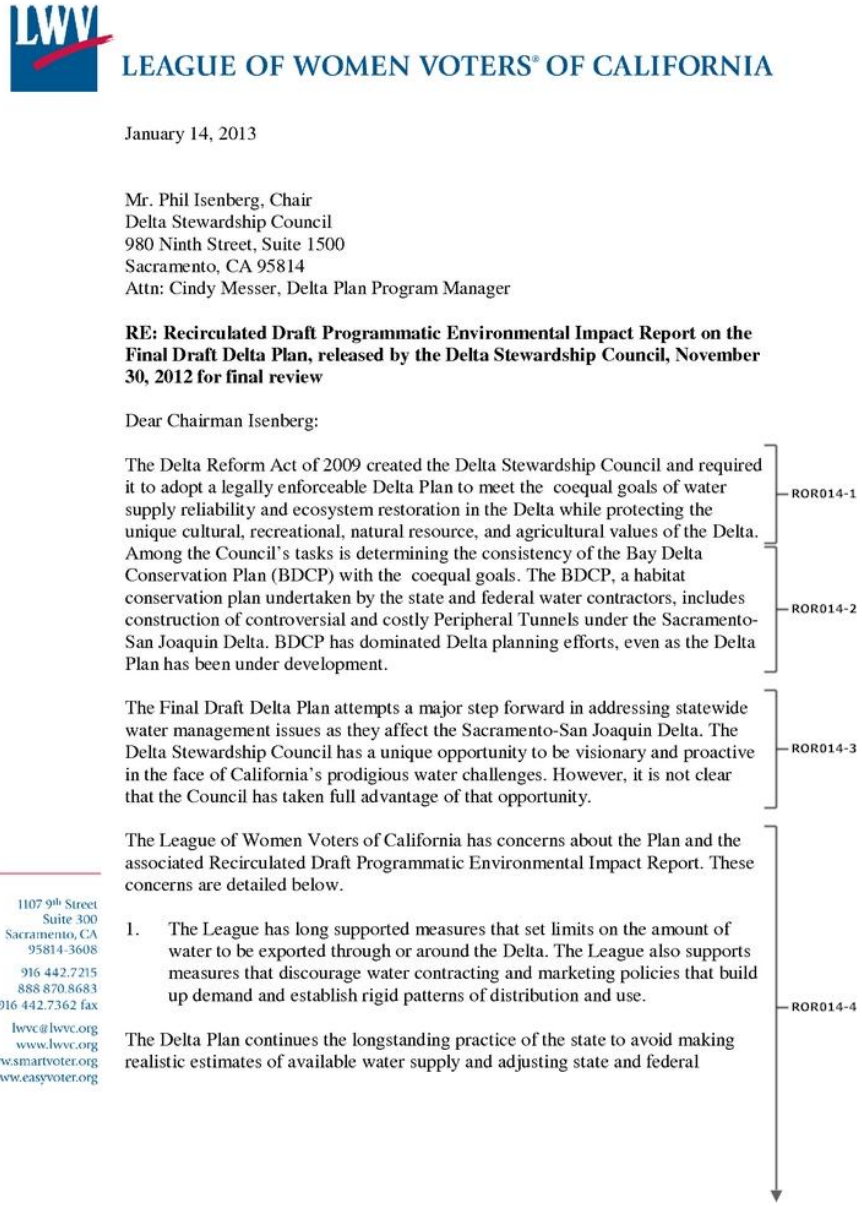
ROR014 LWVC



LEAGUE OF WOMEN VOTERS® OF CALIFORNIA

January 14, 2013

Mr. Phil Isenberg, Chair
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814
Attn: Cindy Messer, Delta Plan Program Manager

RE: Recirculated Draft Programmatic Environmental Impact Report on the Final Draft Delta Plan, released by the Delta Stewardship Council, November 30, 2012 for final review

Dear Chairman Isenberg:

The Delta Reform Act of 2009 created the Delta Stewardship Council and required it to adopt a legally enforceable Delta Plan to meet the coequal goals of water supply reliability and ecosystem restoration in the Delta while protecting the unique cultural, recreational, natural resource, and agricultural values of the Delta. ROR014-1

Among the Council's tasks is determining the consistency of the Bay Delta Conservation Plan (BDCP) with the coequal goals. The BDCP, a habitat conservation plan undertaken by the state and federal water contractors, includes construction of controversial and costly Peripheral Tunnels under the Sacramento-San Joaquin Delta. BDCP has dominated Delta planning efforts, even as the Delta Plan has been under development. ROR014-2

The Final Draft Delta Plan attempts a major step forward in addressing statewide water management issues as they affect the Sacramento-San Joaquin Delta. The Delta Stewardship Council has a unique opportunity to be visionary and proactive in the face of California's prodigious water challenges. However, it is not clear that the Council has taken full advantage of that opportunity. ROR014-3

The League of Women Voters of California has concerns about the Plan and the associated Recirculated Draft Programmatic Environmental Impact Report. These concerns are detailed below.

1. The League has long supported measures that set limits on the amount of water to be exported through or around the Delta. The League also supports measures that discourage water contracting and marketing policies that build up demand and establish rigid patterns of distribution and use. ROR014-4

The Delta Plan continues the longstanding practice of the state to avoid making realistic estimates of available water supply and adjusting state and federal

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Response to comment ROR014-1

Comment noted.

Response to comment ROR014-2

The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1.

Response to comment ROR014-3

Comment noted.

Response to comment ROR014-4

This is a comment on the project, not on the EIR. Completion of the Delta Plan is driven by the Delta Reform Act, Water Code section 85300. The Delta Plan must be reviewed at least once every five years and may be revised as the Council deems appropriate pursuant to Water Code section 85300(c). Hence, the Delta Plan would be amended when the BDCP is ready for incorporation.

contracts accordingly. Your own April 2009 testimony to the Little Hoover Commission hearing on Water Governance made it clear that California's water system is oversubscribed. This situation encourages state and federal water contractors to expect and plan for increased exports under the BDCP.

The Delta Plan does call for incorporating updated Delta Flow Objectives. However, the State Water Resources Control Board is not scheduled to complete these objectives until 2014. Meanwhile, the Delta Plan has a completion goal of early 2013, and the Council appears to be prepared to incorporate into it the BDCP, which is aiming for completion by the end of 2013. It is premature and inappropriate for either the Delta Plan or the Bay Delta Conservation Plan to be approved without valid flow criteria approved by the SWRCB. We recommend that implementation of the Delta Plan be delayed until the SWRCB sets clear flow objectives.

ROR014-4

2. The League supports measures that require strong, binding environmental safeguards as part of any cross Delta transfer system. We are concerned that the Delta Plan does not adequately consider options to protect the environment in areas of origin or to reserve stream flows for fish, wildlife habitat, and other in-stream uses.

The Delta Plan must provide strong environmental safeguards in order to meet the coequal goals of water supply reliability and ecosystem restoration. As recently as September 2012, BDCP planners at a public meeting were unable to adequately address "red flag" concerns by permitting fish agencies on how BDCP will meet the biological goals and objectives for species recovery. Nevertheless, the Delta Plan seems to assume that BDCP can be permitted and will be incorporated into the Delta Plan as the method of ensuring reliable water supply. Reliance on the BDCP to meet the goal of water supply reliability undermines the Delta Plan's obligation to provide for ecosystem restoration.

The State Water Resources Control Board has found that habitat supportive of native fish species in the Delta would require unimpaired Delta outflow of 75% from January through June; there are similar substantial Delta inflow requirements (SWRCB, "Development of Flow Criteria for the Sacramento-San Joaquin Delta," 8/3/2010). A recent USGS report linked declines in the health of the aquatic ecosystem in the San Francisco Bay estuary to increased Delta exports over the last three decades (Cloern and Jassby, "Drivers of Change in Estuarine-Coastal Ecosystems: Discoveries from Four Decades of Study in San Francisco Bay," 10/24/2012). Salinity intrusion is already a problem in the Delta and can be expected to worsen with predicted changes in precipitation and sea level. Numerous scientific findings support the assertion that the Bay-Delta Estuary will not recover without increased freshwater flows. See, for example, the April 2012 final report on Bay-Delta issues by the National Research Council, which endorsed flow standards that would strictly limit diversions in dry years and called on the SWRCB to develop flow standards limiting diversions to a fraction of unimpaired flows

ROR014-5

Response to comment ROR014-5

This is a comment on the project, not on the EIR. The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The Delta Plan must be reviewed at least once every five years and may be revised as the Council deems appropriate pursuant to Water Code section 85300(c). Hence, the Delta Plan would be amended when the BDCP is ready for incorporation.

in order to sustain the Delta ecosystem ("Sustainable Water and Environmental Management in the California Bay-Delta").

The RDPEIR predicts substantial adverse effects on a variety of species based on operation of upstream reservoirs and groundwater basins, as well as on size and timing of flows and water temperature. However, it is not clear that these impacts are unavoidable. That determination cannot be made until the Delta Plan considers alternatives to BDCP for water supply reliability.

ROR014-5

3. The League advocates developing and maintaining a statewide inventory of ground and surface water supplies and a centralized database to evaluate current and potential needs, demands, and uses. We support measures that coordinate groundwater and surface water management, particularly measures that set and enforce standards for groundwater management tailored to the carrying capacity and characteristics of each basin.

A statewide inventory of ground and surface water supplies is an ambitious task, but the Delta Stewardship Council, which includes watersheds and users in much of the state in its planning area, should attempt this task with respect to the Delta. In fact, without a basic analysis of the availability of water flowing into the Delta, the Council cannot establish meaningful water management policies to protect the Delta ecosystem and ensure reliable supplies.

Management of groundwater is problematic in California. Groundwater is well-managed in a few areas by local agencies, for example by preventing overdraft through effective use of water budgets to ensure that discharge does not exceed recharge of aquifers, and/or by undertaking pollution prevention programs and, where necessary, remediation of contaminated groundwater. However, critical data for effective management of groundwater are unavailable in many parts of the state. We recommend that the Delta Plan be revised to strengthen policies for groundwater management as part of water supply reliability for the large portion of the state that uses water from the Delta or its watershed.

ROR014-6

Regarding the areas upstream of the Project, the RDPEIR asserts that, "In most of this upstream area, groundwater supplies are not substantial, especially in the foothills and mountains that surround the Sacramento and San Joaquin valleys. In these areas, it is anticipated that projects to recycle wastewater and stormwater would predominate over groundwater projects." The RDPEIR does not support either the claim that upstream groundwater supplies are not substantial or the claim that groundwater projects would be minor compared with wastewater and stormwater projects. In particular, it is a serious mistake to in effect minimize the importance of the Lower Tuscan Aquifer to the hydrology of the Sacramento River.

Response to comment ROR014-6

This is a comment on the project, not on the EIR. The Delta Plan contains recommendations WR R16 and WR R17 to require supplemental water use reporting and to develop a coordinated statewide system for water use reporting. The Delta Plan contains recommendations WR R9, WR R10, and WR R11 to update Bulletin 118, California's groundwater plan, to implement groundwater management plans in areas that receive water from the Delta watershed, and to recover and manage critically overdrafted groundwater basins. Figure 3-3 of the DEIR, adapted from Department of Water Resources' Bulletin 118-2003, illustrates that groundwater resources are, in general, less available in the upstream foothill areas of the Delta watershed than in other areas that overlie more extensive groundwater basins.

ROR014-6

So essential is groundwater to the state's water supply that the RDPEIR itself (Appendix D) lists sixteen counties in the areas affected by the Delta Plan that have groundwater-related ordinances. Groundwater management merits a more central place in this Plan. This will require clearer information on upstream projects that may actually be covered or encouraged by the Plan.

4. The League supports measures that provide for assessment of economic, social, and environmental costs and benefits of water projects.

The Delta Plan itself is not a water project, but it is required by its enabling legislation to comment on planning efforts that will affect the Delta. This includes especially the BDCP. The Delta Stewardship Council should press for a meaningful financial analysis of the BDCP, which will have costs and economic impacts beyond those the beneficiaries will pay for.

ROR014-7

The dual tunnel proposal currently being put forward by BDCP will be supported by the beneficiaries paying for it only if it exports water at levels that have led to the decline of fish and ecosystems in the Delta and the estuary. BDCP fails to meet the Delta Reform Act goal of reducing reliance on the Delta. The Delta Plan should, at a minimum, include alternatives to BDCP for ensuring water supply reliability, such as the proposal contained in the Delta Protection Commission's *Economic Sustainability Plan,* and the Reduced Exports Plan proposed by the Environmental Water Caucus, which warrants a fair evaluation.

5. The League supports measures that ensure enforcement authority for water quality control boards. Particularly with respect to the Delta, the League calls for federal and state entities to abide by high water quality standards.

Federal (CVP) and state (SWP) contracts must reflect available water supplies and realistic and reliable yields.

ROR014-8

The Delta Plan does not ensure that existing water quality laws will be implemented. Current levels of export undermine water quality, impairing beneficial uses in the Delta. This is despite the fact that the Delta Reform Act requires that the Delta Plan call for performance measurements leading to improved water quality. The Delta Plan should include mechanisms to ensure that the state and regional water boards have the authority and the necessary funding to fully protect beneficial uses, including aquatic life in the Delta, and enforce water quality regulations.

6. The League strongly supports water conservation to minimize reliance on water exported through and around the Delta. Conservation should be a condition of delivery and use of agricultural water and of interbasin transfers.

ROR014-9

Response to comment ROR014-7

CEQA does not require a cost-benefit analysis. Social and economic impacts are not effects on the environment under CEQA, and are not analyzed in the EIR (CEQA Guidelines §§ 15064(e) and 15131). The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1. Regarding the EIR's analysis of alternatives, please see Master Response 3.

Response to comment ROR014-8

This is a comment on the project, not on the EIR.

Response to comment ROR014-9

This is a comment on the project, not on the EIR.

ROR014-9

The Delta Plan should make it clear that water supply reliability and restoration of the Delta ecosystem will necessitate a reduction of exports in the future, and thus will require stronger conservation measures and development of local water supplies.

7. The League supports measures that require that documents present clear, concise information, readily available to the public.

In this regard, we have concerns about use of a programmatic EIR that lacks detail that decision-makers and the public will rely on to analyze covered projects in the future. It should be made clear that the PEIR is not intended to be the sole environmental review document for future projects.

ROR014-10

The League appreciates the opportunity to comment on this document that is so central to improving water management in California.

Sincerely,

Jennifer A. Waggoner
President

Response to comment ROR014-10

As described in subsection, 1.4, Overview of the Delta Plan Environmental Impact Report, of the Draft Program EIR, the Delta Plan Program EIR is a program-level EIR due to the broad, program level of the Delta Plan. Future environmental documents would be completed by other agencies when they propose to implement projects that are subject to consistency reviews by the Council, or projects which are encouraged or otherwise influenced by the Delta Plan. This program EIR is not intended to provide project-level environmental review for any specific project. Please see Master Response 2.

ROR015 Protectors of Northstate Wetlands

January 16th, 2013

Cindy Messer, Delta Plan Program Manager

Email: RulemakingProcessComment@deltacouncil.ca.gov

Attn: Terry Macaulay and Joe Grindstaff, Executive Officers
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

RE: Official Comments on the Delta Watershed Plan Environmental Impact Report (EIR)
•Efforts by Pacific Gas & Electric (PG&E) to Deceive the Whitmore Community
•Proposed De-commission of the Kilarc Co-generation Plant, FERC Project #606
•Proposed Shasta Dam Raising Project (aka Shasta Lake Water Resources Investigation)
•Efforts by Bureau of Reclamation and 3M to hide *cumulative* impacts of their Project

We, the citizens of Shasta County are the heart of the water supply to the Delta Watershed (as shown in the included map). We are gravely disappointed over the intentions of the Delta Watershed Plan and its failure to address our concerns at the top of the impacted watershed. ROR015-1

Many varied and significant impacts to our community have not been adequately addressed in this EIR.

In the town of Whitmore, CA, the Federal Energy Regulatory Commission (FERC) has been conducting an Environmental Impact Statement (EIS) on the proposed De-commission of the Kilarc PG&E Co-generation Plant, FERC Project #606. This proposed action will affect the greater Cow Creek Project, and ultimately the Sacramento River, for which both the German Ditch and Cow Creek are tributaries of.

PG&E has prevented residents from fully participating in the EIS process being conducted by FERC. PG&E plans to shut down Kilarc, a historical, fully functioning hydro-electric plant, specifically to divert water to the Sacramento River/Delta Watershed. (see attached letter to the Office of Enforcement at FERC) A grave impact on the small, rural community of Whitmore, CA. ROR015-2

Please factor in the proposed De-commission of the Kilarc PG&E Co-generation Plant (FERC Project #606), as the outcome of these actions by FERC and PG&E will have far-reaching impacts on the Delta Watershed. What happens in Whitmore, CA could also impact policy decisions for other rural water rights holders.

Another concern to citizens in Shasta County is the longstanding mistreatment of the Winnemem Wintu. The Winnemem Wintu have lived in Northern California for over eight thousand years.

The Wintu tribe was recognized by the federal government in the 1951 Cottonwood treaty.

In 1985 (at the same time as the Bureau of Reclamation began pushing to raise Shasta Dam) the Winnemem's federal status was mysteriously removed. This was done without notification, ROR015-3

Response to comment ROR015-1

Comment noted.

Response to comment ROR015-2

The projects described in this comment are outside of the scope of the Delta Plan and therefore are not considered in the EIR, except as reasonably foreseeable and probable future projects that may contribute to cumulative impacts.

Response to comment ROR015-3

The projects described in this comment are outside of the scope of the Delta Plan and therefore are not considered in the EIR except as reasonably foreseeable and probable future projects that may contribute to cumulative impacts.

change of circumstance or explanation. Members of the Winnemem were denied access to health care, educational opportunities and their status of sovereignty. It has never been rightfully restored.

The Winnemem band of the Wintu Indians is the *only one of the six Wintu Bands* who were covertly removed from federal roles. This is the same band of the Wintu tribe who have a legal agreement with the government not to impact the McCloud River. Many water rights holders, including the Metropolitan Water District (MWD), believe this agreement will have a significant legal impact on the Shasta Dam Raising Project.

The proposed raising of Shasta Dam to provide more water for Southern California water users (such as the MWD) has broad and significant impacts. The Winnemem urgently want their federal standing reinstated. They hope to re-obtain sovereignty so they may object to the Shasta Dam Raising Project on stronger grounds.

The original construction of Shasta Dam destroyed a majority of the Winnemem sacred ceremonial sites. However, many sacred sites are still accessible, particularly in the summer months. One such place is the "Female Stone," a special rock that the leaders of this matriarchal tribe use in their ceremonies. This rock is a critical part of a ritual where leadership roles between women are passed on to the next generation.

If Shasta Dam is raised, it will bury this and other ancestral sites underwater forever. Caleen Sisk, the current Winnemem Wintu tribal leader, has said this "will kill our culture."

ROR015-3

Will the Delta Stewardship Council please address this issue? Why are the Winnemem Wintu being denied a seat at the decision-making table? What actions can your organization do to ensure that the rights of indigenous peoples are protected?

The citizens of Shasta County are also concerned about the gravel/hard rock quarry impacts of the Shasta Dam Raising Project. To the best of my knowledge, all dams require materials in construction that can only be obtained through heavy mining operations. The nearest existing quarry capable of providing the type and quantity of rock needed is located in Vallejo, CA.

Why has this never been addressed in any of the feasibility studies conducted by the Bureau of Reclamation?

In late December 2011, 3M proposed building an immense open pit quarry mine with four factories (each requiring separate PSD permits) on the outskirts of Shasta Lake, CA.

The proposed 3M Quarry would be approximately a mile from the proposed Shasta Dam Raising Project Site.

We are requesting that the Delta Stewardship Council conduct a cumulative analysis of the impacts of the Shasta Dam Raising Project, including a study of the proposed 3M Quarry in Shasta Lake, CA.

No comments

- n/a -

The raising of Shasta Dam and the quantity of rock required could have disastrous results for the low income community of Shasta County. We already have small surface quarries in the area to serve local needs. Nothing as astronomical as the proposed 800 foot deep 3M quarry seem economically feasible in this area of low development... unless it is being built to service the raising of Shasta Dam.

Therefore, the impacts of the proposed 3M Quarry and the Shasta Dam Raising Project are significant and must be addressed in this EIR . I have included questions about these potential impacts for this comments document.

I am grateful for the California Environmental Quality Act (CEQA). This well reasoned Act allows the concerned citizens of Shasta County an opportunity to receive comprehensive answers for all of our concerns regarding the proposed 3M Quarry.

I have a few questions due to the size and complexity of the proposed 3M Quarry Project. Thank you for addressing these concerns.

NOISE

•If trains carrying rocks from the 3M Quarry in Shasta Lake are going north after loading, they will need five engines to pull them up the mountains. A significant amount of noise.

A) How often will they run?

1) How many days a week?

2) Are they limited to what times of day (to limit noise impact on the local community)? — ROR015-3

B) What is the sound decimal of these trains?

C) Is the noise from the track (when they are running) loud enough to be considered a noise pollutant?

D) How far will the noise from the 3M Quarry impact the surrounding environment?

E) What noise mitigation is being considered for this impact?

F) What studies will be conducted regarding the impacts of train noise on surrounding wildlife, including the wetlands directly on and surrounding the 3M Quarry Project site?

2) My understanding is that it takes 250 pounds of dynamite to blow up a section set to be mined.

A) What decibel is the noise of such a blast rated at?

B) How far away would this noise be heard?

C) The proposed 3M Quarry is very large and deep. Would this quarry be using larger charges?

D) If so, how big would those charges be ?

E) How often would they be detonating?

F) Would they detonate more than one site at a time?

G) Would they mine more than one location at a time?

H) Would the neighbors be notified ahead of time regarding these blasts?

I) What would be the immediate impact on the surrounding wildlife from this blasting?

J) What is the cumulative impact on surrounding wildlife if repeated blasting occurs?

K) What noise mitigation methods are being considered to mitigate blasting impacts?

No comments

- n/a -

L) What is the impact to the surround wetlands and underlying water table?
M) What is the impact to the underground areas on and surrounding the proposed 3M Quarry?

3) Heavy equipment operations are a significant aspect of the proposed 3M Quarry.
A) How many pieces of heavy equipment would 3M require at full operational status?
B) What types of heavy equipment will be used in construction, as well as full build-out?
C) What types of noise will this equipment make while operating? (For example, scraping the rocky hillside causes an *x* or *y* amount of noise.)
D) Are the engines from this heavy equipment loud enough to be considered noise pollutants?
E) Are there other noises associated with this equipment?
F) How many pieces of heavy equipment would be operating at one time?
G) How many days a week would they operate heavy equipment?
H) What hours would 3M operate their heavy equipment and could these operations disrupt sensitive receptors?
I) What other environmental impacts are being addressed and what mitigations are being considered regarding heavy equipment for the proposed 3M Quarry?

4) Noise concerns regarding the 3M Aggregate Crushing, Screening and Washing Plant:
A) How loud will the proposed Aggregate Crushing Plant be?
B) How many sources of noise might come from the 3M Aggregate Crushing Plant?
C) What is the noise decibel at ½ mile away?
D) What is the noise decibel at 2 miles away? — ROR015-3
E) What is the noise impact to surrounding wildlife and the wetlands habitat nearby?
F) What are the proposed hours of operation for the 3M Aggregate Crushing Plant?
H) What are the impacts on wildlife over the proposed100 year life of the 3M Quarry?
I) What mitigation is being considered to reduce the noise impact from this factory?

5) The 3M Portland Cement Concrete Plant.
A) How loud is the Portland Cement Concrete Plant?
- B) How many sources of noise from this plant are there?
C) Are the cumulative impacts of these noise sources being considered?
D) Are the noises from the stream of heavy equipment coming and going in the plant part of the cumulative impact consideration?
D) What is the noise decibel at ½ mile away?
E) What is the noise decibel at 2 miles away?
F) What is the noise impact to surrounding wildlife and wetlands?
G) How far away from the plant are the impacts to wildlife and critical habitat?
H) What are the proposed hours of operation for this plant?
I) Is serious consideration being given to minimizing hours of operation as mitigation?
J) What other mitigation measures are being considered?
K) What noise threshold would cause this factory to be too big of an impact to allow it's construction on and near wetlands?

No comments

- n/a -

6) The 3M Asphalt Concrete Plant.

A) How loud will this Asphalt Concrete Plant be?

• B) How many sources of noise does this factory create?

C) Is the cumulative noise impact being considered?

D) What is the noise decibel at ½ mile away?

E) What is the noise decibel at 2 miles away?

F) What is the noise impact to surrounding wildlife and wetlands?

G) What are the proposed hours of operation for this plant?

H) Is serious consideration being given to making the Asphalt Plant smaller to minimize its noise impact?

I) What other ideas are being proposed to minimize the noise?

J) What, if any, noise threshold would trigger a denial for permission to construct this factory?

7) The 3M Recycled Building Materials Processing Plant Since this is a "processing plant" and not just a shed to catch a few left-over building supplies, similar questions need answers:

A) What noise levels can be expected from a Recycled Building Materials Processing Plant?

B) How many sources of noise are there from this type of factory?

C) Are the noises being considered cumulatively?

D) What is the noise decibel at ½ mile away?

E) What is the noise decibel at 2 miles away?

F) What is the noise impact to surrounding wildlife and wetland habitat?

G) What are the cumulative impacts to wildlife over the life of the plant?

H) What ideas are being considered to minimize the noise impact?

I) What noise threshold, if any, would qualify this plant as too hazardous to permit?

8) The 3M Truck and Railroad Loading Facility: We are all familiar with the piercing sound of a big rig backing up and the deafening rattling of trains rushing by and blowing their horns.

A) What noise restrictions would be placed on truck back- up alarms, especially between 7PM and 7AM?

• B) What is the maximum number of trucks that would be loading and unloading at one time?

C) What is the cumulative noise impact from that maximum number?

D) During high production times, is there a limit to how many trucks can be idling while they wait to be loaded? What air pollutants might be generated?

E) What is the noise decibel of the trucks' back-up alarms ½ mile away?

F) What is the noise decibel of the trains' horn 3 miles away?

G) What is the noise impact from this loading facility to surrounding wildlife wetland habitat?

H) Is serious consideration being given to minimizing hours of loading and off-loading to minimize the noise impact?

I) Has a noise barrier around the shipping area been considered for mitigation?

ROR015-3

No comments

- n/a -

J) Are there other means being considered to reduce the noise of the shipping area?

K) What is the cumulative impact on surrounding wildlife and wetland habitat over the 100 year life of the proposed shipping facility?

ENVIRONMENTAL CONCERNS:

1) How are the three streams (all tributaries of the Sacramento River) running through the property being safeguarded? What concerns might your agency have?

2) What agencies are involved in protecting these existing streams?

3) What methods are being proposed to contain the rain run-off from the proposed 3M Quarry?

4) What studies have been conducted regarding endangered and threatened species on the proposed 3M Quarry site?

5) What mitigation will be implemented to protect these species and critical habitat?

6) What agencies oversees the protection of these species?

7) What types of mitigation rare being considered?

8) How is the rain run-off from the Aggregate Crushing Building Plant being addressed?

9) There are four proposed plants on this site. How much water run-off is projected for each factory?

10) Where will each building's water run-off be stored?

11) What chemicals (or other toxins) are used or produced in the Aggregate Crushing Plant?

12) If any chemicals/toxins are identified in regards to the Aggregate Crushing Plant, what are the handling and storage procedures for these chemicals or toxins?

13) If any chemicals/toxins are identified in regards to the aggregate crushing plant, what is the waste disposal plan for the chemicals? Will Shasta County be expected to accept hazardous waste at either the facility in Anderson, CA or the one in Igo, CA? ROR015-3

14) What chemicals or other toxins are used or produced at the 3M Portland Cement Plant?

15) If any chemicals/toxins are identified in regards to the Portland Cement Concrete plant, what is the handling and storage procedure for these chemicals or toxins?

16) If any chemicals/toxins are identified in regards to the Portland Cement Concrete Plant, what is the waste disposal plan for these chemicals?

17) What chemicals or other toxins are used or produced in the 3M Asphalt Concrete Plant?

18) If any chemicals/toxins are identified in regards to the Asphalt Concrete Plant? What is the handling and storage procedure for these chemicals or toxins?

19)If any chemicals/toxins are identified in regards to the Asphalt Concrete Plant, what is the waste disposal plan for these chemicals?

20) What chemicals or other toxins are used or produced in the Recycled Construction Materials Processing plant?

21) If any chemicals/toxins are identified in regards to the Recycled Construction Materials Processing Plant, what is the handling and storage procedure for these chemicals or toxins?

No comments

- n/a -

22) If any chemicals/toxins are identified in regards to the Recycled Construction Materials Processing Plant, what is the waste disposal plan for these chemicals?

23) If there are any toxic chemicals, what is the emergency plan in case of an accident?

24) Is there any toxic waste that must be transported to an off-site facility?

25) What arrangements has 3M made for fire protection?

26) Rock quarries are notoriously dusty. What mitigation measures are being proposed to to minimize the dust continually landing on local homes and impacting wildlife habitat?

27) What mitigation measures are being proposed to minimize non-stop dust to surrounding waterways and wetlands?

28) It is my understanding that dust is a major concern with all rock quarries What studies of the surrounding area will be implemented to offer safeguards?

NATIVE AMERICAN INTERESTS

There is a Native American cemetery as well as other culturally sensitive artifacts and sites on and near the proposed 3M Quarry site.

1) What experts are consulting with the local tribes?

2) Will there be a separate document addressing the concerns of indigenous peoples?

SEISMIC CONSIDERATIONS — ROR015-3

- What seismic impacts will there be to the surrounding area?
- What size area should be studied to know the impacts to the surrounding area (5 miles?)
- Are there seismic considerations to consider when operating heavy machinery?
- What are the immediate seismic impacts from construction of the 3M Project?
- Are there potential cumulative seismic effects?
- Are there other seismic considerations we should be concerned about?

7) Could these seismic impacts affect the integrity of Shasta Dam itself? Could they impact the construction aspect of raising Shasta Dam?

POLLUTION

- Is the significant emissions from the trains (especially if they are running 5 engines each) coming in and out of the 3M Quarry included in an air quality analysis? Are their emissions while waiting and being loaded considered?
- What type and quantity of pollution does each 250 pound detonation generate?
- Are the dynamite pollutants included in an air analysis?
- What type of local water analysis is being conducted? Certainly some of these pollutants would drift into the creeks and wetlands near and on the site.
- How are the exhaust emissions from the heavy equipment (both operating and idling) being considered?
- There is a constant need when operating a quarry to dump the excess from the cement trucks. Where is the dump on this project? Could such dumps affect local water quality?

No comments

- n/a -

•Where will the cement mixers on the trucks be washed?
•Will the water from washing these trucks be contained in a lined pond?
a) How will this waste water be treated? Will a local reclamation plant be used?
b) If so, are there any other sources of waste water?
c) How would other sources of waste water be treated?

- In order for citizens to participate in the CEQA process effectively, we need to know the size of each plant proposed, the equipment that would be used in each plant, all chemicals used in the process (and their disposal) and all air and water emissions. We need a map showing the locations of these proposed plants on the 3M site. Could you provide that information?

BACT

I am hoping that the Bureau of Reclamation (Bureau) and the Delta Stewardship Council will address BACT (Best Available Control Technology) seriously, as part of the environmental review process on the Shasta Dam Raising Project.

1) What specific and actual examples of filtering technology are being considered in the manufacturing processes of those who wil be providing the aggregate rock needed to build the dam? Many proposed sites for mining have been looked at by the Bureau. If new factories are to be constructed for the purpose of providing rock aggregate, what incentives will the Bureau use to ensure the least impact on the California citizenery?

2) Are wet electrostatic precipitators (WESP or wet ESP) being considered for use at the proposed facilities? A WESP operates with saturated air streams (100% relative humidity). WESPs are commonly used to remove liquid droplets such as sulfuric acid mist from industrial process gas streams. The WESP is also commonly used where the gases are high in moisture content, contain combustible particulate, or have particles that are sticky in nature. Will this be considered? ROR015-3

3) The preferred and most modern type of WESP is a downflow tubular design. This design allows the collected moisture and particulate to form a slurry that helps to keep the collection surfaces clean. Will the downflow tubular design be utilized at the proposed 3M site?

4) Plate style and upflow design WESPs are very unreliable and should not be used in applications where particulate is sticky in nature. Are the particulates at the proposed facilities of a type that could be effectively filtered out by a plate style and unflow design?

5) ESPs continue to be excellent devices for control of many industrial particulate emissions, including smoke from electricity-generating utilities (coal and oil fired), salt cake collection from black liquor boilers in pulp mills, and catalyst collection from fluidized bed catalytic cracker units in oil refineries to name a few. These devices treat gas volumes from several hundred thousand ACFM to 2.5 million ACFM (1,180 m^3/s) in the largest coal-fired boiler applications. For a coal-fired boiler the collection is usually performed downstream of the air preheater at about 160 °C (320 deg.F) which provides optimal resistivity of the coal-ash particles. For some difficult applications with low-sulfur fuel hot-end units have been built operating above 371 °C (700 deg.F). Will this technology be considered? Will the Bureau

No comments

- n/a -

encourage these type of applications?

6) The original parallel plate–weighted wire design has evolved as more efficient (and robust) discharge electrode designs were developed, today focusing on rigid (pipe-frame) discharge electrodes to which many sharpened spikes are attached (barbed wire), maximizing corona production. Transformer-rectifier systems apply voltages of 50 – 100 kV at relatively high current densities. Modern controls, such as an automation voltage control, minimize electric sparking and prevent arcing (sparks are quenched within 1/2 cycle of the TR set), avoiding damage to the components. Automatic plate-rapping systems and hopper-evacuation systems remove the collected particulate matter while on line, theoretically allowing ESPs to stay in operation for years at a time. Which of these BACT methods, procedures and determinations are being considered?

7) Please provide and describe what tests have been conducted to determine resistivity under the previous permits utilized by the Vallejo, CA site and how that would apply here? A widely taught concept to calculate the collection efficiency is the Deutsch model, which assumes infinite remixing of the particles perpendicular to the gas stream. Was the Deutsch model be used here, as part of your agency's BACT analysis? (Resistivity can be determined as a function of temperature in accordance with IEEE Standard 548. This test is conducted in an air environment containing a specified moisture concentration. The test is run as a function of ascending or descending temperature or both. Data are acquired using an average ash layer electric field of 4 kV/cm. Since relatively low applied voltage is used and no sulfuric acid vapor is present in the environment, the values obtained indicate the maximum ash resistivity.) — ROR015-3

8) Ideally, BACT considers energy, environmental, and economic impact. How specifically are these issues being addressed?

9) BACT can be add-on control equipment or modification of the production processes or methods. Were any add-ons to the manufacturing processes at the Vallejo, CA quarry, looked at? Will any add-ons be used?

10) BACT includes fuel cleaning or treatment and innovative fuel combustion techniques. BACT may also be a design, equipment, work practice, or operational standard, if imposition of an emissions standard is infeasible. Were any of the above items and conditions considered in the BACT determination?

11) Currently, Shasta County has rated 2nd worst in California for filthy air quality, behind Los Angeles. What mitigations is the Delta Stewardship Council planning on doing to help solve our air quality problems?

12) PSD increment is the amount of pollution an area is allowed to increase. PSD increments prevent the air quality in clean areas from deteriorating to the level set by the NAAQS. The NAAQS is a maximum allowable concentration "ceiling." A PSD increment, on the other hand, is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant. Please explain how the baseline concentration in Shasta County was determined and where our "ceiling" is currently at. What efforts, if any, were considered in regards to PSD increments for the proposed 3M Quarry sites being considered?

13) The baseline concentration is defined for each pollutant and, in general, is the ambient concentration existing at the time that the first complete PSD permit

No comments

- n/a -

application affecting the area is submitted. Significant deterioration is said to occur when the amount of new pollution would exceed the applicable PSD increment. It is important to note, however, that the air quality cannot deteriorate beyond the concentration allowed by the applicable NAAQS, even if not all of the PSD increment is consumed. Will significant deterioration be the case here? How were ambient concentrations determined at the proposed 3M Quarry site?

Why aren't the various federal agencies involved in this project looking at the cumulative impacts? Why is the City of Shasta Lake whose boarder has 90 acres in the 3M Project Area not the lead agency? They would likely be supplying the water, electricity and access roads. The Shasta Lake Fire District is the closest emergency responder. ROR015-3

The proposed 3M Quarry is a substantial project both is size and complexity. There are four proposed plants for which we have not been given even cursory information.

Where are these 3M factories to be located on the proposed quarry site? What type of heavy equipment? What are the dimensions of these factories? What chemicals is 3M planning to use and what are their cumulative impacts? What mitigations are being looked at? What incentives will the Bureau of Reclamation and the Delta Stewardship Council consider offering 3M in order to encourage the lowest impact on the surrounding environment?

The Environmental Appeals Board has officially recognized Shasta County as an Environmental Justice Community. (See *In Re KNAUF FIBER GLASS, GMBH PSD Appeal Nos. 983 through 9820*, "ORDER DENYING REVIEW IN PART AND REMANDING IN PART," decided February 4, 1999) Environmental Justice Guidelines call for federal agencies "to go above and beyond regular protocol to protect and involve these communities."

In light of these Environmental Justice issues, I am asking that your agency extend the public comment period until after the Public Hearing has ended. To do less is disengenuous to the notion of "early and sustained involvement." How can the Delta Stewardship Council claim they are interested in public involvement when they close the comment period prior to the public meeting? ROR015-4

I also found Section 2A Proposed Project and Alternatives, 2.2.1.6 Water Transfers in the Delta Plan EIR of particular interest. This section makes it appear that the real intent of this project is to transfer significant quantities of the Northern California water supply south so that private industry can sell their surplus water supply. Access to clean water is a public good and a state trust. ROR015-5

This section must be deleted.

I hope that these concerns will be addressed. The health and welfare of real people will be affected by the decisions made here. ROR015-6

Thank you for conducting this study. I look forward to the next step in the process.

Response to comment ROR015-4

The review period for the Recirculated Draft PEIR began on November 30, 2012 and ended on January 14, 2013. The public hearing for the RDPEIR was held on January 11, 2013, prior to the close of the review period. CEQA guidelines, Section 15105 requires that review periods for draft EIRs should not be less than 30 days, and no longer than 60 days. The 45 day comment period is sufficient under CEQA.

Response to comment ROR015-5

This is a comment on the project, not on the EIR.

Response to comment ROR015-6

Comment noted.

Thank you,

Celeste Draisner
Protectors of Northstate Wetlands
P.O. Box 172
Whitmore, CA 96096
(530) 223-0197

No comments

- n/a -

No comments

- n/a -

January 13th, 2013

Norman C. Bay, Director
Office of Enforcement
Federal Energy Regulatory Commission (FERC)
888 First Street, NE
Washington, DC 20426

RE: Official Request for Investigation of FERC Project #606 and the Activities of Pacific Gas & Electric

Dear Director Bay, Office of Enforcement;

My neighbors have expressed concerns over the potential loss of their water rights. I am writing to request an official investigation into the actions of Pacific Gas & Electric (PG&E) in regards to their company's efforts to decommission the Kilarc Co-generation Plant in Whitmore, California.

In 2002, PG&E's legal representative promised the South Cow Creek Ditch Assoc. (SCCDA) members that they would not lose any of their water rights. He also stated that PG&E would provide a signed legal contract to the SCCDA members "within a couple of weeks." The promised document would legally bind PG&E to surrender their water rights on the German Ditch back to our Association. PG&E explained this would take effect when FERC officially de-comissioned PG&E's Kilarc co-generation plant in Whitmore.

In June 2011, I asked the SCCDA secretary for a copy of the legal agreement PG&E had stated (at their 2002 public hearing) they would supply. She said she had never received any such document. Concerned, I immediately contacted PG&E's legal department and requested clarification.

After much correspondence with PG&E's legal department, their final position was, "To the extent you are requesting that such a legal document... be drafted and executed now...I must respectfully decline. To do so now would require an expenditure of resources this is not prudent at this time..."

At this point, I became worried. I read through PG&E's surrender applications. I compared the old maps with the most recent map. I discovered our diversion (as well as two other disputed water diversions) shown in PG&E's early applications were removed from the latest map.

In PG&E's earlier applications they state; "Upon decommissioning, PG&E will divest its ownership of shares in the Association **and the shares will remain with the [SCCDA] Association.**" In PG&E's latest Application, they no longer make this claim. In fact the section quoted above in bold was removed. Now it simply says they will "divest their shares."

During the time PG&E claimed they intended to transfer their water shares to our Association, they gave California Fish and Game a different story. They stated to California Fish and Game that they now intended to abandon their water rights. They explained that transferring their water rights

No comments

- n/a -

to 3rd parties (such as the SCCDA) could be "extremely time-consuming and resource-intensive" and would "Potentially disrupt well-settled water rights."

In fact, California Fish and Game filed a complaint with FERC on October 10, 2007, stating PG&E had made "*a significant modification to the project agreement.*"

I believe that soon after the 2002 public hearing PG&E held with the SCCDA, they realized the liability they had created for themselves.

This is evidenced by comments PG&E made to California Fish and Game on December 10, 2007. "*Consequently, we believe court approval would be necessary for PG&E to change its use from power generation to instream use prior to transferring its water rights. Court approval of such a water rights transfer would be extremely time-consuming and resource-intensive, could be contested by the parties to the adjudication, and could potentially disrupt well-settled water rights on an a adjudicated watercourse..." "abandonment would accomplish the ....goals more easily and with greater certainty. Specifically, abandonment would return the water to the streams without legal proceedings."*

In the same letter PG&E states,"*PG&E believes abandoning its water rights...will achieve the goals of the project agreement more efficiently and with greater certainty than would seeking to transfer those rights to a third party, a process that would require court approval and necessarily implicate a panoply of procedural and substantive issues the resolution of which would be time-consuming and resource intensive.*"

On January 9, 2008, PG&E's project co-coordinator sent a letter stating that PG&E had intentions "*at this time*" to convey the water rights to our Association '*in the future*." PG&E has tried repeatedly to pass this letter off as the legal contract they promised us in 2002. I asked California Fish and Game if they would accept this letter as proof our Association had been granted legal rights to the PG&E water shares.

California Fish and Game declined to answer my letter.

This leads many people in my community to believe that PG&E's strategy is to string our Association along until the co-generation plant is de-comissioned. At that time, our water rights will no longer be PG&E's concern. We could lose our legal claims to this critical water flow. Our water rights are necessary for our homes, our orchards and the crops in our fields.

This deception has prevented our community from participating in the decision-making process. Shasta County has been designated an Environmental Justice Community by the Environmental Appeals Board. (See *In Re KNAUF FIBER GLASS, GMBH PSD Appeal Nos. 983 through 9820*, "ORDER DENYING REVIEW IN PART AND REMANDING IN PART," decided February 4, 1999) A basic covenant of Environmental Justice is "early and sustained involvement."

No comments

- n/a -

Environmental Justice Guidelines call for federal agencies "to go above and beyond regular protocol to protect and involve these communities."

Please investigate the reasons why we have been denied meaningful involvement by FERC and PG&E. This situation urgently needs the assistance of your office.

Thank you for your consideration.

Heidi Strand, Member South Cow Creek Ditch Assoc.
P.O. Box 172,
Whitmore,CA 96096
(530) 472-1355

CC: hand delivered 8 members SCCDA
Gary Stacey, California Fish & Game, Matthew A. Fogelson, PG&E
Winnemem Wintu Tribe Shasta County Supervisors
Erin Brockovich, W.M. Beaty & Associates,
Deldi Reyes, Environmental Justice Coordinator, EPA

No comments

- n/a -

ROR016 PSSEP

PSSEP
Partnership for Sound Science in Environmental Policy

January 14, 2013

Cindy Messer
Delta Plan Program Manager
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

via email to: recirculateddpeircomments@deltacouncil.ca.gov

Re: Draft Programmatic Environmental Impact Report, Vol. 3, Recirculated Draft Delta Plan (State Clearing House # 2010122028)

Dear Ms. Messer:

These comments are submitted on behalf of the Partnership for Sound Science in Environmental Policy ("PSSEP") on the Draft Programmatic Environmental Impact Report, Vol. 3, for the Recirculated Draft Delta Plan ("RDPEIR"). PSSEP is an association of municipal and industrial entities and trade associations in California whose members are regulated by the State and Regional Water Boards under their joint, Federal Clean Water Act and Porter-Cologne Water Quality Control Act authorities. Some of PSSEP's members are located in the San Francisco Bay Area and will be directly affected by any actions taken, or decisions made by, the Delta Stewardship Council under the Final Delta Plan to be adopted thereby. As such, PSSEP and its members are "interested parties" for purposes of the California Environmental Quality Act ("CEQA"). ROR016-1

The foci of these comments are related to the unquestionable impacts that the Project (as defined in the RDPEIR) will have on the Delta and to San Francisco Bay related to a reasonably certain increase in selenium loadings that will occur from the San Joaquin River. Our exhaustive review and analysis of the RDPEIR reveals that these impacts are not even identified, let alone adequately considered, in the RDPEIR. As such, the RDPEIR cannot legally support adoption of the Recirculated Draft Delta Plan ("RDDP") unless and until adequate consideration of these impacts has been completed and fully mitigated in any final Delta Plan.

The Central Valley Regional Water Board has completed three different selenium TMDLs in its region, including the San Joaquin River Selenium TMDL (August 2001), Selenium TMDL for Grasslands Marshes (April 2000), and the Salt Slough Selenium TMDL (January 1997). All of the waters impaired by selenium and which required development of these TMDLs drain into the main-stem or tributaries of the San Joaquin ROR016-2

Response to comment ROR016-1

Comment noted.

Response to comment ROR016-2

This comment assumes significant new diversions of water from the Sacramento River north of the current state and federal pumping facilities and a resulting increase in flow to the Delta from the San Joaquin River, with resulting increases in selenium loads. The Delta Plan does not direct such a change in diversions or flows, nor does the EIR analyze resulting impacts on the environment. See Master Response 1. In addition, the EIR does address selenium. Subsection 3.3.4.2.2 of the Draft Program EIR discusses surface water quality in the San Joaquin watershed, including selenium. Other subsections also address the presence and sources of selenium in the Delta and its watershed (see, e.g., DEIR, pp. 3-11, 3-18, 3-37). In addition, Impacts 3-1a, 3-1c, and 3-1d address potential impacts of the Delta Plan on water resources that relate to selenium. For example, the analysis of impact 3-1a states that operation of new water supply facilities may create long-term changes in local mixtures of source waters within channels, as well as long-term changes in the balance of sedimentation and scour within channels. These changes may affect the bioavailability of pollutants, including selenium. Mitigation Measure 3-1 on page 3-93 of the Draft Program EIR also has been amended by adding the following provision: "Projects that may affect drainage patterns or flow patterns, water quality, or groundwater elevations or quality, should use appropriate and available scientific and engineering tools and methods to evaluate how operation of the project could affect Delta flow patterns, water quality, and groundwater elevation and quality. The following elements should be considered by the lead agency when pursuing a covered action: changes in hydrodynamics, timing and quantity of fresh water flow, temperature, salinity, selenium, dissolved oxygen, turbidity, nutrients, methylmercury, and total organic carbon loadings and/or concentrations."

River. The San Joaquin River, in turn, flows into the Delta and, ultimately, through San Francisco Bay. It is therefore not an overstatement to say that ***virtually all*** of the selenium loading from the San Joaquin River has a quantifiable and likely significant impact on selenium loading to the San Francisco Bay.

The San Francisco Regional Water Board began work on a selenium TMDL for North San Francisco Bay in 2007. Since that time, numerous studies have been completed to analyze the contribution of selenium coming from the Delta, including loads derived from the Sacramento River and the San Joaquin River. Total selenium loads to San Francisco Bay from the Delta have been estimated at approximately 3,938 kg/year. (Technical Memorandum 2: North San Francisco Bay Selenium Data Summary and Source Analysis. Table 3-19, p. 3-60. July 2008. TetraTech, Inc., http://www.swrcb.ca.gov/rwqcb2/water_issues/programs/TMDLs/northsfbayselenium/TMDL_TM2_July2008.pdf). The estimated selenium contribution from the Sacramento River at Freeport is 1,577 kg/yr, and the estimated selenium contribution from the San Joaquin River at Vernalis is 2,289 kg/yr. ROR016-2

Any project or program that encourages, leads to, or results in a hydrologic change that extracts water from the Sacramento River north of the existing Federal and State Water Projects pumping facilities near Tracy will mean that ***more*** water from the San Joaquin River will necessarily flow into the Delta and impact San Francisco Bay. This, in turn, will likely have dramatic and substantial impacts on selenium loadings from the Delta into San Francisco Bay. As a result thereof, logic dictates that there will be substantial impacts on fish and other wildlife in San Francisco Bay. This phenomenon was recently explored by scientists studying the sources and fate of selenium loads affecting San Francisco Bay, wherein it was concluded that, "Manipulations to the Delta system, especially those that increase San Joaquin [River] flow into the bay, will also have selenium impacts to the bay that must be evaluated." ("*Modeling Fate, Transport, and Biological Uptake of Selenium in North San Francisco Bay*", L. Chen, Meseck, Roy, Grieb, and Baginska; Estuaries & Coasts, November 2012.)

Current BDCP implementation projects include the construction and operation of five intake structures on the east bank of the Sacramento River between Clarksburg and Walnut Grove, each with a water diversion capacity of 3,000 cubic feet per second (cfs). The water extracted from the Sacramento River from these five intake structures would then travel in pipelines from the intakes to a sedimentation basin and solids lagoon before reaching the intake pumping plants. From the intake pumping plants water will be pumped into another set of pipelines to an Intermediate Forebay (via a transition structure) or to a tunnel (Tunnel 1) that would also carry water to the Intermediate Forebay. From this forebay, water would be pumped or conveyed by a gravity bypass system into a dual-bore tunnel (Tunnel 2) that will run south to a new ROR016-3

Response to comment ROR016-3

The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1.

forebay near Byron Tract, adjacent to Clifton Court Forebay. (http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/BDCP_Chapter_4_-_Covered_Activities_and_Associated_Federal_Actions_2-29-12.sflb.ashx) Thus, the currently-envisioned BDCP implementation project(s) would result in a massive amount of Sacramento River water being removed from the Delta, resulting in a substantial increase in flow from the San Joaquin River, along with what is already known to be extremely elevated levels of selenium.

A review of the BDCP technical documents purporting to analyze potential impacts associated with increased San Joaquin River selenium loading to the Delta fails in at least two respects. (*See*, Appendix D (Toxins) of the Bay Delta Conservation Plan, Working Draft (January 2012).) First, the BDCP analysis of potential selenium impacts is focused ***solely*** on potential impacts to the Delta and Suisun Bay, and is ***completely void*** of any analysis on potential impacts of selenium loads to San Francisco Bay. This obviously fails to satisfy CEQA. ROR016-3

Second, the BDCP selenium analyses findings presented in Table D-21 were that preliminary proposal actions (we assume this means flow scenarios) would result in a less than 10% annual average increase in San Joaquin River water in the south Delta relative to other source waters (including the Sacramento River). The preliminary proposed actions were determined to have little to no effect on the proportion of San Joaquin water flows to Suisun Marsh. While the selenium issue is addressed in the working draft document, very few details are provided, and we have numerous questions and concerns regarding the modeling details and the aqueous selenium concentrations findings presented in Appendix D. For example, the historical selenium concentrations presented for the Sacramento River in Table D-14 are very high compared with what many researchers have measured. Also, the predicted concentrations for all locations in Table D-15 are very high. It seems that the lack of concern with the predicted selenium concentrations as well as the overall assessment approach by BDCP is based on demonstrating the ability to meet the "lowest of relevant thresholds", *i.e.*, 2 ug/L, the level of concern for the Grassland Bypass Project. We question whether DSC and BDCP staff have been in contact with USGS and USEPA to ascertain what the revised selenium criterion for San Francisco Bay is likely to be, and how that criterion may affect the assumptions made in the RDPEIR and underlying BDCP work in this area.

Section 3 of the RDPDEIR generally discusses "project level" water quality impacts associated with construction and operation of various unidentified "facilities" that would be "encouraged" by adoption of the Delta Plan. These impacts also generally relate to potential water quality impacts ***within*** the Delta associated with construction and operation of these unidentified facilities. And while we appreciate the ROR016-4

Response to comment ROR016-4

Because the Delta Stewardship Council cannot direct the construction of specific projects, nor would the projects be implemented under the direct authority of the Council, it is difficult to identify specific future projects, including their location. Due to this uncertainty and the programmatic nature of the EIR in the absence of project-specific information, it is not appropriate to speculate regarding details of future project-specific impacts. Analyses associated with specific projects will provide such project-level details as they become available. See also Master Response 2.

fact that, "Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies," CEQA mandates that all reasonably known impacts of the programmatic project be identified, analyzed, and where deemed substantial, adequately mitigated. ROR016-4

We have thoroughly analyzed the RDPEIR and have found no discussion of the selenium-related issues or impacts referenced in this comment letter. This is despite the fact that much of the information on which these comments are based has been known to various agencies that have coordinated with the Delta Stewardship Council in developing the draft Delta Plan for at least three years. In any event, we respectfully request that the RDPEIR be amended to reflect these concerns, and to adequately address the potentially substantial water quality impacts associated with any anticipated "manipulations to the Delta system" as Chen, *et al* have observed. Equally important is the need for the RDPEIR to identify adequate mitigation measures for the likely impacts, along with a reasonable estimate of, and the source of funding for, implementation of those mitigation measures. ROR016-5

Thank you for the opportunity to provide these comments.

Sincerely yours,

Craig S.J. Johns
Program Manager

Attachments:

(1) Technical Memorandum 2: North San Francisco Bay Selenium Data Summary and Source Analysis, July 2008, TetraTech, Inc.

(2) *"Modeling Fate, Transport, and Biological Uptake of Selenium in North San Francisco Bay"*, L. Chen, Meseck, Roy, Grieb, and Baginska; Estuaries & Coasts, November 2012.

(3) "Working Draft. Bay Delta Conservation Plan, Appendix D: Toxins", ICF International. January, 2012.

Response to comment ROR016-5

Please see response to comment ROR016-2.

1115 – 11th Street, Suite 100 * Sacramento, CA * 95814 * 916/498-3326

No comments

- n/a -

No comments

- n/a -

TECHNICAL MEMORANDUM 2: NORTH SAN FRANCISCO BAY SELENIUM DATA SUMMARY AND SOURCE ANALYSIS

July 2008

Prepared for:
Regional Water Quality Control Board
San Francisco Bay Region
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No comments

- n/a -

ABBREVIATIONS

BASMAA	Bay Area Stormwater Management Agencies Association
cfs	cubic feet per second
mgd	million gallon per day
NDOI	Net Delta Outflow Index
NSFB	North San Francisco Bay
psu	Practical Salinity Unit
RMP	Regional Monitoring Program
SFEI	San Francisco Estuary Institute
SSC	Suspended Sediment Concentration
SWAMP	Surface Water Ambient Monitoring Program
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
TMDL	Total Maximum Daily Load
TSM	Total Suspended (Particulate) Material

No comments

- n/a -

No comments

- n/a -

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No comments

- n/a -

No comments

- n/a -

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No comments

- n/a -

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No comments

- n/a -

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No comments

- n/a -

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No comments

- n/a -

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No comments

- n/a -

1. INTRODUCTION

North San Francisco Bay (NSFB) including Suisun Bay, Carquinez Strait, San Pablo Bay and Central Bay, shown in Figure 1-1, is listed as being impaired for selenium under section 303(d) of the Clean Water Act. This listing was based, in part, on elevated concentrations in white sturgeon and diving ducks in the 1980s and is more than a decade old. There is an ongoing effort by the San Francisco Bay Regional Water Board to prepare a TMDL for selenium in North San Francisco Bay with the most up-to-date information. This technical memorandum has been prepared in support of the TMDL development effort. The purpose of this memorandum is two-fold: provide a summary of relevant water and sediment selenium data in the North Bay and to develop a quantitative estimate of the sources of selenium to the waters of the North Bay. In addition to this document, two other technical memorandums are under preparation. The first of these assesses the scientific literature to develop recommendations for selenium toxicological endpoints in the North Bay, and the second presents a conceptual model of selenium behavior in the North Bay, with an emphasis on describing the biogeochemical processes relating selenium sources to concentrations in biological tissues. Information in these memorandums will support the development of a mechanistic model of selenium in NSFB linking sources to endpoints of interest in the TMDL.

There has been a long history of research on selenium sources, transport, and biological uptake in San Francisco Bay, the Delta, and in the Central Valley (e.g., Cutter, 1989; Cutter and San Diego-McGlone, 1990; Cutter and Cutter, 2004; Presser and Luoma, 2006; Meseck and Cutter, 2006). Starting in the mid-1980's, selenium concentrations have been monitored in the bay across the salinity gradient and in different seasons reflecting variations in freshwater flows. Major sources of selenium to the Bay-Delta identified in these previous studies include:

- San Joaquin River that receives discharge from agricultural drainage from the western San Joaquin Valley
- Selenium discharged from the effluents of North Bay refineries.
- Sacramento River, which is the dominant freshwater inflow to the Bay-Delta during the wet season.

This memorandum contains a summary of data and findings from past work, including an updated estimate of the selenium load contributions from various point and non-point sources. Over the past two decades, there have been major declines in refinery loads due to improved wastewater treatment installed in 1998; there is some evidence that San Joaquin River concentrations were lower in the late 1990s and beyond than in the 1980s, although this is not clear cut.

The data summary (Section 2) provides an overview of water and sediment data collected in and upstream of NSFB over the past two decades. Data on selenium in biota are discussed in the memo on toxicological endpoints (TM-3). The water and sediment data are presented in maps and plots to provide a visual summary and to identify major processes occurring in the North Bay. There are many ways to represent this large and complex data set. The broad objective of the data summary was to provide a reader with the spatial and temporal extent

No comments

- n/a -

of the data collected to date, and to evaluate whether existing data could be used to address questions of interest to the TMDL. A more detailed evaluation of the data and underlying processes will be presented in the Conceptual Model (TM-4). These data will also serve as the basis for model calibration to be performed in the next step of the TMDL development. The majority of the data collected in the bay is focused on total selenium. Speciation, particularly the concentrations of selenate, selenite, and particulate selenium, determines how efficiently selenium enters higher aquatic food web (Presser and Luoma, 2006). To the extent available, speciation data on selenium are also described.

The goal of the source analysis (Section 3) was to use data on concentrations and flow volumes of each of the identified sources in NSFB, and to take a fresh look at estimating the relative magnitudes of the key point and non-point sources of selenium. The source estimates differ from previous work in the use of more recent data and the examination of a wider range of potential sources. Sources considered include: atmospheric deposition, urban and non-urban runoff, Delta inflows and the relative contributions of the Sacramento and San Joaquin Rivers, municipal wastewater effluents, petroleum refinery effluents, and inputs from the existing reservoir of selenium in the sediments of the North Bay. Accurate quantification of sources is a key input to selenium fate and transport modeling proposed for the bay. In the event that the TMDL finds that most recent data are consistent with selenium impairment in the North Bay, the source analysis is a means to identify the loads that need to be decreased to meet targets in the bay.

No comments

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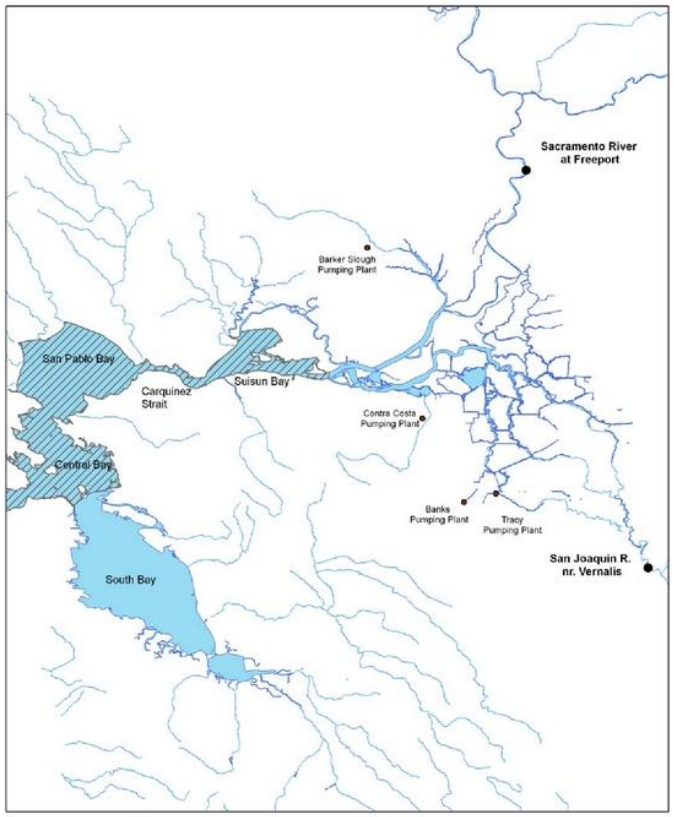

Figure 1-1 **The San Francisco Bay estuary, Delta and Sacramento and San Joaquin Rivers. The cross-hatched area shows the area of interest for the North San Francisco Bay Selenium TMDL. The Sacramento River at Freeport and the San Joaquin River at Vernalis are the principal freshwater inflows into the Delta. A significant portion of the freshwater inflows are exported out of the Delta through the four pumping plants shown.**

No comments

- n/a -

No comments

- n/a -

2. Selenium Concentrations in Bay Water and Bottom Sediments

2.1. Goals of Data Summary

A key objective of the data summary is to evaluate whether the following questions of relevance to the selenium TMDL in the NSFB can be addressed through the existing database:

- What is the distribution of selenium in the water column?
- What are the long term trends of selenium concentrations in water?
- What is the relative mix of dissolved and particulate selenium in the water column?
- How does selenium correlate with salinity and freshwater flows?
- What was the effect of refinery selenium load reduction in 1998?
- How does selenium correlate with suspended sediments and chlorophyll-a?
- What is the distribution of selenium in sediments?

In this section, the data sources used in this evaluation are first described, and plots and maps of the data are used to address each of the questions above.

2.2. Data Description

Selenium concentrations in the bay water column and bottom sediments have been collected by different entities since the 1980s. The major sources of data for selenium in the North Bay are: 1) data collected by the Regional Monitoring Program (RMP) since 1993; and 2) data collected by Dr. Greg Cutter's research group at Old Dominion University[1]. The RMP is a joint effort among San Francisco Estuary Institute (SFEI), the Regional Board, and local dischargers. All data collected by the Cutter research group from the mid-1980s onwards was made available to us electronically for the preparation of this and subsequent technical memorandums.[1]

The RMP was initiated in 1993 to sample contaminant concentrations in water, sediment and bivalves. Fifteen monitoring sites were located in the North Bay (out of 26 sites in the whole bay; Figure 2-1; Table 2-1). Samples were collected at a frequency of 2-3 times a year during high flow, intermediate flow and low flow periods. Starting in 2002, EPA's Generalized Random Tessellation Stratified (GRTS) sample design approach was utilized to monitor contaminants (SEFI, 2006). Thereafter, most of the long-term sites were discontinued except for five locations noted in Table 2-1. Since 2002, each year 12 randomly selected sites in the North Bay have been sampled for selenium in the water and 24 random sites have been sampled for selenium in sediments. Water samples were collected 1-2 feet below surface. Water samples were analyzed for total and dissolved (0.45 µm filtered) concentrations, with a detection limit of 0.02 µg/L. Sediment samples were

[1] Funded by the U.S. Bureau of Reclamation, CALFED (Grant 01WRPA0077), California Department of Water Resources, and National Science Foundation, Environmental Geochemistry and Biogeochemistry Initiative (Grant: OCE-9707946).

No comments

- n/a -

analyzed for dry weight concentrations with detection limit of 0.01 mg/kg. Sediment samples were taken from the top 5 cm of the sediment surface.

Dr. Cutter's research group used a different sampling design to sample dissolved and particulate selenium concentrations along the estuarine transect from the Golden Gate to the Sacramento (Rio Vista) and San Joaquin River (USGS Station 757), during 1980s and again during 1997-1999 (Cutter and Cutter, 2004; Doblin et al. 2006). Samples were taken along the salinity gradient at approximately equal salinity intervals and were analyzed for dissolved selenium and selenium species (selenate, selenite, and organic dissolved selenide) at detection limits of 1.6 ng/L. Because salinity varied according to the sampling year, the spatial locations varied slightly for individual sampling events. Locations for a sampling event during November 1999 are shown in Figure 2-1 along side RMP sampling stations. Samples were also analyzed for particulate selenium and its speciation (elemental selenium, selenite and selenate). Sampling depth is at 1-2 m below surface. The detection limit for particulate selenium was 0.4 ng/L. For the sediments, Dr. Cutter's research group sampled sediment cores at 23 locations in the Bay-Delta (Meseck, 2002). Sediment core profiles were taken from depths ranging from 5 cm to 20 cm at different locations. The cores were analyzed for total selenium, elemental selenium and selenite and selenate. Dr. Cutter's research group is the only one that has reported selenium speciation in the bay.

Table 2-1
RMP long-term sampling locations in the North Bay.

Site Code	Site Name	Sample Matrix	Period of data
BC10*	Central Bay/Yerba Buena Island	Water, sediment, bivalve	1993-2005
BC21	Central Bay/Horseshoe Bay	Sediment, bivalve	1993-2001
BC30	Central Bay/Richardson Bay	Water, sediment	1993-2001
BC41	Central Bay/Point Isabel	Water, sediment	1993-2001
BC60	Central Bay/Red Rock	Water, sediment, bivalve	1993-2001
BD15	San Pablo Bay/Petaluma River	Water, sediment, bivalve	1993-2001
BD20	San Pablo Bay	Water, sediment, bivalve	1993-2001
BD30*	San Pablo Bay/Pinole Point	Water, sediment, bivalve	1993-2005
BD40	San Pablo Bay/Davis Point	Water, sediment, bivalve	1993-2001
BD50	San Pablo Bay/Napa River	Water, sediment, bivalve	1993-2001
BF10	Suisun Bay/Pacheco Creek	Water, sediment	1993-2001
BF20*	Suisun Bay/Grizzly Bay	Water, sediment, bivalve	1993-2005
BF40	Suisun Bay/Honker Bay	Water, sediment	1993-2001
BG20*	Delta/Sacramento River	Water, sediment, bivalve	1993-2005
BG30*	Delta/San Joaquin River	Water, sediment, bivalve	1993-2005

*Sampling continued at these locations after 2002

No comments

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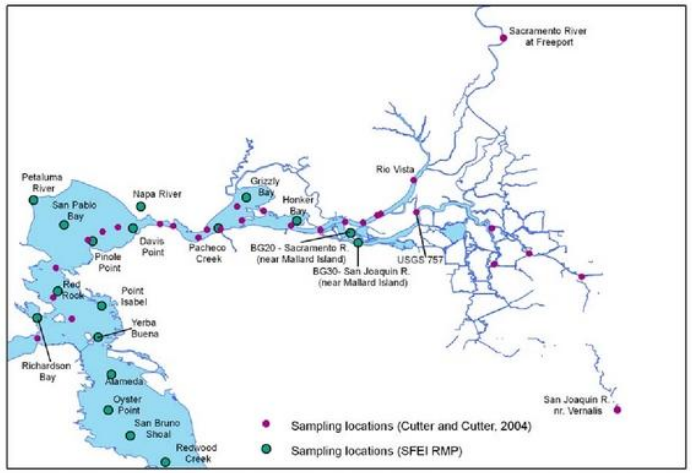

Figure 2-1 **Locations of RMP long-term monitoring sites and sampling by Cutter and Cutter (2004) during November 1999.**

2.3. WHAT IS THE DISTRIBUTION OF SELENIUM IN THE WATER COLUMN?

Selenium concentrations observed in the North Bay water column are generally low and mostly in the dissolved form. Over the period of 1993-2005, mean dissolved and total selenium concentrations averaged at each station were between 0.12-0.18 µg/L and 0.13-0.24 µg/L in the North Bay (Table 2-2 and Table 2-3). Particulate selenium (calculated as the difference between total and dissolved selenium) accounts for approximately 10% of the total. During the most recent sampling over 1999-2005, i.e., following improved wastewater control in the oil refineries in 1998 (Presser and Luoma, 2006), mean dissolved and total selenium concentrations pooled across all the long-term monitoring sites in North Bay were 0.10 µg/L (0.03-0.24 µg/L, n = 105) and 0.13 µg/L (0.04-0.45 µg/L, n = 100). In comparison, mean dissolved and total selenium concentrations for the period of 1993-1999 at these pooled long-term sites were 0.17 µg/L (range: 0.03-0.44 µg/L, n = 258) and 0.20 µg/L (0.02-0.5 µg/L, n = 230).

Spatially, total selenium concentrations are marginally higher in the mid-estuarine regions of Suisun and San Pablo Bays compared to the freshwater and marine portions (Figure 2-2). Total selenium concentrations in the Central Bay are lower, most likely due to ocean exchange and dilution. A few locations near the confluence of local tributaries (e.g., Petaluma and Napa River) show higher total selenium concentrations relative to the rest of the bay (Figure 2-2). The trends are most apparent when median values are considered.

No comments

- n/a -

Table 2-2
Summary of dissolved selenium concentrations in the water column for the period 1993-2005 for the North Bay (data source: RMP).

Site Code	Site Name	Mean (µg/L)	S.D. (µg/L)	Median (µg/L)	Count
BC10	Yerba Buena Island	0.14	0.08	0.11	27
BC20	Horseshoe Bay	0.14	0.10	0.10	23
BC30	Richardson Bay	0.14	0.10	0.13	23
BC41	Point Isabel	0.14	0.09	0.10	24
BC60	Red Rock	0.15	0.10	0.12	20
BD15	Petaluma River	0.18	0.07	0.17	21
BD20	San Pablo Bay	0.15	0.06	0.14	24
BD30	Pinole Point	0.16	0.06	0.15	24
BD40	Davis Point	0.17	0.06	0.16	25
BD50	Napa River	0.16	0.06	0.16	24
BF10	Pacheco Creek	0.17	0.08	0.15	24
BF20	Grizzly Bay	0.14	0.06	0.13	25
BF40	Honker Bay	0.12	0.05	0.11	22
BG20	Sacramento River (near Mallard Island)	0.13	0.09	0.12	29
BG30	San Joaquin River(near Mallard Island)	0.16	0.09	0.14	28

S.D. - Standard deviation

No comments

- n/a -

Table 2-3
Summary of total selenium concentrations in the water column for the period of 1993-2005 for the North Bay (data source: RMP).

Site Code	Site Name	Mean (µg/L)	S.D. (µg/L)	Median (µg/L)	Count
BC10	Yerba Buena Island	0.16	0.09	0.12	23
BC20	Horseshoe Bay	0.17	0.12	0.11	19
BC30	Richardson Bay	0.13	0.08	0.11	22
BC41	Point Isabel	0.14	0.07	0.12	20
BC60	Red Rock	0.18	0.08	0.15	16
BD15	Petaluma River	0.24	0.09	0.25	19
BD20	San Pablo Bay	0.18	0.07	0.17	23
BD30	Pinole Point	0.18	0.08	0.17	23
BD40	Davis Point	0.21	0.08	0.18	23
BD50	Napa River	0.20	0.05	0.19	22
BF10	Pacheco Creek	0.19	0.07	0.19	22
BF20	Grizzly Bay	0.17	0.07	0.17	23
BF40	Honker Bay	0.16	0.05	0.15	22
BG20	Sacramento River (near Mallard Island)	0.15	0.08	0.13	27
BG30	San Joaquin River (near Mallard Island)	0.18	0.09	0.16	26

S.D.- Standard deviation

No comments

- n/a -

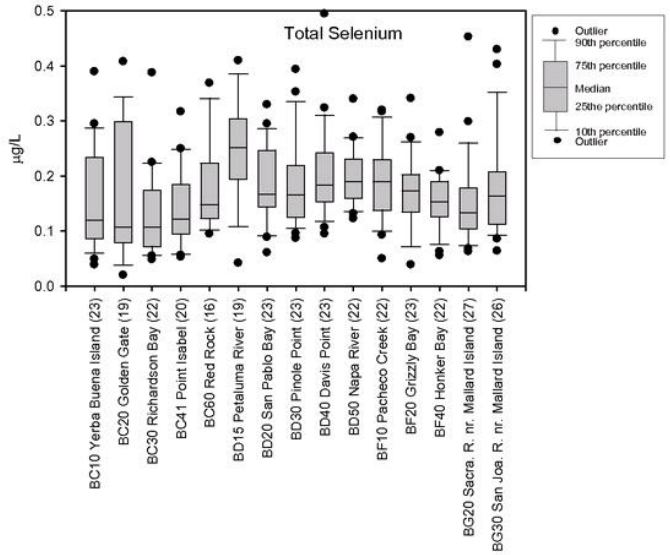

Figure 2-2 **Total selenium concentrations at long-term monitoring sites for the period of 1993-2005. Values in parentheses are numbers of samples (data source: RMP).**

Data from random sampling during 2002-2005 also indicated relatively low dissolved and total selenium concentrations, below 0.15 µg/L, with a whole North Bay average of 0.12 µg/L. Total selenium concentrations are higher in the upper estuary (Suisun Bay) than the San Pablo and Central Bays.

2.4. WHAT ARE THE LONG TERM TRENDS OF SELENIUM CONCENTRATIONS IN WATER?

Over the long-term, dissolved and total selenium concentrations show large temporal (both inter-annual and seasonal) variations (Figure 2-3 to Figure 2-6). For most stations in the North Bay, a weak negative correlation with time is noted, beginning in 1993. In most instances, the data show a general negative slope with time, and not an abrupt change in 1998 when refinery loads and concentrations were decreased. The temporal patterns in dissolved selenium closely resemble those in the total selenium.

No comments

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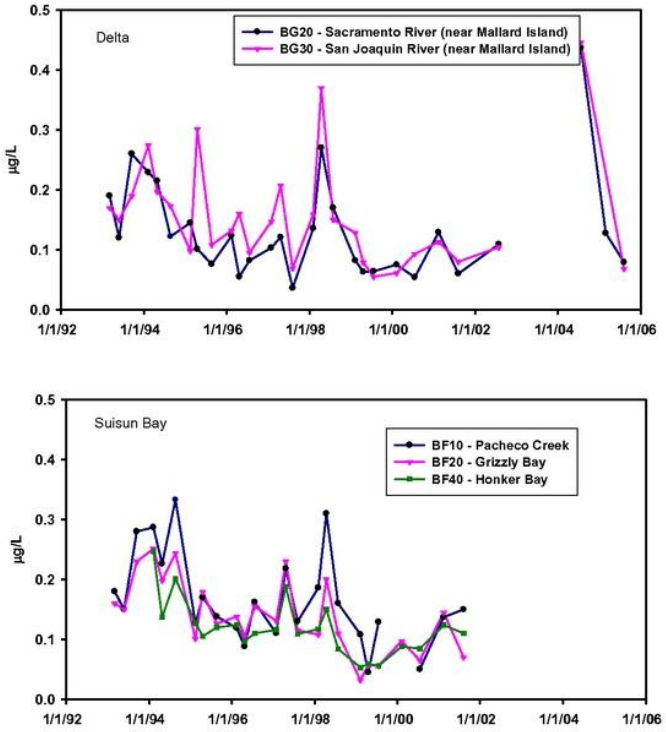
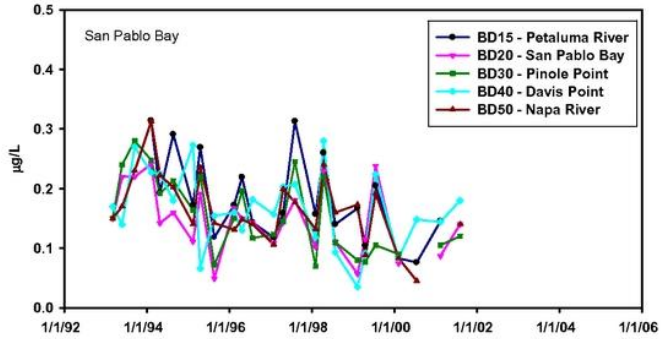


Figure 2-3 **Dissolved selenium concentrations as a function of time in stations near Mallard Island and in Suisun Bay (data source: RMP).**

No comments

- n/a -



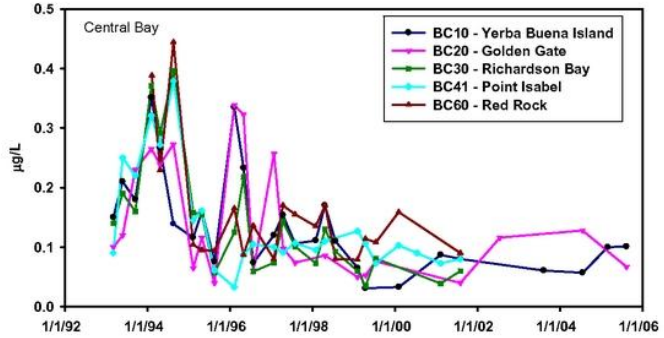


Figure 2-4 **Dissolved selenium concentrations as a function of time in the San Pablo and Central Bay (data source: RMP).**

No comments

- n/a -

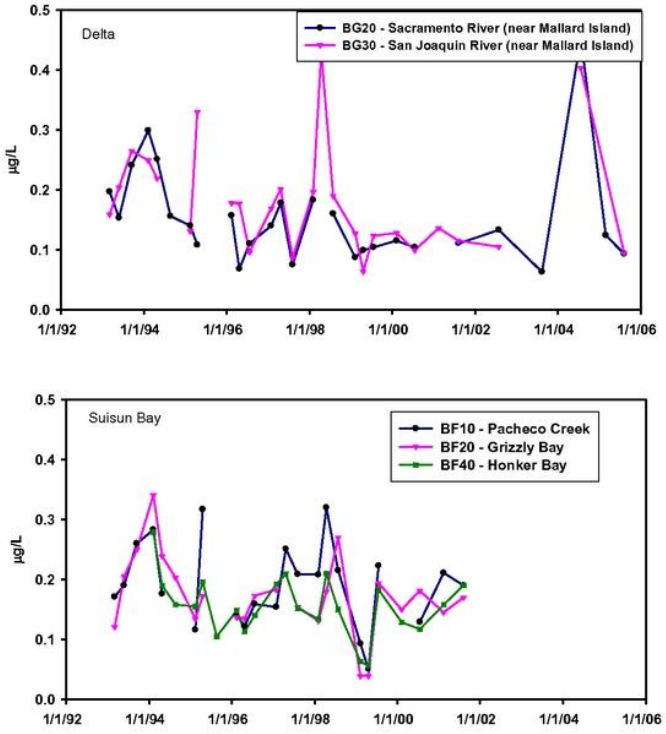


Figure 2-5 **Total selenium concentrations as a function of time in stations near Mallard Island and in Suisun Bay (data source: RMP).**

No comments

- n/a -

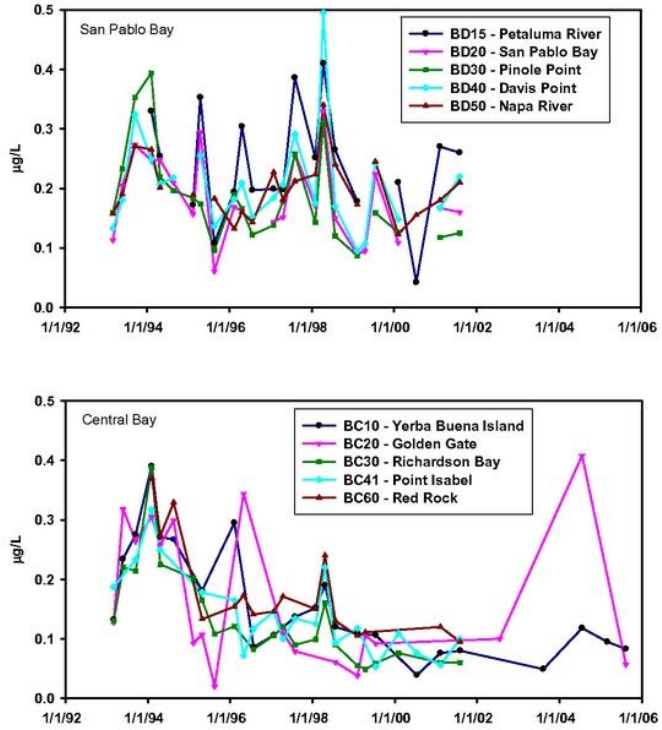


Figure 2-6 **Total selenium concentrations as a function of time in the San Pablo and Central Bay (data source: RMP).**

2.5. WHAT IS THE RELATIVE MIX OF DISSOLVED AND PARTICULATE SELENIUM IN THE WATER COLUMN?

Pooling all the data from the RMP monitoring indicates a close correlation between dissolved and total selenium (Figure 2-7), with the dissolved fraction representing more than two-thirds of the total selenium.

No comments

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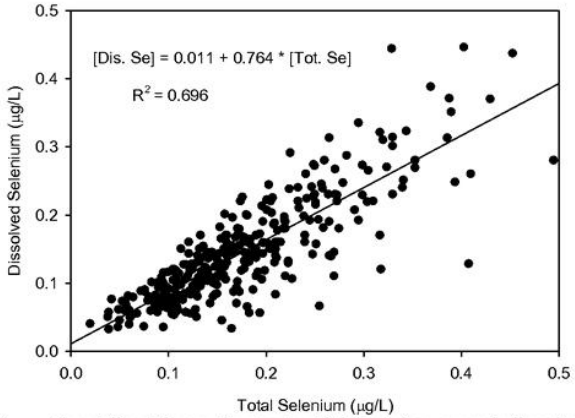

Figure 2-7 **Correlation between dissolved and total selenium concentrations for long-term monitoring sites (data source: RMP).**

2.6. HOW DOES SELENIUM CORRELATE WITH SALINITY AND FRESHWATER FLOWS?

Freshwater inflows from the Delta and from local tributaries, which are strongly seasonal, influence salinity and selenium concentrations in the bay. Measured dissolved selenium concentrations by RMP long-term monitoring were plotted as a function of salinity for the period before July 1998 and after July 1998, and for low flow and high flow periods (Figure 2-8 and Figure 2-9). The July 1998 cutoff represented periods before and after refinery load reductions. Transect sample data from Cutter and Cutter (2004) were also included for comparison. During low flow periods, dissolved selenium concentrations are low at salinity 0 psu, and increase in the middle of estuary (salinity 5-20 psu), and then decrease again with increase of salinity (> 25 psu). During high flow periods, selenium concentrations were generally higher at low salinity and decreased with increase of salinity or remain relatively constant (e.g. Feb 1999, Feb 2000). The observed patterns in the RMP data set agree well with the patterns observed by Cutter and Cutter (2004). Similar patterns for both low and high flow were observed for sampling dates after July 1998: during low flows, a mid-estuarine peak is more evident while concentrations were relatively constant during high flow (Figure 2-9).

No comments

- n/a -

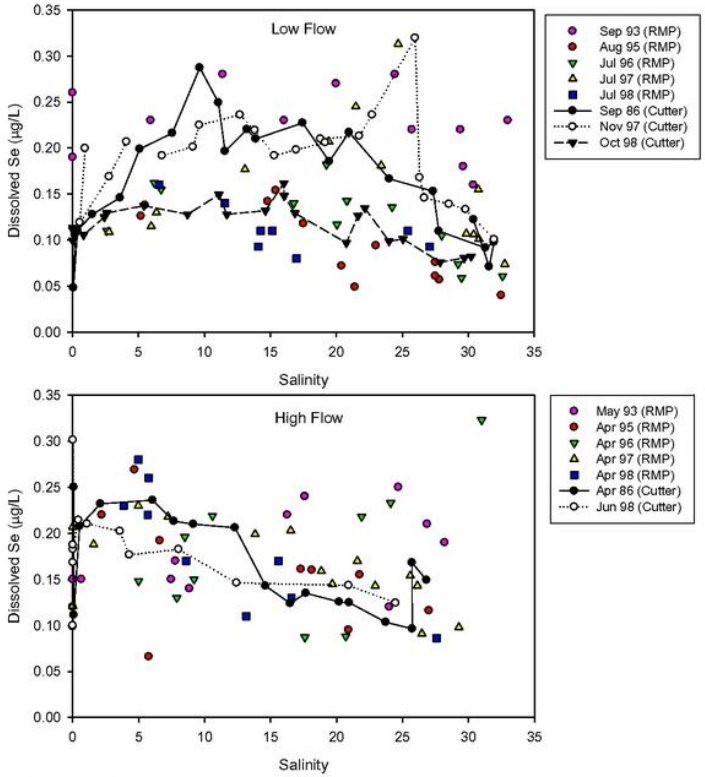

Figure 2-8 **Dissolved selenium concentrations along salinity gradient during low and high flow sampling periods by RMP and Cutter and Cutter (2004) before 1999[2].**

[2] Low flow and high flow for the RMP data set were defined based on sampling months: July-November (low flow), January-June (high flow). Low flow and high flow definition for the Cutter data set were the classification reported in Doblin et al. (2006): NDOI < 1.5 x 10^{10}l/d (low flow), NDOI > 8.5 x 10^{10}l/d (high flow) with October 1998 defined as low flow for simplification.

No comments

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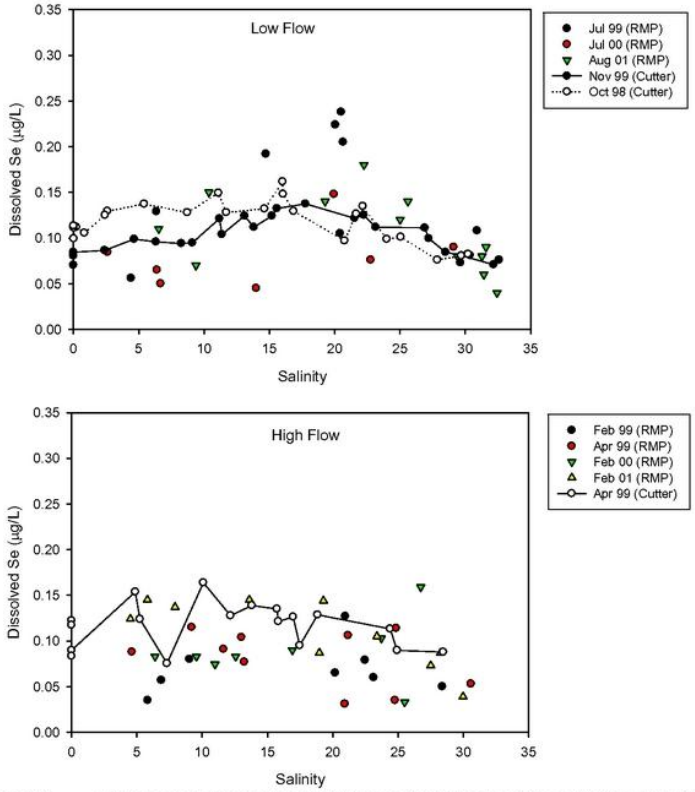

Figure 2-9 **Dissolved selenium concentrations as a function of salinity during low and high flow sampling periods by RMP and Cutter and Cutter (2004) from 1999 onwards.**

Selenium concentrations during the low flow period of a dry year (August 2001) indicated elevated concentrations in the Suisun Bay relative to the head of the estuary (Figure 2-10), suggesting local inputs of selenium. Maximum concentrations were observed in Suisun Bay near the Carquinez Strait. Concentrations in the San Pablo Bay remain relatively high compared to the head of estuary. Concentrations in Central Bay are lower. Salinity showed an increasing pattern from the head of estuary to the Golden Gate: from 0 to 10 psu in Suisun Bay, 25 psu in San Pablo Bay and above 30 psu in Central Bay.

No comments

- n/a -

During a wet period of the same year (February 2001), dissolved selenium concentrations were similar among the head of the estuary, Suisun Bay and San Pablo Bay stations (Figure 2-11). Lower concentrations were observed in the Central Bay. As expected, salinity during high flow is lower in Suisun and San Pablo Bay compared to the low flow period of the same year (August 2001).

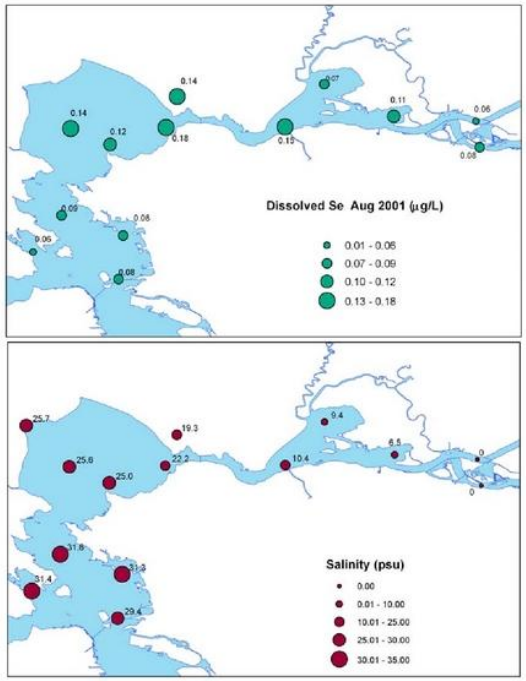

Figure 2-10 **Spatial distribution of dissolved selenium and salinity during a sampling event in a dry period of a dry year (August 2001) by the RMP.**

No comments

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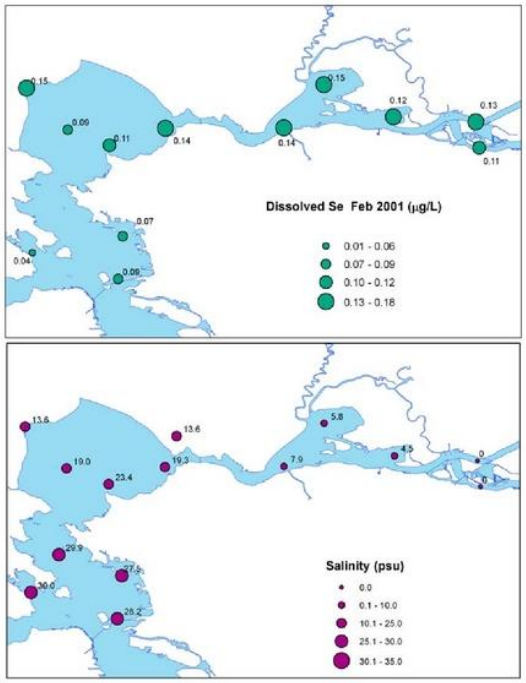

Figure 2-11 **Spatial distribution of dissolved selenium and salinity during a sampling event in a wet period (February 2001) by the RMP.**

During high flow periods, dissolved selenium concentrations along several salinity transects sampled by Cutter and Cutter (2004) suggested either a dilution pattern by seawater or were relatively constant throughout the bay (Figure 2-12). Dissolved selenium concentrations in April 1986 and June 1998 decreased with increase of salinity with some removal along salinity gradient, possibly due to phytoplankton uptake. Dissolved selenium concentrations were lower in April 1999 compared to April 1986 and June 1998. With the implementation of improved waste water treatment in the refineries in 1998, the most significant change in water column selenium was with respect to selenite (Cutter and Cutter, 2004). For both April 1986 and June 1998, selenite concentrations indicated an increase in the mid-estuary. In contrast, selenite concentrations for April 1999 remained low throughout the Bay (Figure 2-12). Selenate concentrations exhibited more conservative mixing behavior. Selenate concentrations in April 1999 were lower than in April 1986 and June 1998. Organic selenide

No comments

- n/a -

concentrations showed some variability along the salinity transect although concentrations for the three high flow periods are similar.

Dissolved selenium concentrations during low flow sampling events indicated elevated concentrations in the mid-estuary (salinity 5-25 psu; Figure 2-13). Concentrations for October 1998 and November 1999 are generally lower than September 1986. However, total dissolved selenium concentrations are still slightly elevated in the mid-estuary. The most significant change is the observed decrease in selenite concentrations (Figure 2-13; Cutter and Cutter, 2004). Selenite concentrations for November 1999 are significantly lower than September 1986 and remain relatively constant throughout the Bay. Selenate concentrations were generally similar between the 1986 transect and October 1998 and November 1999 transects. Selenate concentrations show slightly elevated concentrations between salinity 10-20 psu. Organic selenide shows variable concentrations along the salinity transects.

No comments

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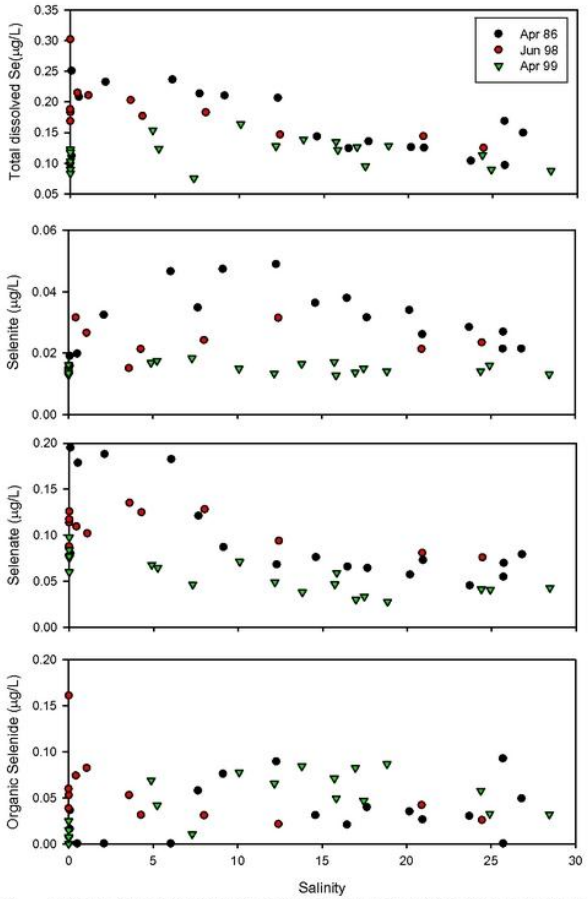

Figure 2-12 **Transects of dissolved selenium, selenite, selenate, and organic selenide under high flow sampling periods (April 1986, June 1998, and April 1999; from Cutter and Cutter, 2004).**

No comments

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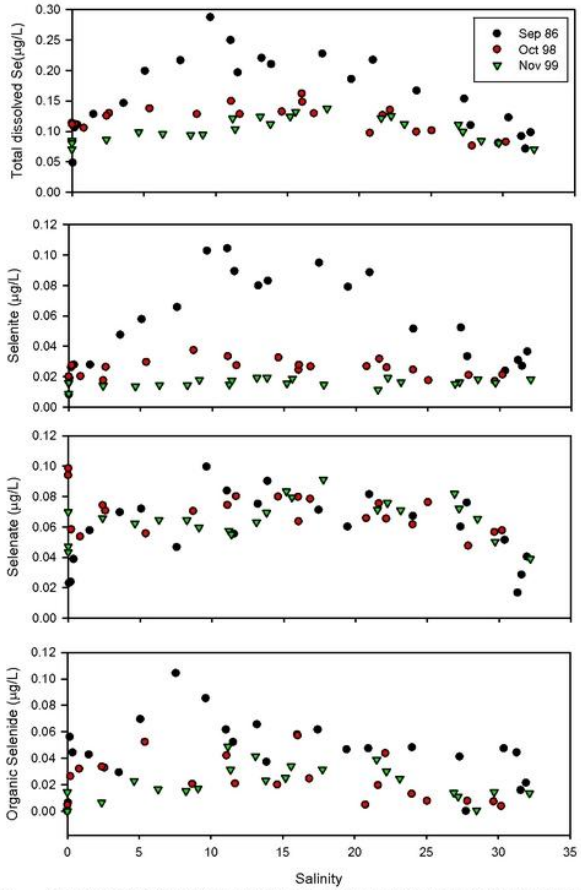

Figure 2-13 **Transects of dissolved selenium, selenite, selenate and organic selenide under low flow sampling periods (September 1986, October 1998, and November 1999; from Cutter and Cutter, 2004).**

No comments

- n/a -

2.7. WHAT WAS THE IMPACT OF REFINERY SELENIUM LOAD REDUCTIONS IN 1998?

Cutter and Cutter (2004) sampled the effluents of five refineries in the North Bay for three time periods during 1999-2000. Average dissolved selenium concentrations in the effluents of the refineries was 16.4 µg/L, a 66% decrease from average concentrations of 45.8 µg/L during 1987-1988 (Cutter and Cutter, 2004). The resulting decreases in selenium concentrations in the bay water are both evident for the low flow and high flow period (Figure 2-14).

Speciation of refinery effluent also changed dramatically after improved wastewater treatment. Average selenite concentrations at the five refineries changed from 28.2 µg/L (4.3 – 59.0 µg/L) from 1987 to 2.3 µg/L (0.3-5.0 µg/L) during the 1999-2000 (Cutter and Cutter, 2004).

Dissolved selenium speciation in the bay water column is dominated by selenate, followed by organic selenide and selenite (Table 2-4). Selenite averages 15% of total dissolved selenium in a low flow sampling event in November 1999, compared with 22% during a high flow sampling event in April 1999. Selenate was 64% and 56% of total dissolved selenium for November 1999 and April 1999, respectively. The changes in wastewater treatment at the refineries resulted in changes in speciation in the bay water column, most noticeably during low flow (Figure 2-15).

Table 2-4
Speciation of dissolved selenium in Bay water (Cutter and Cutter, 2004)

	Selenite		Selenate		Organic selenide		Total dissolved
	µg/L	% of total	µg/L	% of total	µg/L	% of total	µg/L
Apr 99 (high flow)	0.026 ± 0.006	22%	0.067 ± 0.010	56%	0.026 ± 0.017	22%	0.119 ± 0.024
Nov 99 (low flow)	0.016 ± 0.002	15%	0.067 ± 0.012	64%	0.022 ± 0.013	21%	0.105 ± 0.019
Apr 86 (high flow)	0.031 ± 0.010	19%	0.099 ± 0.094	59%	0.035 ± 0.055	21%	0.167 ± 0.062
Nov 86 (low flow)	0.057 ± 0.029	35%	0.058 ± 0.023	36%	0.047 ± 0.024	29%	0.162 ± 0.063

No comments

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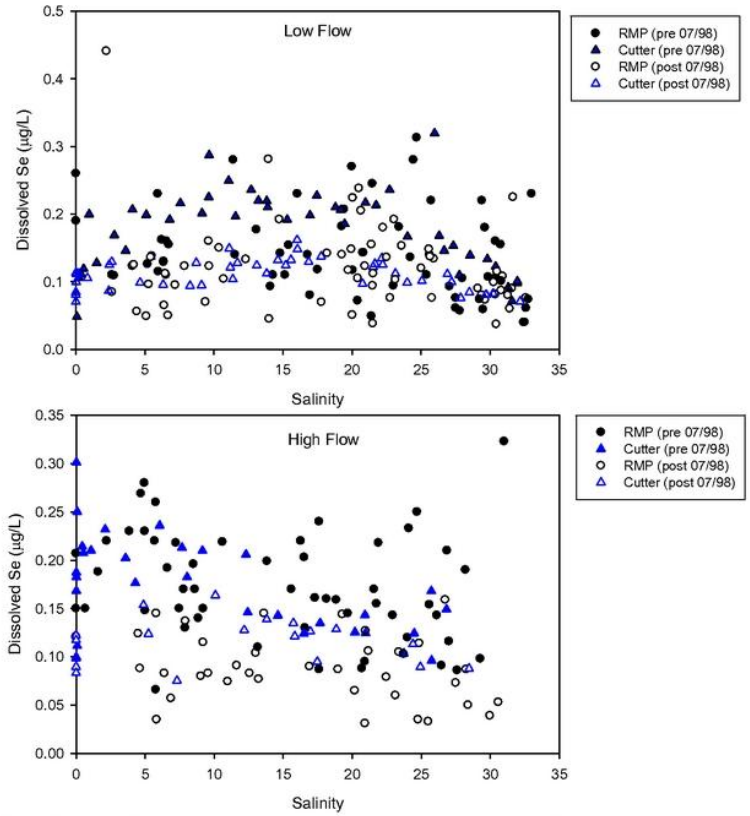

Figure 2-14 **Dissolved selenium concentrations under low and high flow before and after July 1998 (data: RMP and Cutter and Cutter, 2004). The July 1998 cutoff date represents samples before and after improved wastewater treatment at the North Bay refineries.**

No comments

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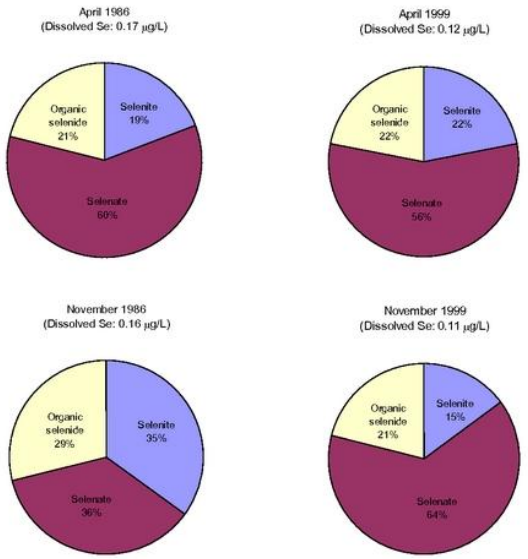

Figure 2-15 Speciation of dissolved selenium in Bay water column during different time periods (Data: Cutter and Cutter, 2004).

2.8. HOW DOES SELENIUM CORRELATE WITH SUSPENDED SEDIMENTS AND CHLOROPHYLL-A?

Doblin et al. (2006) reported the variation of total suspended particulate material (TSM),[3] and selenium on particles in San Francisco Bay. Particulate selenium content, including speciation, was measured directly using material collected on 0.4 µm filters. Particulate selenium was reported as mass of selenium per unit volume of water or as mass of selenium per unit mass of particles. The latter measure normalizes for the effect of changing TSM in water samples at different locations and times.

Particulate selenium concentrations along the salinity gradient generally track the pattern in TSM, and decrease along the salinity gradient during high flow (Figure 2-16). Chlorophyll-a concentrations show some occasional elevated values for the April 1986 transect. Selenium concentrations in particulate material are generally lower during high flow than low flow (Doblin et al., 2006), however, values as high as 1.6 µg/g were measured in the bay.

[3] TSM: total suspended particulate material, was determined by directly filtering 2l of water (out of 5l of sample water collected) through 142mm diameter, 0.4 µm polycarbonate membranes that were pre-weighted. The filters were dried at 40 ºC and weighed for TSM concentration (Doblin et al. 2006).

No comments

- n/a -

During low flow, TSM concentrations also decrease slightly with an increase in salinity (Figure 2-17). TSM concentrations show occasional increases in the middle of estuary, possibly due to resuspension. Particulate selenium concentrations track the patterns in TSM (Doblin et al. 2006), most evidently for the September 1986 and November 1999 transects. Selenium concentrations in particulate material exceed values measured during high flow and also show some increase with increase of salinity (up to 2.2 µg/g). For the October 1998 and November 1999 transects, chlorophyll-a concentrations are relatively constant throughout the bay with some increases in the Central Bay.

No comments

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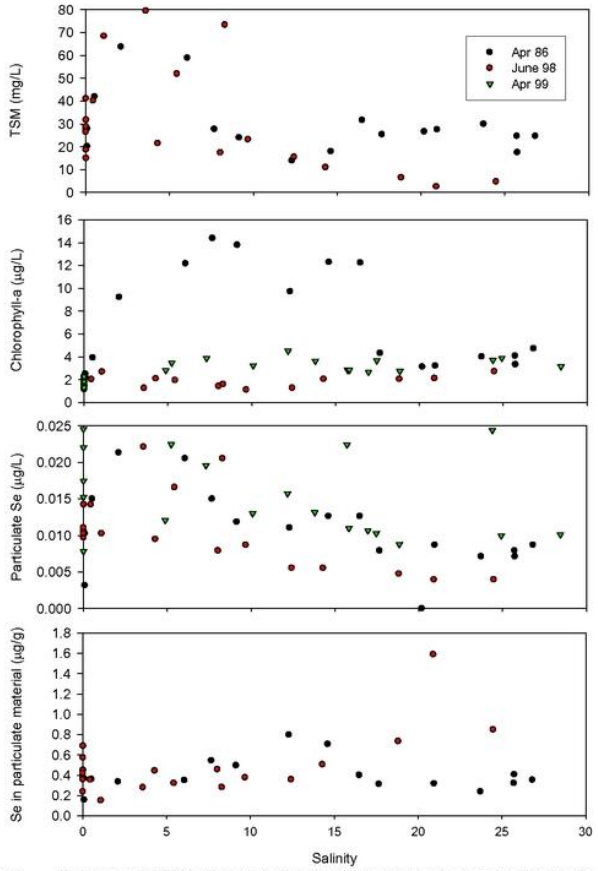

Figure 2-16 **Transects of TSM, chlorophyll-a, particulate selenium and selenium in particulate material under high flow (April 1986, June 1998 and April 1999; Doblin et al. 2006).**

No comments

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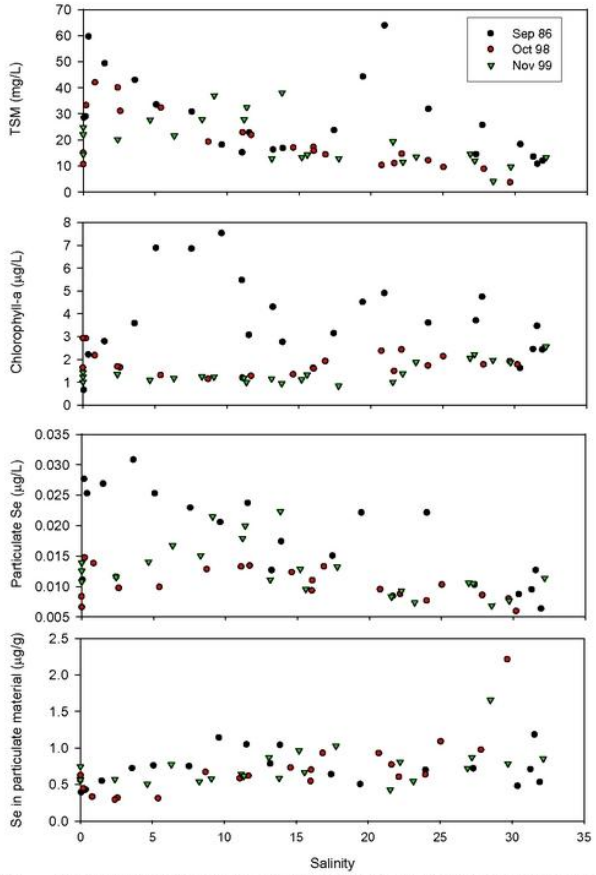

Figure 2-17 **Transects of TSM, chlorophyll-a, particulate selenium and selenium in particulate material under low flow (September 1986, October 1998, and November 1999; Doblin et al. 2006).**

Particulate selenium concentrations, expressed as µg/l, vary less over time than TSM (Table 2-5), although selenium content in suspended particles differs between low flow and high

No comments

- n/a -

flow conditions. Low flow periods were found to have higher selenium content in suspended particles, most likely due to longer residence time and accumulation by phytoplankton and bacteria (Doblin et al. 2006). Selenium:Carbon ratios are higher during low flow. Selenium species on particulate material are dominated by organic selenide (45 ± 27%), followed by elemental selenium (35 ± 28%), and adsorbed selenite and selenate (20 ± 10%). The percentage of organic selenide is roughly similar during low and high flow periods. Speciation of particulate selenium along the five sampling transects are shown in Figure 2-18 and Figure 2-19.

Table 2-5
Summary of particulate concentrations during low and high flow periods (Doblin et al. 2006).

	Low Flow			High flow	
	Oct. 1998	Nov. 1999	Nov. 1997	June 1998	April 1999
TSM (mg/L)	19.1 ± 10.4	19.4 ± 8.8	13.1 ± 5.8	30.2 ± 22.0	31.2 ± 20.0
Particulate Se (µg/L)	0.010 ± 0.002	0.013 ± 0.004	0.010 ± 0.003	0.010 ± 0.005	0.015 ± 0.006
Se content in particulate (µg/g)	0.70 ± 0.41	0.73 ± 0.25	0.87 ± 0.30	0.49 ± 0.31	--
Se: C ratio (X 10^{-6})	4.7 ± 3.1	5.9 ± 2.7	6.5 ± 2.5	4.1 ± 2.0	3.0 ± 1.0

Particulate selenium concentrations are correlated with TSM (Figure 2-20). Particulate concentrations along the salinity gradient follow the pattern of TSM, which exhibit a linear decline along the salinity gradient due to mixing (Figure 2-21).

No comments

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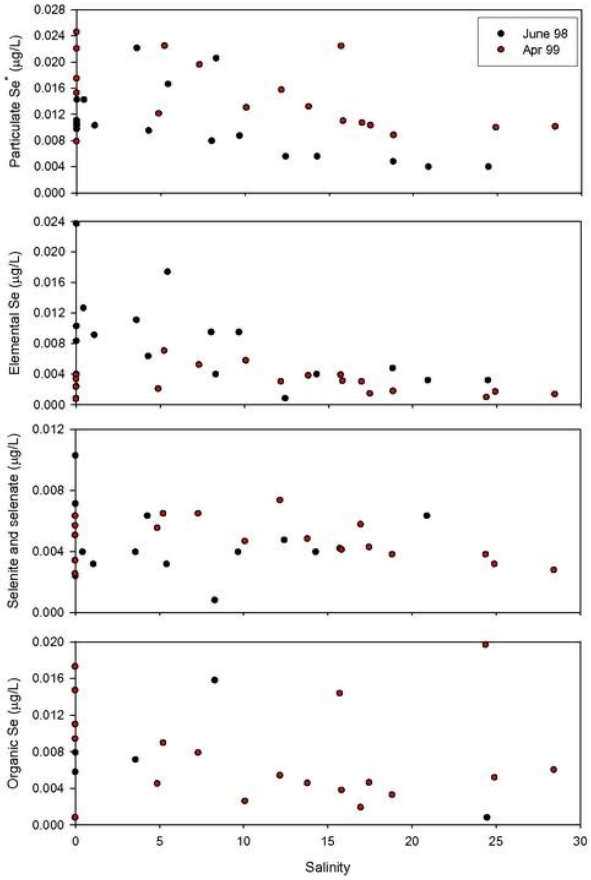

*include all adsorbed selenite and selenate, elemental and organic selenium

Figure 2-18 **Transects of total particulate selenium, particulate elemental selenium, particulate adsorbed selenite and selenate, and particulate organic selenium during high flow (June 1998 and April 1999; Doblin et al. 2006).**

No comments

- n/a -

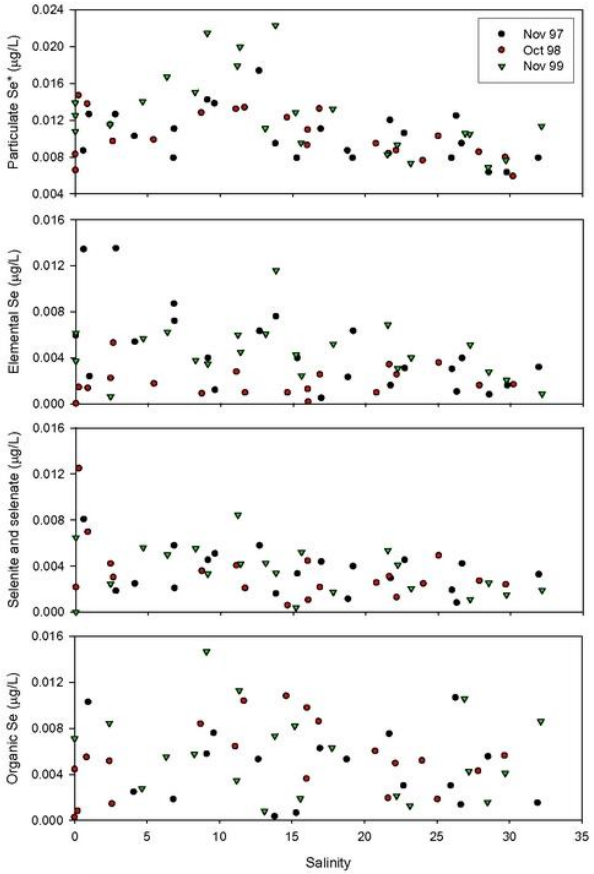

Figure 2-19 **Transects of total particulate selenium, particulate elemental selenium, particulate adsorbed selenite and selenate, and particulate organic selenium during low flow (November 1997, October 1998 and November 1999; Doblin et al. 2006).**

No comments

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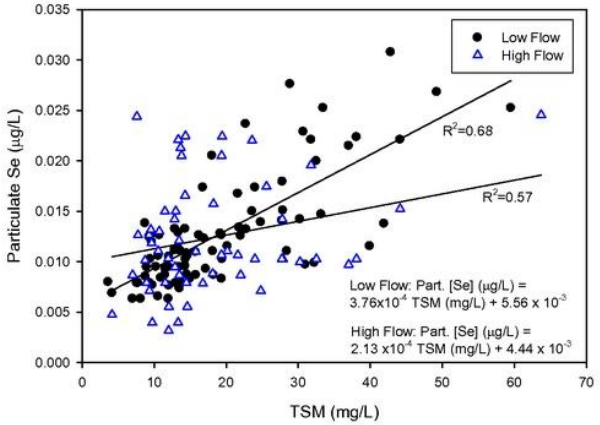

Figure 2-20 **Correlation between particulate selenium and TSM under low and high flow (Data Source: G. Cutter, personal communication)**

No comments

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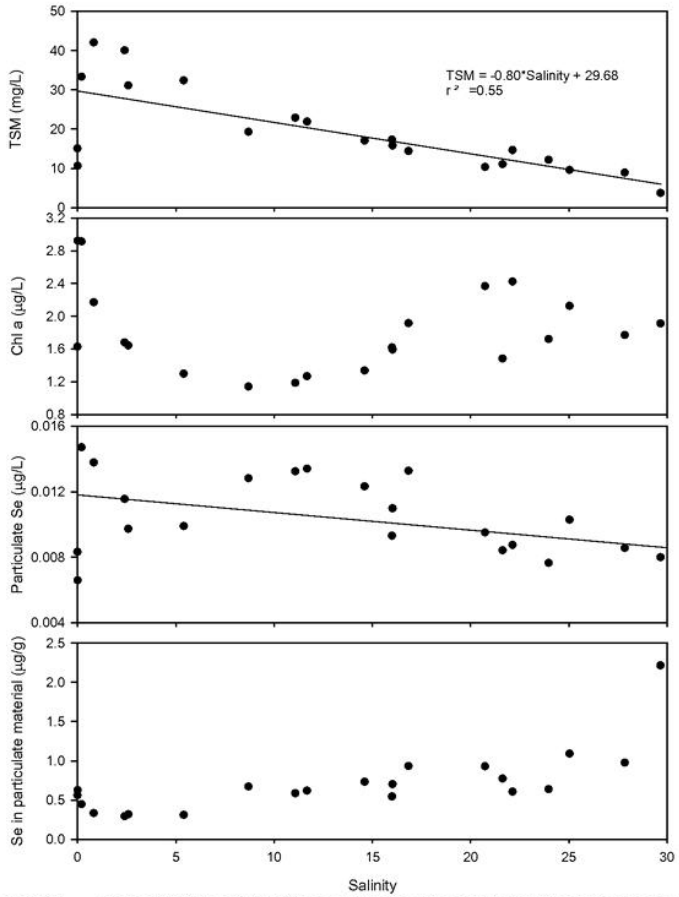

Figure 2-21 **Concentrations of TSM, Chl a, and particulate selenium and selenium content in particulates for a low flow sampling event of Oct. 1998 (Doblin et al. 2006).**

No comments

- n/a -

2.9. WHAT IS THE DISTRIBUTION OF SELENIUM IN SEDIMENTS?

Average selenium concentrations in bottom sediments of the North Bay show spatial variations at the RMP long-term monitoring sites although the total range of concentrations is not large (Figure 2-22). Sediment selenium concentrations are somewhat lower for the San Joaquin and Sacramento River stations near Mallard Island and the Central Bay stations (below 0.3 µg/g), whereas bottom sediments at sites in Grizzly Bay, San Pablo Bay and Napa River exhibit slightly elevated selenium concentrations (> 0.4 µg/g).

Sediment concentrations from RMP random sampling indicate somewhat larger spatial variation than the long-term sites because these are single point concentrations and not averages. The majority of the sediment samples have concentrations between 0.2 – 0.3 µg/g, while concentrations as high as 1.7 µg/g were also observed (Figure 2-23). The average for the whole North Bay is 0.25 µg/g. Generally, the sediment selenium concentrations observed are well below the ecological guideline of 1.5 µg/g established by SFBWQCB (1992). Selenium concentrations in seston however can reach 1.5 µg/g occasionally, as observed by Doblin et al. (2006).

Selenium concentrations in the bottom sediments are correlated to sediment grain size and organic carbon content. Sediment selenium concentrations were found to be highly related to percent fines < 0.00625 mm and percent total organic carbon (TOC) (R^2 = 0.78 and R^2 = 0.56; Figure 2-24; pooling all the data from long-term sites). Relationships between sediment selenium and percent fines and TOC are weaker for the random monitoring sites (Figure 2-25), however clear positive relationships are still observed. As illustrated in Figure 2-24, sites with low sediment selenium concentrations correspond to low percent fines in the sediments and vice versa. Meseck (2002) observed a similar strong relationship between sediment selenium and organic carbon concentrations (R^2 = 0.85).

Average selenium concentrations for sediment cores, 5-15 cm deep, collected by G. Cutter's research group range between 0.22-0.41 µg/g in the North Bay. Selenium in sediment cores is found to be dominated by elemental selenium (Meseck, 2002). Elemental selenium accounts for a median of 45% of the total selenium in the sediments across the sites, with selenite and selenate accounting for a median of 17%. The difference between total, elemental and selenite and selenate is the organic selenium. Selenium concentrations are generally uniform in the sediment cores, although some variations along the depth were observed (Cutter, unpublished data).

Long term data from the RMP indicated that despite sediment selenium concentrations showing inter-annual or seasonal variations, concentrations are generally stable at the monitoring sites except in early 1990s (Figure 2-26 and Figure 2-27).

No comments

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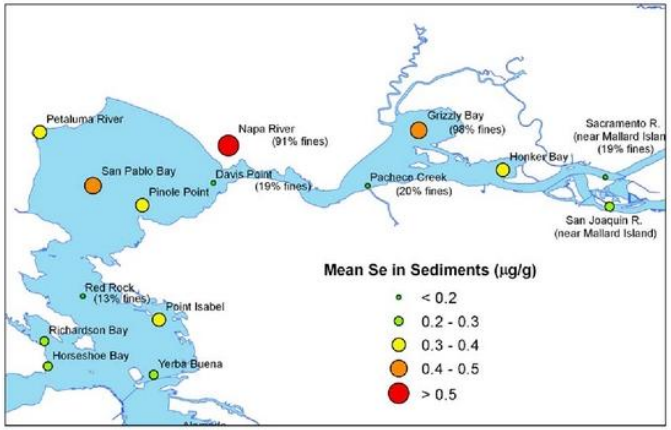

Figure 2-22 **Mean selenium concentrations in sediments for the period of 1993-2005 (data source: RMP).**

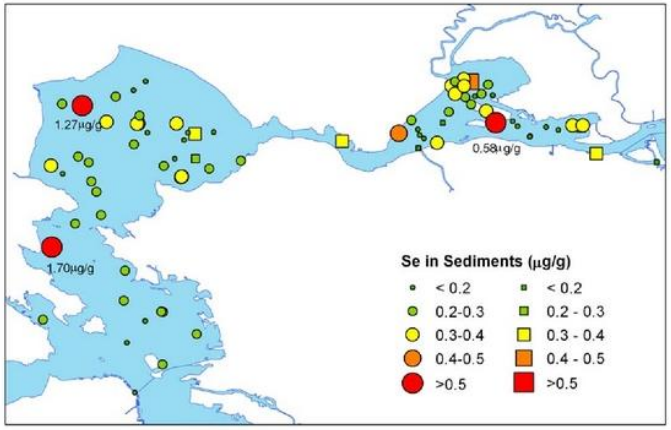

Figure 2-23 **Selenium concentrations in sediments with data from RMP random sampling sites (circles) and data collected by G. Cutter's research group (squares). Numbers shown are individual values from the sampling.**

No comments

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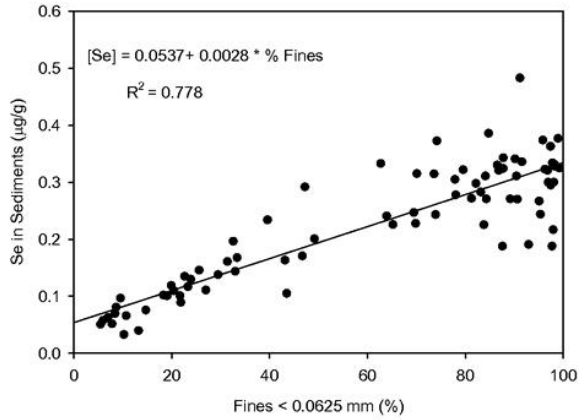

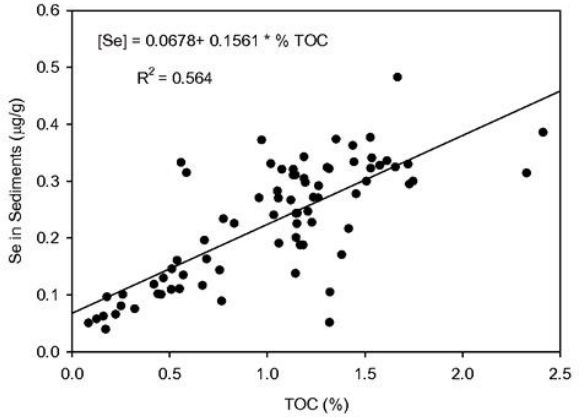

Figure 2-24 **Relationship between selenium concentrations in sediments and sediment characteristics at long-term sites (data source: RMP).**

No comments

- n/a -

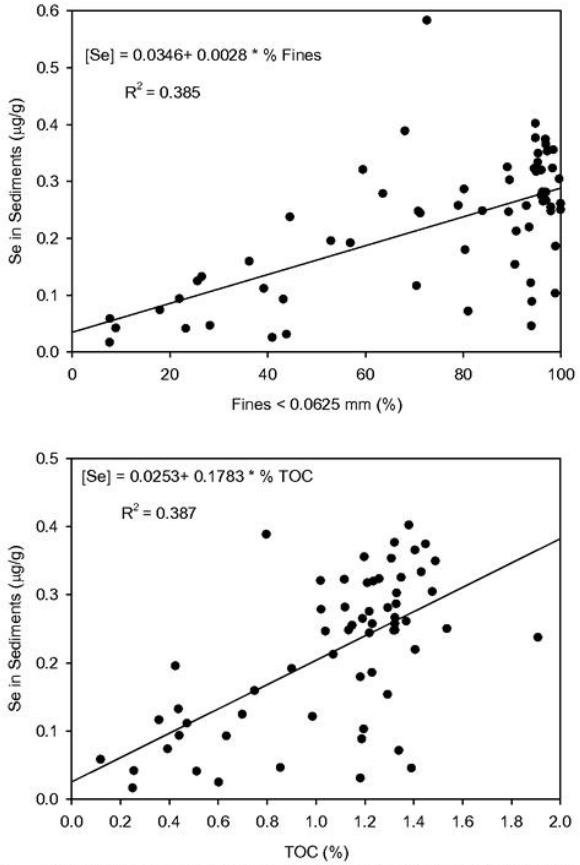

Figure 2-25 **Relationship between selenium concentrations in sediments and sediment characteristics at random sampling sites (data source: RMP).**

No comments

- n/a -

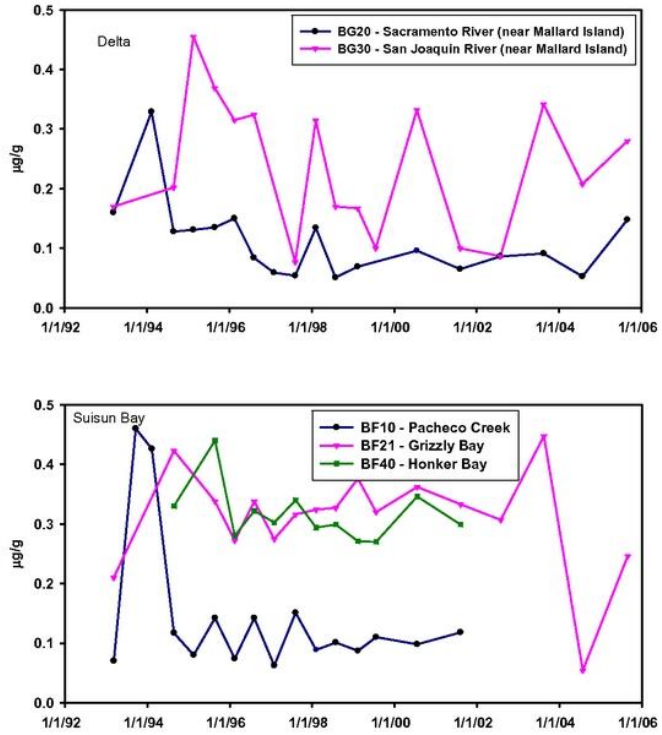

Figure 2-26 **Selenium concentrations in sediments as a function of time in stations near Mallard Island and in Suisun Bay (data source: RMP).**

No comments

- n/a -

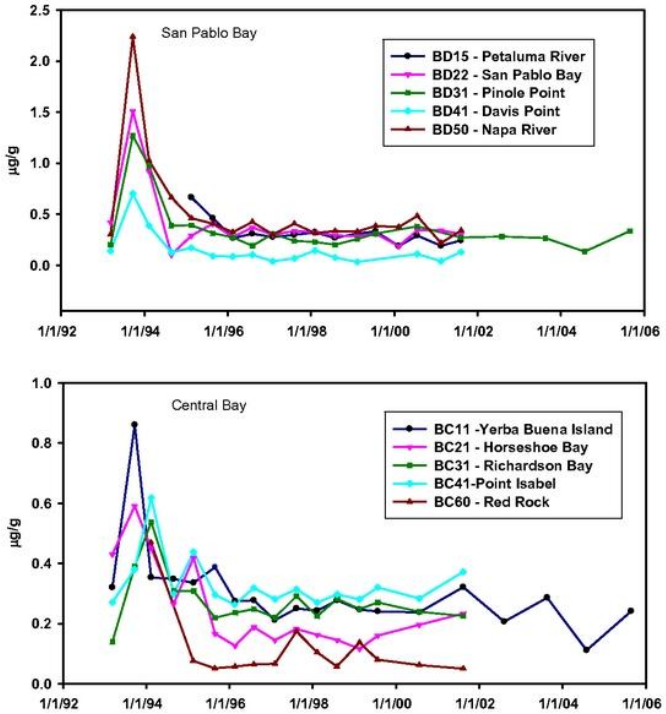

Figure 2-27 **Selenium concentrations in sediments as a function of time in San Pablo and Central Bay (data source: RMP).**

No comments

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No comments

- n/a -

3. SOURCE CHARACTERIZATION

The goal of the source characterization is to quantify the various point and non-point sources that contribute selenium to North San Francisco Bay. The sources evaluated and their key features are listed below.

- Atmospheric deposition – includes both dry and wet deposition to the bay water surface, and is usually considered as a small selenium source
- Urban and non-urban runoff from local tributaries – includes both agricultural and urban stormwater runoff, and may be a significant source of selenium during the wet season
- Delta inflow – which consists of flow from both the San Joaquin and Sacramento Rivers, is the major source of selenium to the bay
- Municipal wastewater effluents – which generally have low concentrations of selenium
- Petroleum refineries – which were the major sources of selenium (in the form of selenite) in the 1980's and have decreased dramatically since 1999 because of improved wastewater treatment
- Input from bay sediment – net sediment erosion, resuspension, diffusion, and dredging activities can be potential internal sources of selenium to the bay water column

The magnitudes of the selenium loads associated with these sources are discussed in the subsequent sections. The dry season is a critical period for selenium bioaccumulation due to longer residence time, while wet season has larger flow volumes and can potentially contribute larger loads of selenium to the Bay. Therefore, for source categories with available flow information, both dry and wet season loads were calculated and compared. The relative contribution of loads may vary significantly between the dry and wet seasons.

3.1. OVERVIEW OF PREVIOUS SOURCE ESTIMATES

Presser and Luoma (2006) estimated annual selenium loads from San Joaquin River at Vernalis to be 1,614 – 7,819 kg/yr with an average of 4,440 kg/yr for the years of 1986-1998. Selenium loads from five agricultural sub-areas of western San Joaquin Valley were also estimated under different discharging scenarios by Presser and Luoma (2006).

Of special relevance to any long-term evaluation of selenium trends in NSFB is the reduction of loads from refineries that occurred because of major improvements in wastewater treatment in the late 1990s. Selenium loadings from oil refineries ranged between 928-2,116 kg/yr during 1987 and 1988 (Cutter and San Diego-McGlone, 1990) and 1,415-3,400 kg/yr during 1986-1992 (SFBRWQCB, 1993). Refinery discharge declined after July 1998 and selenium loads from five refineries were estimated to be 506 kg/yr in 1999 (Presser and Luoma, 2006).

Loads from the Sacramento River were calculated using an average concentration of 0.04 µg/L as a conservative estimate and were estimated to be 247 kg/yr during a critically dry

No comments

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year, 494 kg/yr for dry to critically dry year, 839 kg/yr for a median year and 1579 for a wet year (Presser and Luoma, 2006).

Abu-Saba and Ogle (2005) developed a conceptual model for selenium in the bay and estimated various sources including:

- Riverine fluxes via the Delta
- North Bay refinery effluent discharges
- Municipal wastewater, local tributaries, and urban runoff

Loading rates from the Delta were estimated by multiplying net freshwater discharge from the Delta and a "river end member concentration" estimated by flow weighting concentrations at the Sacramento and San Joaquin Rivers, measured by Cutter and Cutter (2004). Estimated loading rates from the Delta by Abu-Saba and Ogle (2005) for the period of November 1997-November 1999 were 282-9,570 kg/yr for dissolved selenium, and 47-686 kg/yr for particulate selenium. Oil refinery effluent discharge loading was calculated from effluent flow rates and selenium concentrations reported by Cutter and Cutter (2004) and ranged between 204-552 kg/yr. Urban and non-urban runoff and municipal wastewater loadings were estimated by some simple calculations (Abu-Saba and Ogle, 2005). Average annual runoff volume (both urban and non-urban) for the Bay Area is about 900 Mm^3 (McKee et al., 2002) and annual discharge volume from wastewater is at a similar volume of 866 Mm^3 (Grovhoug et al., 2004). Selenium concentration in local runoff and municipal wastewater effluents were thought to range from 0.1-1 µg/L, therefore Abu-Saba and Ogle (2005) estimated loadings from each of these sources to range between 90-900 kg/yr with uncertainty.

Cutter and Cutter (2004), based on data for five sampling events in 1997, 1998, and 1999, estimated riverine inputs from the Delta into the bay and inputs from refineries to the bay. Riverine inputs of dissolved selenium ranged between 773–26,195 g/day, with selenite inputs ranging between 110-2,446 g/day, selenate ranging between 497 – 17,121 g/day, and organic selenide ranging between 55 – 6,486 g/day. Refinery loadings were estimated to range between 1,515-6,328 g/day with selenite ranging between 379-2,414 g/day, selenate between 970-2,107 g/day and organic selenide ranging between 174-1,854 g/day. These data are described in daily load terms, as in the original work; the analysis below uses this information to compute annual loads. Because of the variability in daily flows and loads, the daily loads cannot be converted to annual loads simply by multiplying by 365. The computation needs assumptions or data on daily flows, as described for the loads calculations performed in the current study.

Subsequent sections present load estimates for all significant non-point and point-sources. These analyses build on previous work and include consideration of the most recent data, especially for point sources, tributaries, and the Delta.

3.2. Direct Atmospheric Deposition

Atmospheric deposition of selenium occurs both as dry and wet forms. Selenium is emitted to the atmosphere naturally as volatile dimethyl selenide, or as selenium dioxide and

No comments

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elemental selenium from fossil fuel combustion (Cutter and Church, 1986). Deposition of selenium is part of a global cycle as gaseous selenium bound to particulate materials can be transported over long distances (EPA, 2002). Selenium in wet deposition consists of selenate, selenite, and elemental selenium. Rainwater samples from coastal California indicated that selenite is the major species in wet deposition for the region (Cutter, 1978). Dry deposition of selenium is mainly associated with fine particles (< 1 µm; Duce et al. 1976; Sweet et al. 1998) and gaseous forms.

Dry and wet deposition of selenium has not been measured in the San Francisco Bay and estimates were made using data from other studies. Atmospheric deposition of selenium is believed to represent only a small input to the water surface and the watershed in other studies (EPA, 2002). Reported concentrations of selenium in precipitation are 0.1 - 0.4 µg/L in urban areas (Mosher and Duce, 1989). Concentrations in precipitation measured in the Chesapeake Bay atmospheric deposition study are in the range of 0.07- 0.17 µg/L (EPA, 1996). To estimate the significance of wet deposition, a simple calculation was done by extrapolating concentrations in the literature to the North Bay. Given an approximate annual rainfall of 450 mm/yr (McKee et al. 2003) and a water surface of 434 km^2 in the North Bay, direct wet deposition of selenium is in the range of 13.7 – 78.1 kg/yr (assuming selenium concentrations of 0.07-0.4 µg/L). Wet deposition of selenium is relatively bioavailable as selenite is the major species.

Dry deposition was calculated from air-phase concentrations of selenium. Reported concentrations in the air exhibit a large variation from 0.3 to 2.4 ng/m^3. Concentrations measured in the Chesapeake Bay range from 1.4 – 1.8 ng/m^3 (EPA, 1996). Different deposition velocity values have been used to estimate dry deposition fluxes for the Great Lakes (0.1 cm/s, Sweet et al. 1998) and the Chesapeake Bay (0.26 cm/s low, 0.72 cm/s high, EPA, 1996). Selenium in the air is mostly associated with fine particles; therefore a lower deposition velocity is expected. Based on a concentration range of 0.3 – 2.4 ng/m^3 and deposition velocities of 0.1 cm/s and 0.26 cm/s, estimated dry deposition is in the range of 4.1 – 85.4 kg/yr.

Due to the lack of site-specific measurements of selenium deposition in the bay, the simple extrapolations from other sites are associated with large uncertainties. Nonetheless, these estimates provide a reference for comparison with other sources discussed below.

3.3. URBAN AND NON-URBAN STORMWATER RUNOFF FROM LOCAL TRIBUTARIES

Local tributaries, that is, streams that discharge directly into the North Bay and not into the Delta and/or the Sacramento and San Joaquin Rivers, can contribute elevated pollutant loadings due to the presence of urban and agricultural lands in their watersheds. Although local tributaries are only responsible for about 4% of the runoff to the bay, they were found to have a much higher sediment export rate than the Central Valley (~100 t/km^2 vs. ~14 t/km^2; McKee et al. 2003). With respect to selenium, relatively high selenium concentrations have been measured in tributaries around the Bay area, both in the wet and dry seasons. Total recoverable selenium concentrations observed in several watersheds in the South Bay during 2005-2006 ranged between 0.22–1.7 µg/L (median 0.38 µg/L) for the dry season and 0.56-9 µg/L (median 3.6 µg/L) for the wet season (EOA, 2006). Selenium concentrations observed in five tributaries of the North Bay in the Surface Water Ambient Monitoring

No comments

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Program (SWAMP) study in 2001-2002 suggested high concentrations of 0.18-3.39 µg/L (median 0.94 µg/L) during the dry season and 0.39- 3.14 µg/L (median 0.90 µg/L) during the wet season (SFBRWQCB, 2007a). Total selenium concentrations as high as 1.7 µg/L and 4 µg/L during wet and dry seasons of 2003-2004 were observed in the Petaluma River (SFBRWQCB, 2007b). Selenium observed in the tributaries is mostly in the dissolved form. Little information is available on the speciation or bioavailability of selenium from local tributaries.

3.3.1 Review of Selenium Concentration Data in Tributaries

Selenium concentrations in local tributaries monitored for the SWAMP[4] study by the San Francisco Bay Regional Water Quality Control Board during 2001-2004 are listed in Table 3-1. SWAMP monitoring programs targeted both clean and polluted areas of the watershed. Therefore, many sampling sites are located in urban or agricultural areas. For each watershed, a number of stations along the tributaries were monitored with 2-4 stations measured for selenium. Among the watersheds monitored, Wildcat Creek/San Pablo Creek and Suisun Creek were sampled during 2001-2002. Kirker Creek, Mt. Diablo Creek and Petaluma River were sampled during 2003-2004. Three sampling events based on hydrological conditions were targeted for each monitoring year including wet (January to March), spring (April to May) and dry (June to October). Samples were analyzed for both total and dissolved selenium with a minimum detection limit (MDL) of 0.1 µg/L (SFBRWQCB, 2007b).

Relatively high total selenium concentrations were found for all seasons (Figure 3-1). The highest total selenium concentration was observed at an urban influenced site during the dry season (8.1 µg/L at KIR115-Kirker Creek Apartments). Average total selenium concentrations for the most downstream sites of all the North Bay watersheds are 1.57 µg/L for wet season, 1.03 µg/L for spring season and 1.95 µg/L for dry season (Table 3-1). The downstream sites were considered to be more representative of the watershed condition by integrating all the land uses and therefore only downstream sites were used in the calculations of loads to the bay. Note that the 8.1 µg/L value did not factor in the average because it was not the most downstream value on Kirker Creek. Due to the limited number of samples, for some sampling events, higher dissolved than total selenium concentrations were reported. For the purpose of the load calculations, estimates were made using total selenium concentrations.

The Bay Area Stormwater Management Agencies Association (BASMAA) has also sampled selenium concentrations from some local tributaries around the North Bay during 1988-1995 (BASMAA, 1996). The sampling sites for the North Bay are mostly located in the Alameda County with two sites located in the Contra Costa County. Selenium concentrations reported by BASMAA are lower than values reported in subsequent SWAMP studies (Figure 3-2). Variable detection limits are noted for the BASMAA dataset, with higher detection limit (at 0.2 µg/L) and higher percentage of non-detects in early period of the study (1988-1992). Lower detection limits (generally below 0.05 µg/L) were used for latter period of the study and most of the samples were above detection limits. Measured concentrations seem to vary

[4] Surface Water Ambient Monitoring Program, a statewide program to assess water quality conditions in surface water bodies.

No comments

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with detection limits. Land uses for watersheds surrounding the sampling locations include open forests, industrial, residential and commercial. Median concentrations are 0.40 µg/L during dry weather (n = 7) and 0.33 µg/L for storm event sampling (n = 28). By land use, median concentrations are 0.29 µg/L, 0.35 µg/L and 0.30 µg/L for residential, open and industrial sites. For some of the BASMAA sampling sties, monitoring was continued for multiple years.

Table 3-1
Total and dissolved selenium concentrations observed at the SWAMP sites during wet, spring and dry seasons. Data for the most downstream location on each stream are shown. Data are individual values.

Creek	Site	Season	Year	Total µg/L	Dissolved µg/L
Kirker Creek	KIR020	Wet	2003-2004	1.26	1.21
		Spring	2003-2004	1.30	1.00
		Dry	2003-2004	2.50	2.00
Mt. Diablo Creek	MTD010	Wet	2003-2004	2.00	2.00
		Spring	2003-2004	0.40	0.30
Petaluma River	PET010	Wet	2003-2004	1.30	1.40
		Spring	2003-2004	0.20	0.50
	PET310	Wet	2003-2004	1.70	1.80
		Spring	2003-2004	1.30	1.50
		Dry	2003-2004	4.00	3.90
San Pablo Creek	206SPA020	Spring	2001-2002	2.74	2.57
		Dry	2001-2002	1.60	1.53
Suisun Creek	207SUI010	Spring	2001-2002	0.90	1.04
		Dry	2001-2002	0.32	0.17
Wildcat Creek	206WIL020	Spring	2001-2002	0.39	1.41
		Dry	2001-2002	1.33	1.11
	Average	Wet		1.57	1.60
		Spring		1.03	1.19
		Dry		1.95	1.74

No comments

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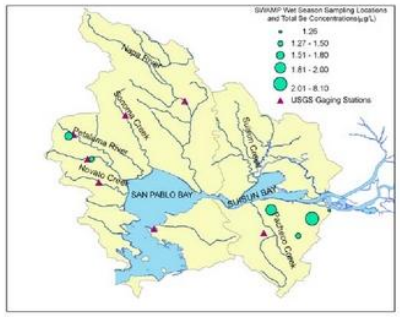

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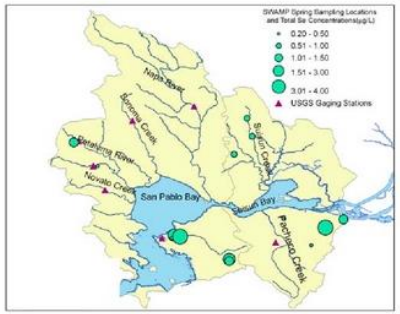

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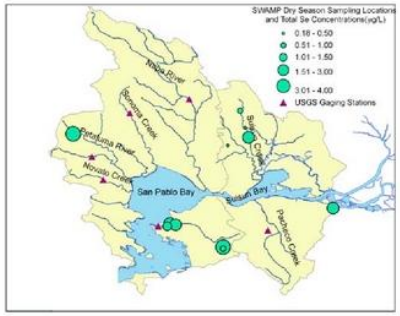

(c)

Figure 3-1 **Total selenium concentrations in the wet (a), spring (b) and dry (c) seasons in local tributaries of the North Bay, sampled in the SWAMP program.**

No comments

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Three methods were used to estimate selenium loads from local tributaries based on two different methods of estimating runoff from local watersheds and selenium concentration data from SWAMP and BASMAA study.

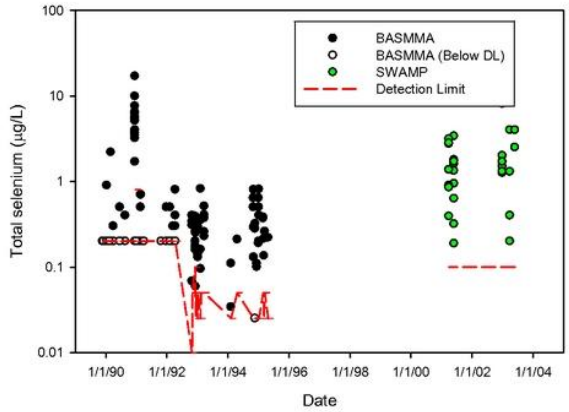

Figure 3-2 **Total selenium concentrations in tributaries of NSFB sampled during 1990–1996 and 2000–2003 (Source: BASMAA, 1996; SWAMP data from SFBRWQCB, 2007a, b).**

3.3.2 *Method 1: Modeled Estimates of Runoff in Tributaries and Using SWAMP Concentrations*

Total annual runoff from local watersheds has been computed using a simple model by Davis et al. (2000). The predicted runoff compared reasonably well to the limited observed data (r2 = 0.62-0.89). We used the Davis et al. (2000) runoff estimates and concentrations measured in the SWAMP study to estimate loadings from each of the watersheds surrounding the North Bay (Table 3-2). A map of these local watersheds (hydrological areas) is shown in Figure 3-3. The average annual loadings of total selenium from local tributaries to the North Bay were estimated to be 913.9 kg/yr, with the Napa River and Fairfield watersheds being the largest sources. Higher selenium loads from these watersheds are most likely due to larger watershed areas and high annual runoff.

Runoff in the Bay area shows large year-to-year variation. Therefore, loadings from local tributaries are expected to vary greatly with climate conditions. Watersheds in the Bay area show inter-annual variation with coefficient of variation (CV) ranging from 0.65 to 1.01 (McKee et al. 2002). The 10th and 90th percentiles of rainfall in the Bay area for the record period of 1961-1990 were summarized previously in Davis et al. (2000). Assuming constant runoff concentrations under different climate conditions, 10th and 90th percentiles of the selenium loadings were calculated to be 522.8 kg/yr and 1367.2 kg/yr, respectively.

No comments

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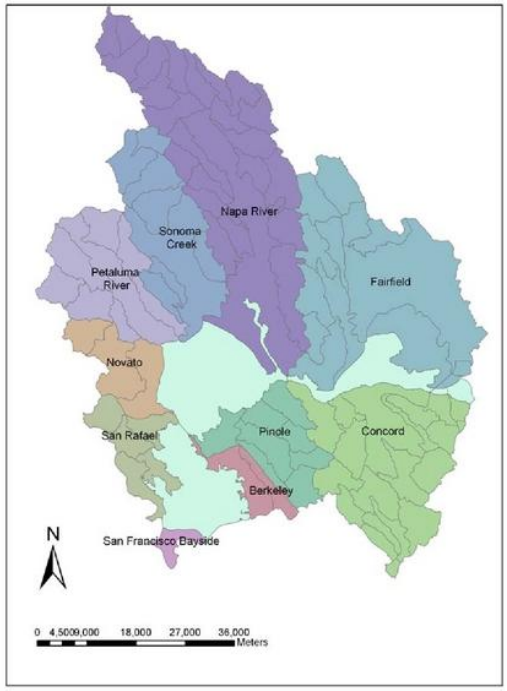

Figure 3-3 **Hydrological areas surrounding NSFB. Source: San Francisco Estuary Institute**

No comments

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Table 3-2
Runoff and selenium loadings from local watersheds to the North Bay

Hydrologic Area	Total Annual Runoff (Mm^3/yr)1	SWAMP Sampling Station	Mean total selenium concentrations (µg/L)[2]	Total selenium loadings (kg/yr)
San Rafael	56		1.57	87.6
Berkeley	25		1.57	39.1
San Francisco-Bayside	8.8		1.57	13.8
Novato	47		1.57	73.6
Petaluma River	60	Petaluma River	1.5	90
Sonoma Creek	68		1.57	106.4
Napa River	180		1.57	281.7
Pinole	35	Wildcat, San Pablo	1.57	54.8
Fairfield	129	Suisun Creek	0.9	116.1
Concord[3]	106	Mt. Diablo Creek	0.4	42.4
Concord[4]	6.7	Kirker Creek	1.26	8.4
Total	721.5			913.9

1Davis et al. (2000)

2SFBRWQCB (2007a, b). 1.57 µg/L is the wet season mean concentration for all the most downstream sites in the North Bay watersheds sampled (n = 4).

3Subunits of the Concord hydrologic area (ID: 220731, 220732, and 220733)

4A subunit of the Concord hydrologic area (ID: 220734)

3.3.3 *Method 2: Measured Flow in Selected Tributaries and Using SWAMP Concentrations*

The second method is based on USGS flow data in the Bay area to estimate selenium loading from local tributaries. Daily flow records from several USGS gaging stations for some major North Bay tributaries are available for different periods (Table 3-3 and Table 3-4). Long-term average monthly flow at these stations suggested that the majority of the flow is discharged during the wet season (defined as Oct 1st to Apr 30th). Flow during the dry season (defined as May 1st to September 30th) comprises only a very small portion of the wet season flow (0.2 – 3.5%) except Walnut Creek (13.1%) and Pinole Creek (5.8%). Many of the stations have relatively short flow records and contain values prior to 1990. Flow records at these stations may not fully reflect the current hydrologic regime of the watershed.

The long-term average monthly flow and the seasonal concentrations measured by the SWAMP study were used to estimate long-term average selenium loadings at these gaging stations for each month. Loadings were estimated by multiplying flow and concentrations of the same river. For tributaries without observed selenium concentrations, the overall average concentration for all the North Bay downstream sites was used. The estimated loadings are shown in Figure 3-4. Following the pattern in flow volumes, total selenium is mainly delivered to the bay in wet season. Dry season loadings average 0.2 – 3.0% of wet season loadings for 6 of the 8 stations (Table 3-5). An annual areal loading was also estimated for

No comments

- n/a -

each of the tributary, based on total annual selenium loading and the drainage area. The estimated areal loadings were used to scale up loading estimates of the entire hydrological area (e.g. Novato Creek at Novato was scaled up for the whole Novato hydrological area). For hydrological areas without data (e.g., San Rafael), areal loading from a nearby watershed was used.

Estimated total selenium loadings for the North Bay area by hydrological area are summarized in Table 3-6 and Figure 3-5. Total selenium loadings from local tributaries using the method above were estimated to be 1,511 kg/yr, higher than the estimates from Method 1. A large portion of the loadings were estimated to originate from Napa and Sonoma hydrological areas. Due to the lack of selenium concentrations for these two areas in the SWAMP dataset, an overall mean concentration of the whole North Bay tributaries were used and therefore the estimates are subject to large uncertainty. Flow records for the Napa and Sonoma rivers also suggested higher runoff from these two areas compared to the rest of the North Bay (337 and 422 mm/yr for Napa and Sonoma, compared to ~200 mm/yr for the other tributaries), contributing to the high estimated selenium loadings.

Table 3-3
Major USGS gaging stations in North Bay watersheds (Source: USGS)

Station Name	Station Number	Latitude	Longitude	Drainage Area (mi^2)	Flow Period
Novato Creek at Novato	11459500	38 06'28"	122 34'44"	17.6	1946-current
San Antonia Creek Nr Petaluma	11459300	38 10'57"	122 36'55"	28.9	1975-1981
Petaluma River at Petaluma	11459000	38 15'40"	122 39'35"	30.9	1948-1963
Sonoma Creek at Agua Caliente	11458500	38 19'24"	122 29'36"	58.4	1955-current
Napa River nr. Napa	11458000	38 22'06"	122 18'08"	218	1929-current
Wildcat Creek at Richmond	11181400	37 57'41"	122 21'33"	8.69	1964-1975
Walnut Creek at Concord	11183600	37 56'43"	122 02'55"	85.2	1968-1992
Pinole Creek at Pinole	11182100	37 58'21"	122 14'43"	10	1938-1977

No comments

- n/a -

Table 3-4
Long-term average monthly flow (in cfs) at USGS gaging stations in North Bay watersheds for the record period (Source: http://waterdata.usgs.gov/nwis)

	USGS11459500 (Novato Creek at Novato)	USGS11459300 (San Antonia Creek nr. Petaluma)	USGS11459000 (Petaluma River at Petaluma)	USGS11458500 (Sonoma Creek at Agua Caliente)	USGS11458000 (Napa River nr. Napa)	USGS11181400 (Wildcat Creek at Richmond)	USGS11183600 (Walnut Creek at Concord)	USGS11182100 (Pinole Creek at Pinole)
Jan	46.79	82.47	58.75	244.85	695.67	22.06	112.55	11.97
Feb	46.56	70.48	64.11	216.32	710.04	11.78	132.28	11.23
Mar	26.92	30.69	28.38	124.3	486.98	10.09	108.15	7.94
Apr	10.50	5.35	14.00	70.74	198.32	6.20	52.33	5.44
May	1.65	0.72	0.49	16.44	59.26	0.89	19.13	1.23
Jun	0.82	0.17	0.03	5.12	18.46	0.61	12.32	0.59
Jul	0.66	0	0	1.81	5.72	0.27	9.52	0.29
Aug	0	0	0	0.98	2.51	0.01	8.27	0.16
Sep	0	0	0	0.77	1.95	0.03	8.77	0.13
Oct	0.69	0.01	0.96	6.28	10.26	1.01	14.33	0.53
Nov	3.01	0.63	2.24	24.26	68.85	4.06	32.47	0.53
Dec	16.81	13.84	37.69	159.32	335.17	7.73	52.05	3.81
Dry season (cfs)	3.9	0.9	0.5	25.1	87.9	1.8	58.0	2.4
Wet season (cfs)	151.3	203.5	206.1	846.1	2505.3	62.9	504.2	41.5
Dry as wet %	2.59	0.45	0.25	2.97	3.51	2.88	11.51	5.79
Runoff (mm/yr)	249.8	200.3	189.4	422.5	336.9	211.0	186.9	124.2

No comments

- n/a -

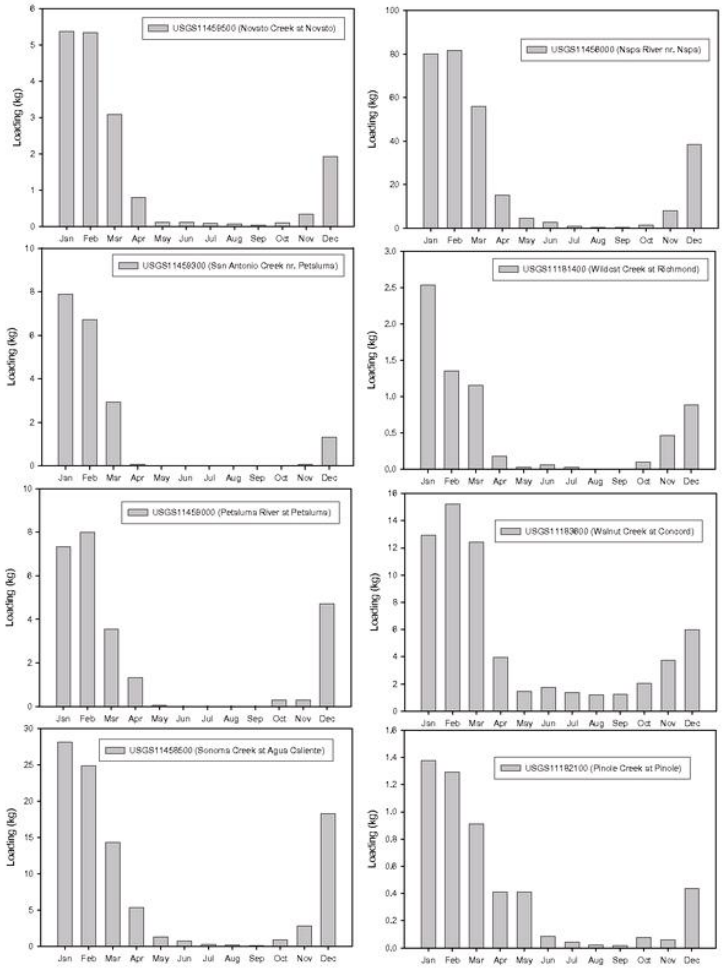

Figure 3-4 **Estimated long-term average monthly selenium loadings at gaging stations of local tributaries.**

No comments

- n/a -

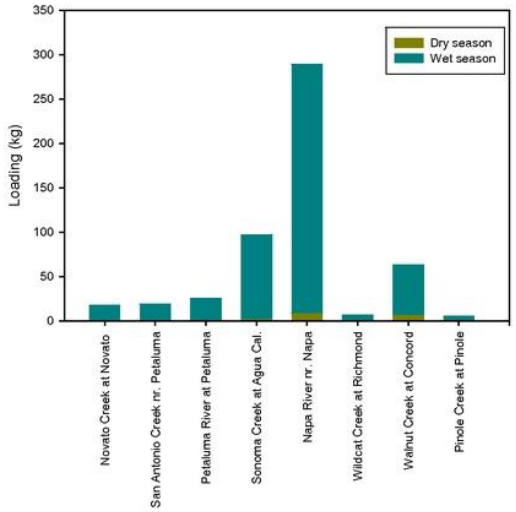

Figure 3-5 **Comparison of dry and wet season selenium loadings for tributaries in the North Bay.**

Seasonal selenium concentrations from the SWAMP data set were also used in conjunction with the daily flow at Napa River near Napa to estimate daily selenium loadings for 1991-2007. The estimated daily loadings were accumulated to estimate seasonal loading for all the years. As a result of variations in hydrological conditions, total selenium loading in Napa River near Napa vary largely across the years (Figure 3-6). Total selenium loadings can be greater than 700 kg/yr during wet year (1995) versus less than 100 kg/yr during a dry year (1994). The dry and wet year notation was based on the classification system for San Joaquin and Sacramento River by the Department of Water Resources (http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST). Wet and above normal years are classified as wet years. Dry, below normal and critically dry years are classified as dry years. Dry season is defined as May 1st to September 30th. The wet season is defined as October 1st to April 30th.

No comments

- n/a -

Table 3-5
Estimated long-term average monthly total selenium loadings (kg/month) to the gaging stations.

	USGS11459500 (Novato Creek at Novato)	USGS11459300 (San Antonia Creek nr. Petaluma)	USGS11459000 (Petaluma River at Petaluma)	USGS11458500 (Sonoma Creek at Agua Caliente)	USGS11458000 (Napa River nr. Napa)	USGS11181400 (Wildcat Creek at Richmond)	USGS11183600 (Walnut Creek at Concord)	USGS11182100 (Pinole Creek at Pinole)
Jan	5.37	7.87	7.33	28.13	79.92	2.53	12.93	1.38
Feb	5.35	6.73	8.00	24.85	81.57	1.35	15.20	1.29
Mar	3.09	2.93	3.54	14.28	55.94	1.16	12.42	0.91
Apr	0.80	0.08	1.34	5.36	15.04	0.18	3.97	0.09
May	0.13	0.01	0.05	1.25	4.49	0.03	1.45	0.41
Jun	0.12	0.02	0.01	0.73	2.64	0.06	1.76	0.08
Jul	0.09	0.00	0.00	0.26	0.82	0.03	1.36	0.04
Aug	0.07	0.00	0.00	0.14	0.36	0.00	1.18	0.02
Sep	0.04	0.00	0.00	0.11	0.28	0.00	1.26	0.02
Oct	0.10	0.00	0.28	0.90	1.47	0.10	2.05	0.08
Nov	0.35	0.06	0.28	2.79	7.91	0.47	3.73	0.06
Dec	1.93	1.32	4.70	18.30	38.50	0.89	5.98	0.44
Annual total (kg/yr)	17.4	19.0	25.5	97.1	288.9	6.8	63.3	4.8
Areal loading (kg/mi^2)	0.99	0.66	0.83	1.66	1.33	0.78	0.74	0.48
Dry season (kg)	0.45	0.04	0.06	2.49	8.59	0.12	7.01	0.26
Wet season (kg)	16.99	18.99	25.47	94.61	280.35	6.68	56.28	4.56
Dry as wet %	2.65	0.21	0.22	2.63	3.06	1.73	12.46	5.71

No comments

- n/a -

Table 3-6
Estimated annual total selenium loadings for the hydrological areas in the North Bay.

Hydrological Areas	Drainage Area (Mm^2)	Area (mi^2)	Loadings (kg/yr)	Dry (kg)	Wet (kg)
Novato	183.98	71.03	70.4	1.8	68.6
San Rafael	157.66	60.87	60.3	1.6	58.8
San Francisco Bayside	28.76	11.11	11.0	0.3	10.7
Berkeley	87.59	33.82	26.4	0.4	26.0
Pinole	152.43	58.85	28.4	1.5	26.9
Concord	648.27	250.30	185.9	20.6	165.3
Fairfield	877.89	338.96	251.8	27.9	223.9
Napa	937.89	362.12	480.0	14.3	465.7
Sonoma	429.77	165.93	275.9	7.1	268.6
Petaluma	377.64	145.81	120.5	0.3	120.2
Total			1510.6	75.8	1434.8

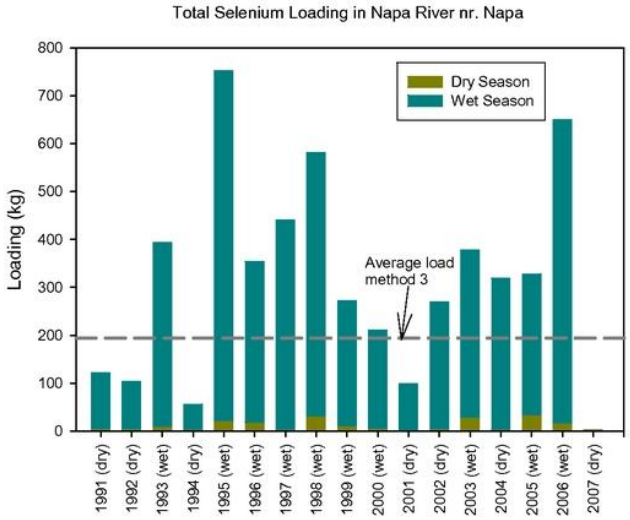

Figure 3-6 **Dry and wet season selenium loadings by water year at Napa River near Napa.**

No comments

- n/a -

3.3.4 Method 3: Modeled Estimates of Runoff with BASMAA and SWAMP concentrations for Calculating Land Use-Specific Loads

To estimate stormwater loads of selenium from urban areas, a previously published approach was used (Davis et al., 2000). This approach has been used in estimating urban loads of PCBs in the San Francisco Bay PCB TMDL (KLI, 2002; SFBRWQCB, 2007c). Loads are estimated from five broad categories of land use (agricultural, open space, industrial, commercial and residential) based on estimated runoff from each land use type and land-use specific concentrations. Urban lands are defined as a group and include industrial, commercial and residential lands.

Land uses for each hydrological area were previously determined by Davis et al. (2000; Table 3-7). Best estimates of runoff coefficient for each land use type were also derived by Davis et al. (2000; Table 3-7). KLI (2002) sampled stormwater concentrations of PCBs and Hg in the Bay area, however selenium was not sampled in this effort. For selenium, land use specific concentrations were derived from BASMAA (1996) and SWAMP study (SFBRWQCB 2007a, b). BASMAA (1996) sampling stations include sites that are mostly residential and sites that are more dominated by forests/open area. Therefore, overall mean concentrations for sites with dominant land use of residential, open, and industrial were calculated. Concentrations for agricultural land use were assumed to be the same as open area. When concentrations were reported as below detection limits, half of the detection limit was used. Mean selenium concentrations from the BASMAA study are similar across land uses (Table 3-8). Stations from the SWAMP study are generally located in the urban areas, with Suisun Creek stations located in agriculture-dominated areas. Therefore values from Suisun Creek were used to derive concentrations for the agricultural areas. Due to the differences in concentrations reported in two programs, values from BASMAA were used as lower bound of concentrations from local tributaries, while SWAMP data were used as an upper bound (Table 3-8). Overall, Method 3 results in a somewhat lower estimate of loads than the prior two methods, with loads ranging from 354.3 to 838.7 kg/yr.

No comments

- n/a -

Table 3-7
Summary of drainage areas and land use for each hydrologic area of NSFB (Davis et al. 2000; KLI, 2002)

Hydrological areas (HA)	Drainage Area (Mm^2)	Residential (%)	Commercial (%)	Industrial (%)	Agricultural (%)	Open (%)	Rainfall
Berkeley	87.59	57	16	18	0	9	21
Concord							
Concord (220731)	283.96	25	10	7	9	49	17
Concord (220732)	212.54	44	4	1	1	50	21
Concord (220733)	121.72	39	6	7	0	47	21
Concord (220734)	30.05	46	9	26	6	12	17
Fairfield							
Fairfield (220721)	226.20	12	1	5	12	70	25
Fairfield (220722)	131.69	0	0	0	13	86	29
Fairfield (220723/26)	410.25	8	6	2	48	36	21
Fairfield (220724/25)	109.76	0	0	0	1	99	19
Napa River	937.89	10	3	1	24	62	31
Novato	183.98	23	7	1	13	56	33
Petaluma River	377.64	14	1	2	35	48	27
Pinole	152.43	33	5	12	0	49	23
San Francisco Bayside	28.76	58	39	2	0	1	21
San Rafael	157.66	50	8	1	0	41	39
Sonoma Creek	429.77	8	1	1	36	54	29

Table 3-8
Land use specific runoff coefficient and mean selenium concentrations

	Residential	Commercial	Industrial	Agricultural	Open	Source
Runoff coefficient (best estimate)	0.35	0.9	0.9	0.1	0.25	Davis et al. (2000)
Selenium concentration (low end) $\mu g1^{-1}$	0.36	0.58	0.58	0.50	0.50	BASMAA (1996)
Selenium concentration (high end) $\mu g1^{-1}$	1.55	1.55	1.55	0.85	0.85	SWAMP

No comments

- n/a -

Table 3-9
Estimated total selenium loadings (kg/yr) by land use from hydrological areas draining NSFB by land uses

Hydrological area	Residential	Commercial	Industrial	Agricultural	Open	Total (kg/yr)
Berkeley	14.4	10.4	11.7	0.0	0.9	37.5
Concord	60.7	30.5	24.6	1.1	31.6	148.5
Fairfield	18.8	20.3	16.1	11.5	67.0	133.8
Napa River	40.1	30.9	10.3	15.1	97.3	193.6
Novato	19.2	15.1	2.2	1.7	18.4	56.5
Petaluma River	19.7	3.6	7.2	7.7	26.4	64.6
Pinole	15.9	6.2	14.9	0.0	9.3	46.3
San Francisco Bayside	4.8	8.3	0.4	0.0	0.0	13.6
San Rafael	42.4	17.4	2.2	0.0	13.6	75.6
Sonoma Creek	13.7	4.4	4.4	9.7	36.3	68.6
Total (kg/yr)-SWAMP	249.8	147.2	94.1	46.8	300.8	838.7
Lower bound estimates (kg/yr) - BASMAA	58.4	54.8	35.0	27.7	178.4	354.3
Urban loads[1] (kg/yr)						491.1 (148.2 lower bound)

[1]Urban loads are the sum of residential, commercial, and industrial land uses.

Estimated stormwater runoff from urban areas surrounding the NSFB is 316.8 Mm^3/yr, about 44% of the total runoff. Estimated loads from urban areas based on the SWAMP concentrations are at 491.1 kg/yr, about 58.6% of loads from all land use types. Because a lower concentration in the agricultural areas compared to other urban land uses was used (0.85 µg/L versus 1.55 µg/L), estimated total selenium loads from all land uses are slightly lower than load estimates in Method 1. Also note for Napa River watershed, because a large portion of the land uses is agricultural, using a lower selenium concentration for agricultural area resulted in lower estimates of selenium loads for the whole hydrological area (193.6 kg/yr versus 281.7 kg/yr in method 1). Estimated loads from urban areas based on the BASMAA concentrations are at 148.2 kg/yr, about 43% of loads from all land use areas.

3.3.5 *Tributary Load Summary*

Three, somewhat overlapping methods were used to compute tributary loads. Using the SWAMP selenium data from the tributaries, loads were computed using flow from different sources: modeled annual flows from a recent study (Davis et al., 2000) and measured flows from USGS gage stations. The modeled flows were used because of the limited availability of measured flow data. Loads from urban and non-urban areas were also estimated based on modeled runoff and land use specific concentrations derived from BASMAA and SWAMP concentration data. Loads from urban areas generally account for 43% or 59% of total loads from tributaries, depending on the concentrations used.

No comments

- n/a -

Driven in large part by relatively high concentrations in the tributaries in both the wet and dry seasons, the average annual loads from the tributaries can be up to 1,511 kg/year depending on the methods used for the load estimation. Much of this load (greater than 95%) is delivered to the bay in the wet months, consistent with the timing of flows, as shown in the calculation using the USGS gage data. The largest single sources of loads are the Napa River, Sonoma Creek, and the Concord hydrological area. Note that selenium is a naturally occurring trace element, and is found even in runoff from open areas. A significant portion of these loadings is associated with natural sources.

On average, the tributary concentration data are generally higher than Sacramento River concentrations, which are more typical of a low background in the region. Although the high average concentrations are not driven by one or two measurements, it is nonetheless clear that the load estimates above are based on a limited amount of data. Furthermore, the SWAMP and BASMAA concentrations differ: lower mean concentrations were observed in BASMAA dataset. However, the range of concentrations (0.06 – 0.90 µg/L after 1/1/1992) indicates that higher concentrations than 0.1 µg/L were not uncommon in local tributaries. Given the underlying data limitations and uncertainty in flows, and the year-to-year variability, estimated loads from tributaries can be as low as 354 kg/yr using BASMAA concentrations and modeled runoff, 834 or 914 kg/yr based on SWAMP concentrations and modeled runoff, and 1511 kg/yr based on SWAMP concentrations and measured flow. For the purpose of this analysis, we go forward with the relatively wide range of 354-834 kg/yr, with about half originating in urban runoff.

Particulate selenium loads from local tributaries were estimated based on previous estimates of total suspended sediment (TSS) loads for different hydrological areas in the Bay Area by Davis et al. (2000). Estimates of TSS loads by Davis et al. (2000) were based on SIMPLE model estimates of runoff multiplied by available TSS concentrations. Data on particulate selenium concentrations are limited from local tributaries. Therefore selenium concentrations in particulates measured for the Sacramento River (0. 62 ± 0.21 µg/g; n =5) by Doblin et al. (2006) were used in the calculation. TSS loads estimated by Davis et al. (2000) are 1.91×10^8 kg/yr for the North Bay watersheds. With a particulate selenium concentration of 0.62 µg/g, estimated particulate selenium loads from local tributaries are 118.2 kg/yr.

3.4. Inputs from San Joaquin and Sacramento Rivers via the Delta

Although selenium inputs from the Central Valley via the Delta are expected to be a significant source to the North Bay, accurately estimating these loads is difficult due to the role of the Delta and tidal influences from the bay. Loads upstream of the Delta can be estimated from measurements at Freeport (on the Sacramento River) and at Vernalis (on the San Joaquin River) (Figure 3-7). Inflow originating from the San Joaquin River has high selenium concentrations due to inputs from agricultural drainage (0.68 ± 0.20µg/L dissolved selenium) and the Sacramento River has much lower selenium concentrations (0.07 ± 0.02 µg/L) (Cutter and Cutter, 2004). However, flows in the San Joaquin River at Vernalis are usually much smaller: 10 to 15 percent of inflow from Sacramento River at Freeport (Figure 3-7). Therefore, on an annual basis loads from both rivers to the Delta are significant. However, selenium processes in the Delta are not well characterized. Besides the normal processes of settling and mixing, a large portion of the water in the Delta is also exported for

No comments

- n/a -

agricultural and urban uses in other parts of California. The relative contribution of the Sacramento and San Joaquin Rivers to the overall export from the Delta to the North Bay changes with tidal cycles and season. The contribution from the San Joaquin River can potentially increase during drier months of September to November (Figure 3-7 and Presser and Luoma, 2006). In this section, available flow and concentration data are used to make the best possible estimates of the selenium load contributions of the Delta and the two major rivers to the North Bay.

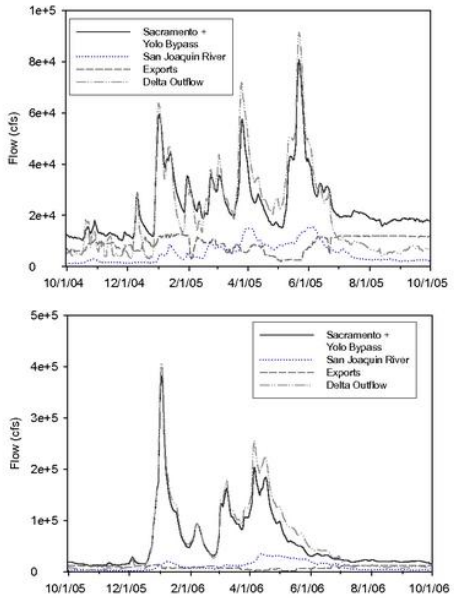

Figure 3-7 **Flow from Sacramento River, San Joaquin River, compared to Delta exports (diversions of Central Valley Project, State Water Project, Contra Costa Water District Diversions and North Bay Aqueduct) and outflow to Delta for a dry year (water year 2004) and a wet year (water year 2005) (Data source: IEP).**

Selenium data have been collected as part of the RMP just above Mallard Island at the BG20 (Sacramento River) and BG30 (San Joaquin River) stations. Observed total selenium concentrations at these stations (0.15 and 0.18 µg/L, respectively) are more representative of Delta concentrations than of the individual rivers. The concentrations are higher than in the Sacramento River at Freeport (0.07 µg/l, noted above), and substantially lower than in the San Joaquin River at Vernalis (0.68 µg/l), indicating mixing between the two sources, and

No comments

- n/a -

possibly tidal influences from the bay during low flow periods. Concentrations observed at BG20 and BG30 also correlate well ($R^2 = 0.59$) possibly due to mixing of common sources. In a separate study, selenium concentrations were found to decrease by 60-80% during transport from the San Joaquin River at Vernalis into the estuary at Antioch (Cutter unpublished data; Meseck and Cutter, 2006).

Different methods have been used in previous studies to calculate riverine inputs of various pollutants through the Delta to the Bay. Davis et al. (2000) used average concentrations at two RMP monitoring stations in the Delta (BG20 and BG30) to estimate loads of different pollutants from Central Valley to the Bay. Leatherbarrow et al. (2005a) and McKee et al. (2006) used continuous monitoring data of SSC at Mallard Island to estimate loads of sediments, mercury and organics to the Bay. With respect to selenium, Presser and Luoma (2006) estimated loads from the two rivers (Sacramento River at Freeport and San Joaquin River at Vernalis) separately to estimate selenium inputs to the Bay. Cutter and Cutter (2004) and Abu-Saba and Ogle (2005) used the approach of flow weighting concentrations from the two rivers to calculate a riverine concentration and multiplied this by the net Delta outflow to estimate loads from the Delta to the bay. Meseck (2002) applied a "Delta removal constant" to the riverine loads to take into account the possible selenium sink in the Delta in her modeling analysis.

Here we used three different approaches to estimate the selenium loadings from Central Valley via Delta to the bay based on the available data. The first approach is the simple approach similar to Davis et al. (2000), which uses average concentration of two RMP stations in the Delta and multiplies it by the net Delta outflow. The second approach uses selenium loadings from the Sacramento and the San Joaquin Rivers separately based on data from Cutter and Cutter (2004) and applies a "Delta removal constant" similar to Meseck (2002) to account for the possible selenium loss in the Delta. The third approach is independent of the prior two, in which the loadings from Central Valley to the bay were estimated as the difference between inputs from the two rivers minus the export through aqueducts. The third method can be used to estimate the relative selenium load contribution of the two rivers to the bay.

3.4.1 Method 1. Loadings Based on the RMP data and Tidally Corrected Delta Outflows

For the first approach, tidally corrected outflow data from the Delta were obtained from the Interagency Ecological Program (IEP) (http://www.iep.ca.gov/dayflow/index.html). Outflows from the Delta show large year-to-year variations (Figure 3-8). Concentrations measured at BG20 and BG30 also show year- to-year variations, and no correlation with the Delta outflow and no clear pattern in wet versus dry seasons were observed.

Daily selenium loadings were estimated by multiplying daily Delta outflow with the average concentrations at BG20 and BG30 of the dry and wet seasons of each year. The estimated daily loadings were summed to compute annual loadings. Estimated annual loadings are highly variable (by a factor of 12) depending on the volume of outflow from the Delta (Table 3-10 and Figure 3-9). Water year 1998 was an exceptionally wet year. Excluding 1998, estimated annual loadings vary by a factor 6 among the years. Loadings from the Delta are more significant in the wet season than the dry season (Figure 3-9). An average load of 3,962 kg/year from the Delta to the North Bay was estimated (1994-2006).

No comments

- n/a -

There is some limited evidence that the Delta load may be higher than computed using this method and using BG-20 and BG-30 concentrations from the RMP. Selenium concentrations have been measured in the outflow from the Delta (Mallard Island) during the storm events of 2005 - 2006 (0.46 ± 0.13 µg/L; L. McKee, personal communication), and separate from the RMP data. Higher concentrations observed at Mallard Island during storm events suggest potential of higher loadings during these periods. Total recoverable selenium concentrations during storm events are a function of daily flow, suggesting a dilution behavior (Figure 3-10). Nonetheless, the relationship was used to estimate total selenium loadings during high flow. The result indicates a potential of 16-56% underestimate of total selenium loadings using BG20 and BG30 concentrations (e.g. 1,059 kg/yr vs. 1,590 kg/yr for a dry year 2001 and 5,078 kg/yr vs. 21,000 kg/yr for wet year 2006). However, the storm selenium concentration data are very limited at this point, and the more complete RMP data record is recommended for calculation of long term Delta loads.

Leatherbarrow et al. (2005a) used concentrations measured at Mallard Island to estimate loads of PCB (polychlorinated biphenyls), PAH (polycyclic aromatic hydrocarbons), OC (Organochlorine) pesticides, and Hg from the Delta to the Bay. Contaminant loads were estimated based on relationships between contaminants and SSC, and the estimated sediment loads using available flow information and continuous SSC concentrations measured at Mallard Island. In quantifying loads of sediment from Mallard Island to the Bay, both the advective and dispersive loads were estimated. The relative contributions of the advective and dispersive load were estimated using point velocity and concentration measured during water year 1994 and 1996 (McKee et al. 2006). During a wet period (mean discharge = 2116 m^3/s), dispersive point-load averages about 11% of the advective point load. Due to the tidal influence at Mallard Island, dispersive loads (most commonly landward) can be a significant portion of total load during low flow period. Estimated dispersive load for a low flow period (April 15, 1994-June 4, 1994) was 49% of advective point load at surface and 52% at mid-depth (McKee et al. 2006). Overall the dispersive loads of sediment were estimated to be 0.24 Mt/yr or 20% of the total loads for the 9 year period of 1995-2003. There is limited applicability of this method for total selenium loadings because most selenium (at least two-thirds, and often more) is in the dissolved form. However, the sediment load estimates are used to estimate particulate loads of selenium from the Delta to the bay. The calculation appears at the end of this section.

No comments

- n/a -

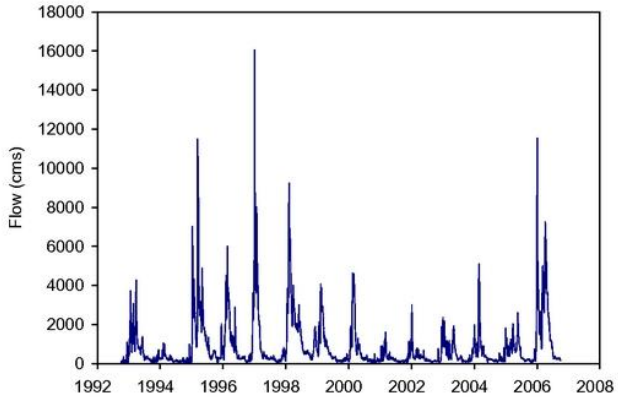

Figure 3-8 **Daily Delta outflow for water years 1992-2006 (Data source: IEP)**

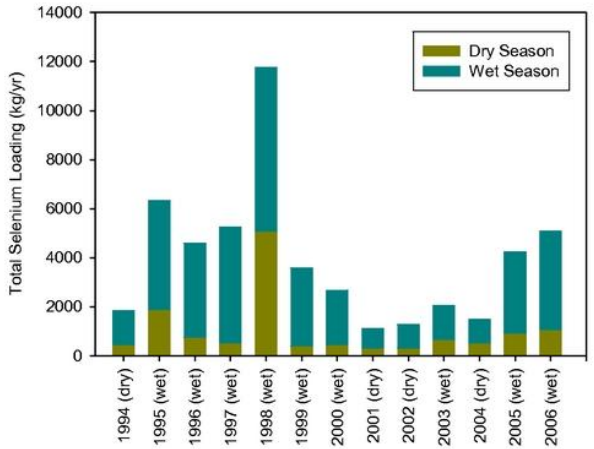

Figure 3-9 **Estimated wet and dry season total selenium loadings from Delta to the Bay by water year.**

No comments

- n/a -

Table 3-10
Estimated total and dissolved selenium loadings from the Delta

Year	Delta outflow m^3	Loadings (total) kg/yr	Loadings (dissolved) kg/yr
1994	7.42E+09	1,831	1,647
1995	4.11E+10	6,859	6,159
1996	2.56E+10	4,355	2,818
1997	4.23E+10	5,252	4,399
1998	5.36E+10	11,752	9,736
1999	2.78E+10	3,572	3,292
2000	2.24E+10	2,666	1,495
2001	8.56E+09	1,110	882
2002	1.13E+10	1,276	814
2003	1.73E+10	2,037	1,797
2004	1.84E+10	1,485	2,259
2005	1.90E+10	4,228	4,337
2006	5.40E+10	5,078	3,970
Average	2.68E+10	3,962	3,354

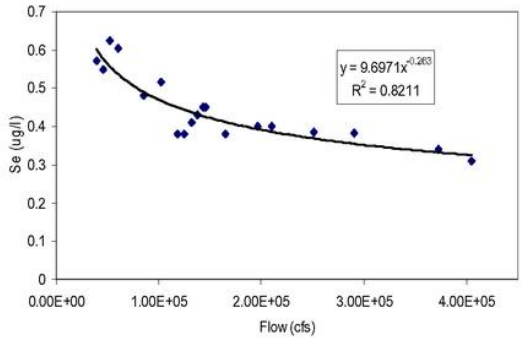

Figure 3-10 **Relationship between total selenium concentrations and flow at Mallard Island (Data source: L. McKee).**

3.4.2 Method 2: Loadings Based on Riverine Loads to the Delta, and Assumption of Delta Removal Constant

Dissolved selenium concentrations in the Sacramento River at Freeport sampled by Cutter and Cutter (2004) on biweekly or monthly bases indicated relatively small changes from 1984 to 2000 (Figure 3-11). Dissolved selenium concentrations in the Sacramento River (at

No comments

- n/a -

Freeport) range between 0.01-0.13 µg/L, with an average of 0.07 ± 0.02 µg/L for the period of 1999-2000. Dissolved selenium concentrations in the San Joaquin River at Vernalis may be 10 times higher. Concentrations for the San Joaquin River at Vernalis range between 0.14 - 4.69 µg/L for entire period of record. A significant decrease in selenium concentrations was observed for 1999-2000 compared to the 1980s sampling. Mean dissolved selenium concentration for the period of 1999-2000 is 0.68 ± 0.20 µg/L.

Concentrations during 1999-2000 show some variations both in the Sacramento and San Joaquin River (Figure 3-12). For the Sacramento River, higher concentrations were observed for the months between April to July. For the San Joaquin River, no clear seasonal pattern was observed. Concentrations in relation to flow are shown in Figure 3-13. For the Sacramento River, no clear relationship between flow and concentrations was observed for the recent years, consistent with findings in Cutter and Cutter (2004). Cutter and Cutter (2004) reported a poor correlation between river discharge and any dissolved selenium forms for the Sacramento River. For San Joaquin River, a negative relationship between concentrations and flow was observed, possibly due to the dilution of selenium discharge by natural flow.

For the Sacramento River, due to the weak relationship between dissolved selenium concentration and flow, monthly concentrations were used to calculate the daily loadings. For the San Joaquin River, the flow and concentration relationship derived was used to estimate daily concentrations based on flow. The daily loading was then estimated based on daily flow and estimated daily concentration. Daily flow for the Sacramento River at Freeport (USGS 11447650) and the San Joaquin River at Vernalis (USGS 11302500) were obtained from the USGS website (http://waterdata.usgs.gov/nwis/dv/?referred_module=sw). The estimated daily loadings were summed to calculate the seasonal loadings. The wet season was defined as Oct 1st to Apr. 30th and the dry season was defined as May 1st to Sep 30th (Tetra Tech, 2006).

No comments

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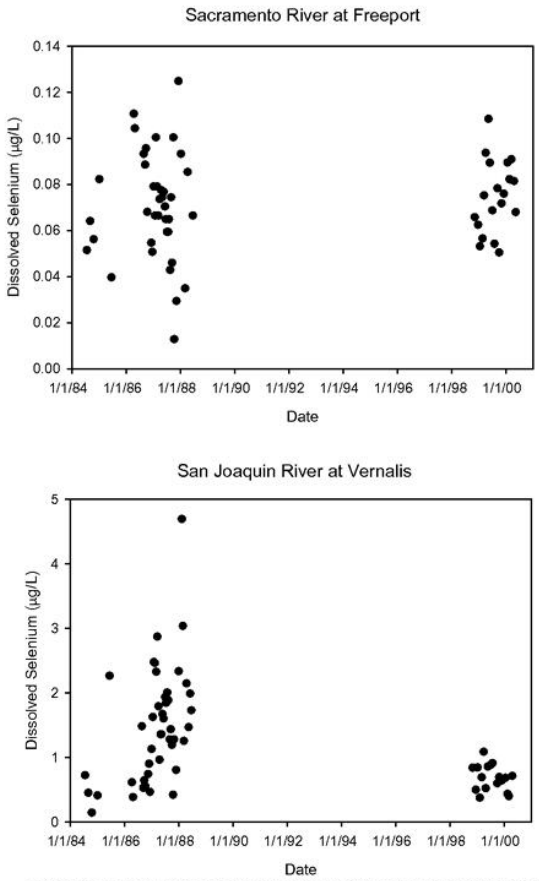

Figure 3-11 **Dissolved selenium concentrations in Sacramento River at Freeport and San Joaquin River at Vernalis during 1984-1988 and 1998-2000, sampled by Cutter and Cutter (2004).**

No comments

- n/a -

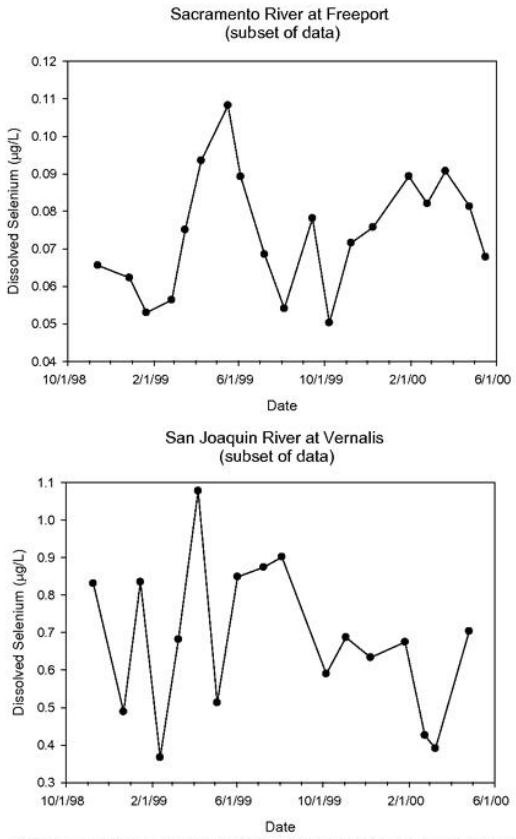

Figure 3-12 **Dissolved selenium concentrations at Sacramento River at Freeport and San Joaquin River at Vernalis during 1998-2000, sampled by Cutter and Cutter (2004).**

No comments

- n/a -

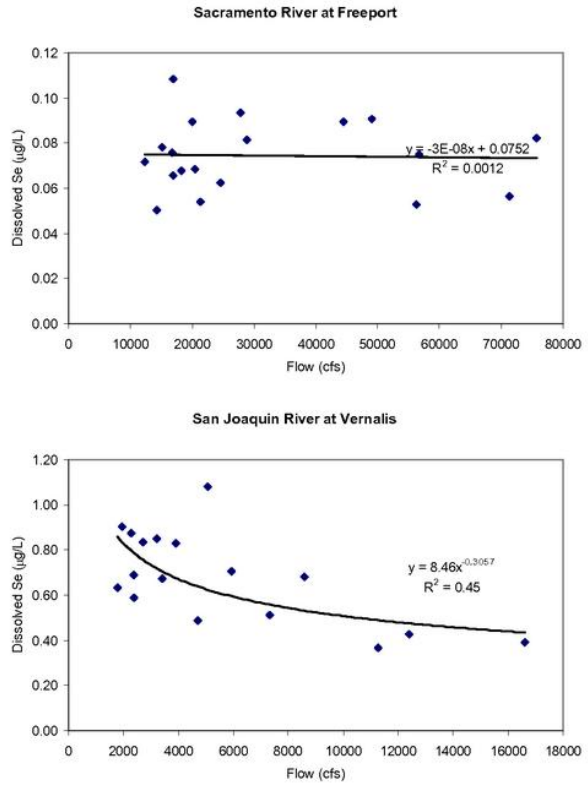

Figure 3-13 **Relationship between dissolved selenium concentrations and daily flow for Sacramento River at Freeport and San Joaquin River at Vernalis for the period of 1998-2000 (data source: Cutter and Cutter, 2004). Note that dissolved selenium concentrations show no correlation with flow rate for the Sacramento River.**

The estimated annual dissolved selenium loadings range between 703 – 2,693 kg/yr for the Sacramento River at Freeport and 867 – 4,710 kg/yr for the San Joaquin River at Vernalis. Estimated dry season loadings range between 234 – 1,074 kg/yr for the Sacramento River (at Freeport) and 261-2,097 kg/yr for the San Joaquin River (at Vernalis). Estimated wet season loadings range between 417- 1,748 kg/yr for Sacramento River and 552- 3,048 kg/yr for San

No comments

- n/a -

Joaquin River. On average, dry season loadings are generally lower and represent 58% and 60% of the wet season loadings for the Sacramento River (at Freeport) and the San Joaquin River (at Vernalis), with only one exception (San Joaquin River in 1995).

Estimated annual dissolved selenium loadings vary with water years (Figure 3-14). Annual loadings can be as high as 2,600-2,700 kg/yr during wet years for the Sacramento River (at Freeport) and approximately 750 – 1,000 kg/yr during dry years. Annual loadings for the San Joaquin River (at Vernalis) also vary with hydrological conditions. Annual loadings can be greater than 4,000 kg/yr during wet years and less than 1,000 kg/yr during dry years. Overall, average dissolved selenium loadings are higher for the San Joaquin River (at Vernalis) than the Sacramento River (at Freeport) (2,380 kg/yr vs. 1,634 kg/yr during 1990-2007).

Total selenium concentrations were also measured by the SWAMP program at San Joaquin River at Vernalis (Airport Way) on a weekly basis by Central Valley Water Quality Control Board(http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/). The observed total selenium concentrations were higher during the 1980s and early 1990s compared to recent years (Figure 3-15). Dissolved selenium concentrations for the same period measured by Cutter and Cutter (2004) agree relatively well with the total selenium concentrations observed in the SWAMP study but were slightly lower (Figure 3-16). This is to be expected as dissolved selenium usually accounts for 80-95% of total selenium measured. The observed decreases of selenium concentration at Vernalis most likely resulted from the implementation of the Grassland Bypass Project in 1996, which has led to a 60% decrease in selenium loads from the Grassland Drainage Area from pre-project conditions (www.sfei.org/grassland/reports/). However, the magnitudes of the decrease were more significant just below the Grassland Bypass Project area (at Crows Landing). With transport downstream, the change in concentration was smaller, likely due to inflow from other tributaries (Figure 3-17). Concentrations are generally lower during the wet years (1996 and 2006) and a negative correlation between flow and concentrations was noted (Figure 3-18). The weekly total selenium concentrations measured by SWAMP were extrapolated to daily concentrations for the week and multiplied by daily flow to estimate daily total selenium loadings for the San Joaquin River. Estimated daily loadings were summed up to calculate seasonal and annual loadings (Figure 3-19). Estimated annual loadings for total selenium based on SWAMP dataset are generally comparable to although slightly higher than loadings of dissolved selenium estimated from the Cutter and Cutter (2004) data (Figure 3-20) except for water years 1998 and 2006, when larger discrepancies between the two methods were observed.

No comments

- n/a -

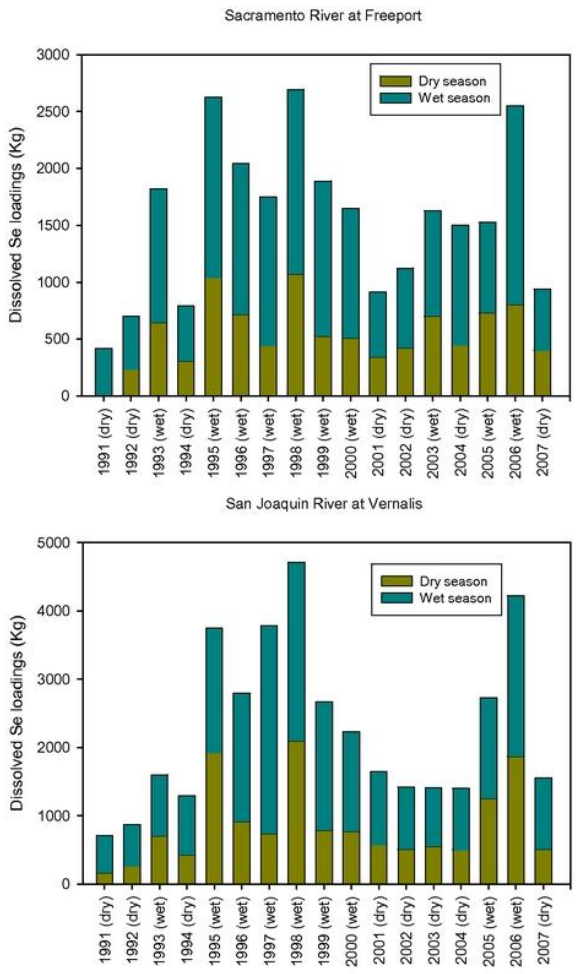

Figure 3-14 **Dry and wet season dissolved selenium loadings at Sacramento River at Freeport and San Joaquin River at Vernalis for 1991-2007.**

No comments

- n/a -

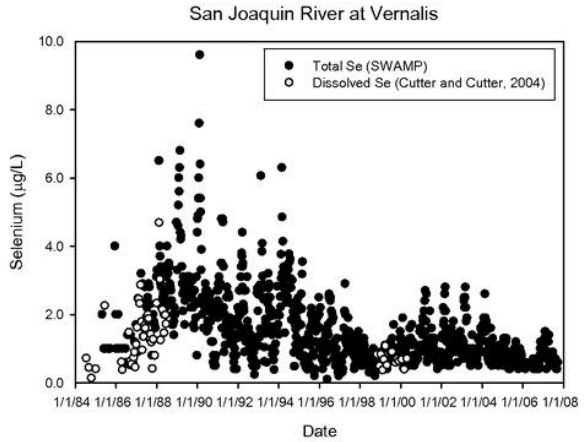

Figure 3-15 **Dissolved selenium concentrations sampled by Cutter and Cutter (2004) at San Joaquin River at Vernalis compared to total selenium concentrations observed in SWAMP study.**

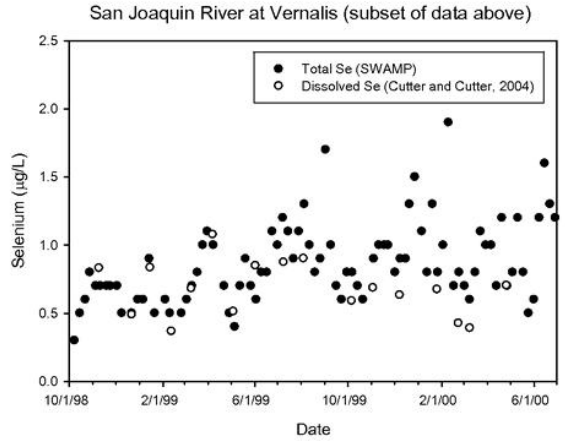

Figure 3-16 **A subset of dissolved selenium concentrations sampled by Cutter and Cutter (2004) compared to total selenium concentrations from SWAMP.**

No comments

- n/a -

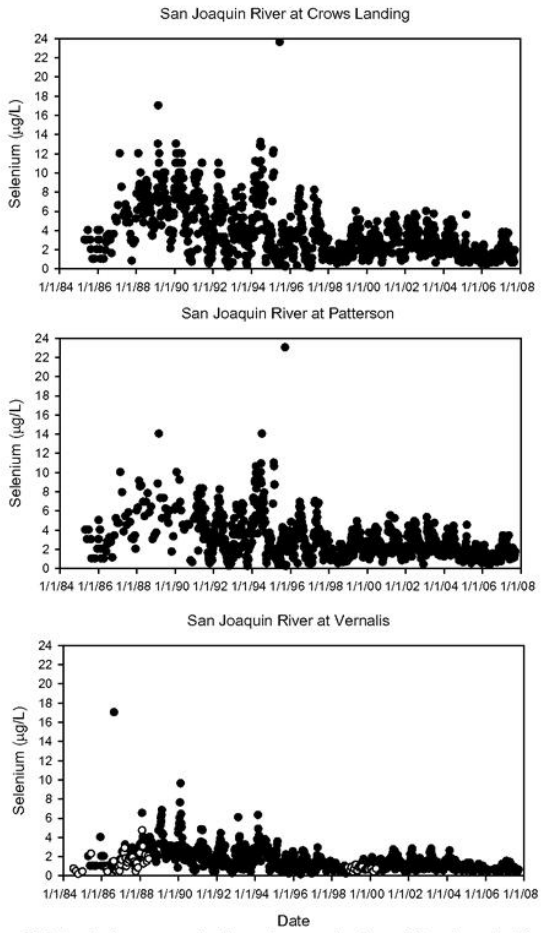

Figure 3-17 **Total selenium concentrations along main stem of San Joaquin River at Crows Landing (below grassland bypass project), at Patterson, and at Vernalis (Data Source: Central Valley RWQCB)**

No comments

- n/a -

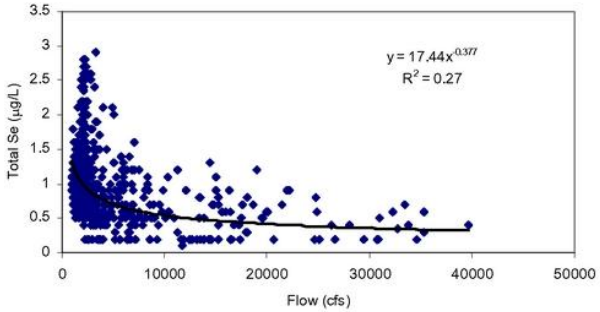

Figure 3-18 **Relationship between total selenium and flow at San Joaquin River at Vernalis (Data source: Central Valley Regional Water Quality Control Board SWAMP study and USGS).**

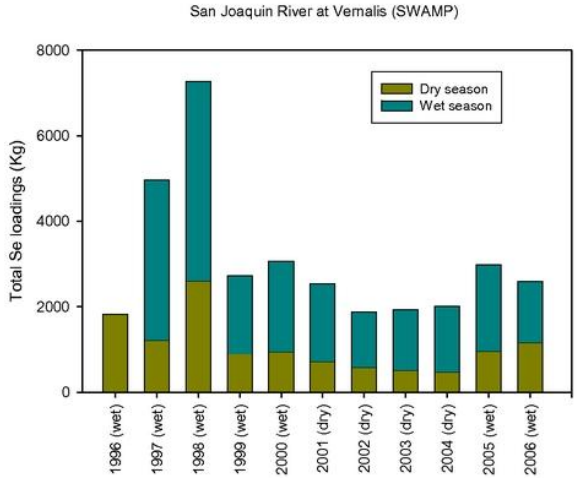

Figure 3-19 **Dry and wet season total selenium loadings at San Joaquin River at Vernalis, estimated from concentrations from SWAMP study.**

No comments

- n/a -

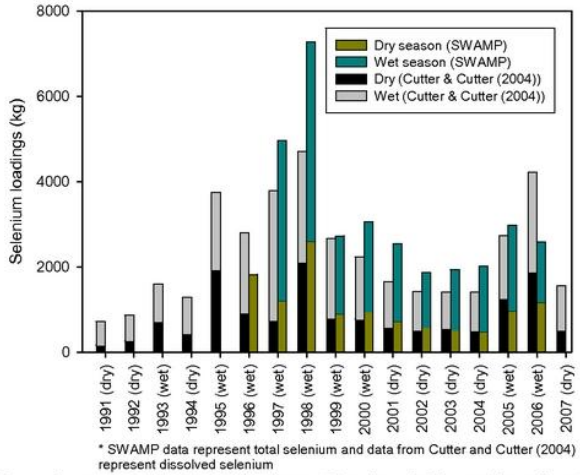

Figure 3-20 **Comparison of selenium loadings at San Joaquin River at Vernalis estimated from Cutter and Cutter (2004) data and data from SWAMP study.**

Biogeochemical processes in the Delta could potentially serve as a mechanism to remove high selenium concentrations originated from the San Joaquin River. As shown in Figure 3-21, during two low flow sampling events, dissolved selenium concentrations were high in close proximity to the San Joaquin River and decrease through the Delta. Dissolved selenium concentrations at the head of estuary were much lower than the concentrations observed close to the river.

No comments

- n/a -

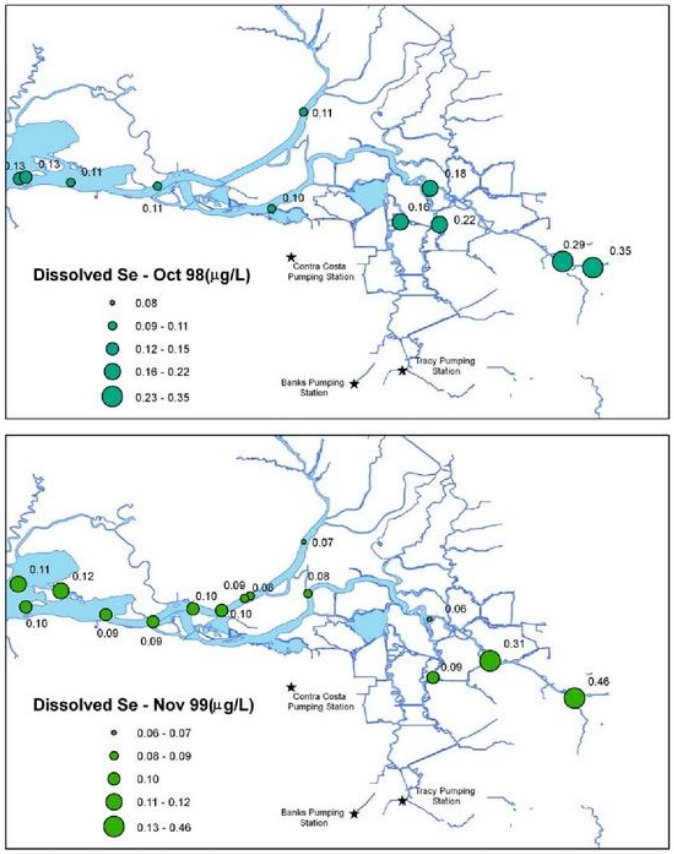

Figure 3-21 **Dissolved selenium concentrations at various locations of the Delta and North Bay in October 1998 (NDOI = 4.27×10^{10} L/d) and November 1999 (NDOI = 1.07×10^{10} L/d) sampling (Cutter and Cutter, 2004).**

Meseck (2002) fitted sine wave equations to selenium data from the Sacramento and San Joaquin Rivers, and used the fitted functions to estimate riverine loads. Based on samples collected during fall 1998 and summer 2000, selenium concentrations at Vernalis are reduced by 60-80% after being transported through Delta into the estuary at Antioch.

No comments

- n/a -

Therefore, Meseck (2002) applied a "Delta removal" constant of 60% to predict actual input of selenium at Antioch from the San Joaquin River.

Using the approach described by Meseck (2002), if a removal constant of 60% was applied to the San Joaquin River inputs, resulting dissolved selenium loading based on estimated river loadings varies between 1,005- 4,578 kg/yr (Figure 3-22). The estimated loadings were compared to Method 1, above, for each year. The percent absolute difference between the two methods for each individual year ranges between 6.3-51.9% except for 1998, an unusually wet year. For 1998, previous method estimated a significantly higher loading of 9,736 kg/yr compared to 4,578 kg/yr using the second approach.

For this method, an average load of 2,493 kg/yr for 1991-2007 from Delta to the Bay was estimated. Average load at Sacramento River at Freeport is 1,577 kg/yr. Average load at San Joaquin River at Vernalis is 2,289 kg/yr.

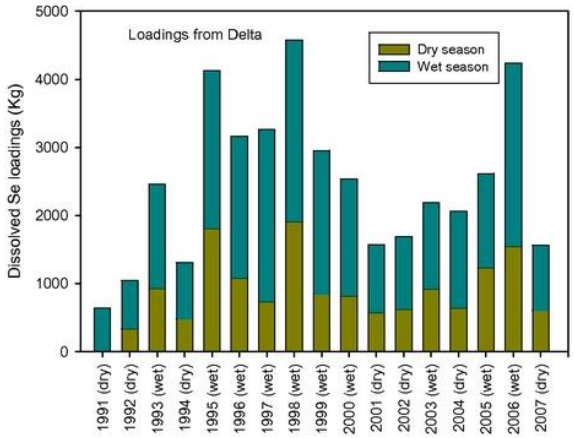

Figure 3-22 **Estimated selenium loadings from the Delta to the bay as a result of inputs from Sacramento River at Freeport and San Joaquin River at Vernalis, assuming a "Delta Removal Constant" of 0.60.**

Both Methods 1 and 2 have limitations in estimating selenium loads from the Delta. The previous method based on RMP monitoring dataset at BG20 and BG30, has the potential issue of overestimating loads during dry season due to tidal influence. The second method, through applying a "Delta removal constant" cannot account for the varying impacts of Delta on the selenium inputs to the Bay. As discussed next, an alternative is to consider outflow data from the Delta through aqueducts, and the estimated selenium concentrations in these outflows, to evaluate the net loads delivered to bay.

No comments

- n/a -

3.4.3 Method 3. Calculate selenium loadings to bay by accounting for export through aqueducts

Average export of water from Delta through aqueducts was 6.82 ± 0.90 × 109 m3/yr during 1994-2006. Flow at pumping plants is mostly dominated by Sacramento River water. During some periods, San Joaquin River water can also dominate. Assuming equal volume mixing of the two rivers, the selenium concentration in pumping plants is approximately 0.4 µg/L (0.07 µg/L at Sacramento River at Freeport and 0.68 µg/L at San Joaquin River at Vernalis). Assuming a concentration range of 0.1 µg/L (low end, when Sacramento River dominates) to 0.4 µg/L, the export of selenium through aqueducts is likely to range between 700- 2,700 kg/yr. For critically dry years during 1986-1998, Presser and Luoma (2006) estimated an aqueduct export of 1,557 kg/6 months, a value comparable to the higher end of this estimated range.

A more detailed computation of the riverine contribution to exports can also be performed. The contribution of the Sacramento and San Joaquin Rivers or other relatively minor inflows to State Water Project (SWP) pumping plant at Banks was previously modeled using a hydrodynamic model (Delta Simulation Model, Version 2, or DSM2) by the California Department of Water Resources (DWR). Results from DSM2 simulations indicated that during dry years or in the dry season, Sacramento River is the major source of flow at Banks pumping plant (DWR 2004; Figure 3-23). During wet years or in wet seasons, San Joaquin River can contribute a large portion of the flow. Results from these DSM2 fingerprinting simulations were used to estimate selenium concentrations at the pumping plant based on concentrations from the Sacramento and San Joaquin Rivers, and selenium loads exported through aqueducts.

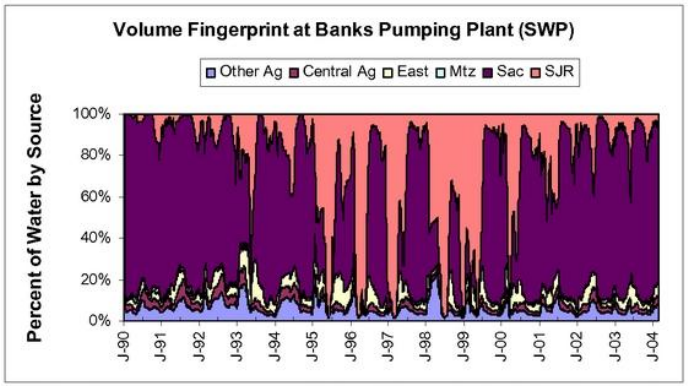

Figure 3-23 **Long-term percentage contribution of flows at the Banks Pumping Plant (data provided by DWR; Tetra Tech, 2006).**

No comments

- n/a -

Concentrations at pumping plants were estimated as:

$$Cexp = (Qsac * Csac + Qsjr * Csjr) / Qexp \quad (1)$$

Where Cexp is daily concentration in the aqueduct, Qsac is export flow originating from the Sacramento River, Csac is daily selenium concentration at the Sacramento River at Freeport (estimated from monthly concentrations from Cutter and Cutter, 2004), Qsjr is export flow originating from the San Joaquin River, Csjr is daily selenium concentration at the San Joaquin River (estimated previously based on relationship between flow and concentrations using data from Cutter and Cutter, 2004), and Qexp is total flow through the aqueducts (includes the Central Valley Project, State Water Project, Contra Costa Water District, and North Bay Aqueduct). We made the assumption that the flow composition from the two rivers at Banks pumping plant is the same as the other pumping plants.

Estimated concentrations in the aqueduct were multiplied by the export flow (obtained from DAYFLOW) to calculate selenium loads lost from the Delta through aqueducts. The seasonal loads were calculated by adding the daily loads. Estimated loads exported through aqueducts for the years between 1993-2003 range between 883 – 1,985 kg/yr (Figure 3-24). Dry season loads are comparable to wet season loads, largely because aqueduct exports are less variable than riverine flows over the course of the year. For a few years dry season loads exceed wet season loads (e.g. 1995, 1998). The range of annual exported loads using this approach is similar to what was determined previously, i.e., 700-2,700 kg/yr.

Contribution of loads to aqueducts from the two rivers was also estimated based on modeled contribution of flow from the two rivers and concentrations at each river. The results indicated that the San Joaquin River is the major, but not the only, source of selenium to the aqueducts. Estimated selenium loads from the Sacramento River are significantly lower ranging between 193- 486 kg/yr for 1993-2003, compared to 600-1,780 kg/yr from the San Joaquin River. Although the Sacramento River dominates in terms of flow in the aqueducts most of the time, due to higher selenium concentrations, San Joaquin River contributes more selenium loads to aqueducts.

Assuming other losses are small, loads from the Delta to the bay can be estimated as the difference between total loads from the two rivers and the export through aqueducts. Estimated loads from the Delta to the bay show large variations among the years (1993-2003; Figure 3-25). Loads for dry years are approximately 1,000 kg/yr (e.g. 1994, 2001). Loads in wet years can be much larger (nearly 6,000 kg/yr in 1998). Contribution of loads from the two rivers to the Delta outflow was estimated as the difference between loads from the rivers and the export through aqueducts. Estimated loads from the two rivers to the Delta are generally comparable. Annual selenium loads from the San Joaquin River are normally below 1,000 kg/yr. However during wet years larger loads can originate from the San Joaquin River (exceeding loads from the Sacramento River). Dry season loads from San Joaquin River to the Bay normally range between 200-300 kg. However for a few wet years, dry season loads from the San Joaquin River are approximately 1,000 kg. An average dissolved selenium load of 2,696 kg/yr from the Delta to the bay for 1993-2003 was estimated using this method.

No comments

- n/a -

Observed selenium concentrations at Delta-Mendota Canal near Tracy Headworks (Milepost 3.50) obtained from U.S. Bureau of Reclamation are higher than the estimated selenium concentrations in the aqueducts using the flow-weighted method described above (Figure 3-23). Note the observed concentration at Delta-Mendota Canal has a high detection limit of 0.4 µg/L. Estimated loads in Delta-Mendota Canal near Tracy Headworks by Bureau of Reclamation are at 792-1279 kg/yr for water year 2002-2006. Given approximately equal export volume in the CVP and SWP, exported loads in aqueducts can range between 1580-2560 kg/yr. The range of loads is at the higher end of our estimates of 700- 2700 kg/yr.

Selenium concentration data from the State Water Project (SWP) aqueducts have been reported using relatively high detection limits. The SWP publishes data from monthly grab samples at the Banks Pumping Plant (http://wwwomwq.water.ca.gov/GrabSamplePage/GrabSampleTables/index.cfm) with a detection limit of 0.001 mg/L or 1 µg/L, with most samples being below detection limits. These data were not used in the calculations.

3.4.4 Summary of Delta load calculations

Although loads from the Central Valley are a major source of selenium to NSFB, the estimation of these loads is not straightforward because of tidal influences at the edge of the Delta and the bay, and because of complexities caused by mixing and water export from the Delta. The load estimates are more difficult because of the limited data in the Delta and the aqueducts.

Our approach in this section was to apply three different methods to compute loads, and to compare these values. Note that for the second and third methods, data was available to compute only the dissolved selenium loads and not the total load.

- The first approach used average concentration of two RMP stations in the Delta and multiplies it by the net tidally corrected Delta outflow. This resulted in an annual average load estimate of 3,962 kg/yr of **total selenium** from the Delta to the NSFB (1994-2006).
- The second approach used selenium loadings from the Sacramento and the San Joaquin Rivers separately based on data from Cutter and Cutter (2004) and applied a "Delta removal constant" similar to Meseck (2002) to account for the possible selenium loss in the Delta. These concentrations were reported only as dissolved selenium, not total selenium. This resulted in an annual average load estimate of 2,493 kg/yr of **dissolved selenium** (1993-2003).
- The third approach was independent of the prior two: the loadings from Central Valley to the bay were estimated as the difference between inputs from the two rivers minus the export through aqueducts, and assuming minimal loss processes in the Delta. This resulted in an annual average load estimate of 2,696 kg/yr of **dissolved selenium** (1993 to 2003).

Given the simplifications and assumptions employed in these load calculations, and given that some loads are in terms of dissolved selenium, the range of annual averages is small, and the methods are supportive of one another. Because the data used in the analysis was most abundant for Method 1, and both total and dissolved data were available, and because the flow volumes used in load calculation are tidally corrected, it is recommended that this

No comments

- n/a -

method be used for describing Delta loads, resulting in an average Delta to bay export of 3,962 kg/yr.

Particulate selenium loads from the Delta to the Bay were estimated based on previously estimated TSS loads by Leatherbarrow et al. (2005a) or McKee et al. (2006) at Mallard Island. McKee et al. (2006) based on continuous monitoring data of SSC at Mallard Island to estimate TSS loads for water year 1995-2003. Reported TSS loads at Mallard Island vary greatly with water years ranging from 0.26 ± 0.08 Mt/yr (2001) to 2.6 ± 0.8 Mt/yr (1995). Particulate selenium concentrations average 0.62 ± 0.21 µg/g (n =5) at the Sacramento River and 0.66 ± 0.42 µg/g (n =5) at the San Joaquin River (Doblin et al. 2006). Therefore an average concentration of 0.64 µg/g was used in the calculation for all years. As a result, estimated particulate selenium loads from Delta range between 151 – 1,510 kg/yr for 1995-2003 (mean: 698 kg/yr). The estimated loads are higher than those estimated by Abu-Saba and Ogle (2005) for November 1997 to November 1999 (47-686 kg/yr).

No comments

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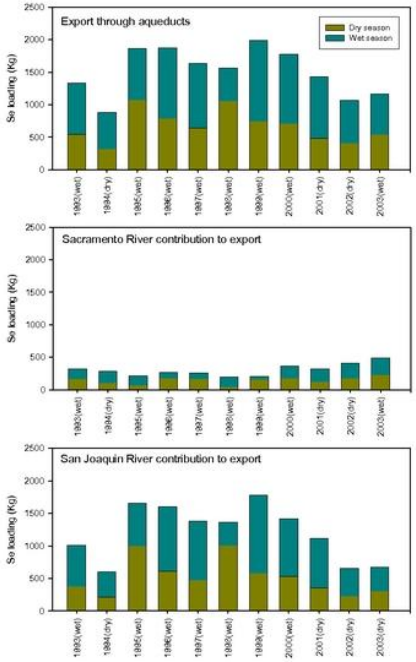

Figure 3-24 **Estimated selenium loadings through the aqueducts and contributions from the Sacramento River and the San Joaquin River.**

No comments

- n/a -

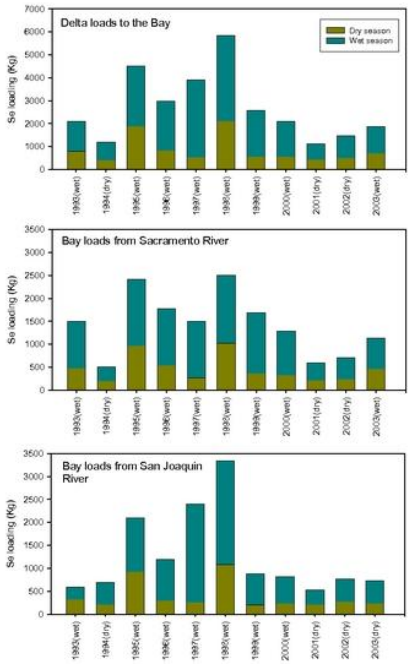

Figure 3-25 **Estimated selenium loadings from the Delta to the Bay as the difference between loads from the Rivers and export through aqueducts, as well as contributions attributed to the Sacramento River and the San Joaquin Rivers individually.**

No comments

- n/a -

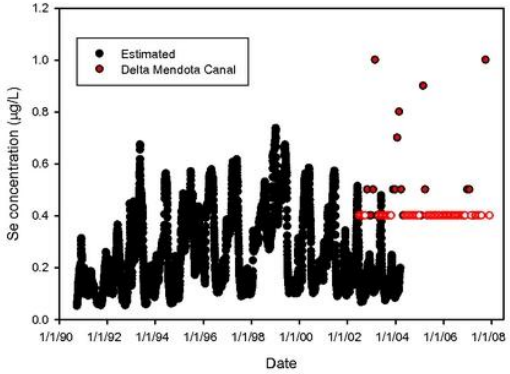

Figure 3-26 **Estimated selenium concentrations in the aqueducts using flow weighted method compared to observed concentrations in Delta Mendota Canal near Tracy Headworks (MP 3.50) (Open circles indicates values below detection limit of 0.4 µg/L).**

3.5. MUNICIPAL AND INDUSTRIAL WASTEWATER DISCHARGERS

Currently there are a total of 24 Publicly Owned Treatment Works (POTWs) located in the North Bay (Figure 3-27). Most of these facilities receive secondary treatment although a few incorporate advanced treatment (i.e., City of American Canyon, Napa Sanitation District). Dry weather flows from these facilities range from <1 to 120 mgd.

Flow at five largest municipal dischargers in the North Bay is shown in Figure 3-28. Flow at municipal discharges generally follows a seasonal pattern of higher concentration during the wet season, most likely due to storm water runoff. Concentrations in effluents of municipal dischargers generally are below 1 µg/L, with many samples below detection limit (Figure 3-29).

Effluent total selenium concentrations at a monthly interval are reported for these facilities. Total selenium concentrations in the effluents are generally near 1 µg/L (Table 3-11). Effluent concentrations at two facilities with the largest discharges (i.e., East Bay Municipal Utility District, EBMUD and Central Contra Costa Sanitation District, CCCSD) average 0.34 ± 0.19 µg/L and 0.34 ± 0.50 µg/L. Reported concentrations compared well to the dissolves selenium concentrations observed by Cutter and San Diego-McGlone (1990) during 1987-1988 sampling (24-hour composite sample at monthly intervals; CCCSD: 0.53 ± 0.11 µg/L, EBMUD: 0.37 ± 0.10 µg/L). No relationship between flow and concentrations in the effluent were observed. Therefore, no flow-concentration correlation was used in the load estimates.

No comments

- n/a -

Two methods were used in calculating daily loadings from POTWs. In the first method, the overall average daily maximum concentration was multiplied by overall average daily flow. In the second method, daily loadings were estimated based on flow and reported concentrations for all the available dates and an overall average of daily loadings was calculated. For concentrations reported as below the detection limit, concentrations were assumed to be half of the detection limit. Some non-detect data were reported with very high detection limits (e.g. 5 µg/L); in these cases data were disregarded. Estimated daily loadings show large temporal variations (Figure 3-30) related to the flow variability.

Estimated annual selenium loadings from POTWs in the North Bay are 255.3-255.8 kg/yr (Table 3-12). More detailed information on flows and concentrations, as well as identification of individual ports used in load estimates is presented in Appendix A5. The loadings are roughly half of values previously estimated by Cutter and San Diego-McGlone (1990) for the entire bay (1.08 kg/day or 394 kg/yr).

Effluents from municipal dischargers are dominated by selenate (60%), followed by selenite (25%) and organic and elemental selenium (15%; Cutter and San Diego-McGlone, 1990).

The second method used for POTWs was also used to calculate loadings from the industrial facilities in the North Bay. Loadings from industrial facilities are minor compared to other sources (Table 3-13).

No comments

- n/a -

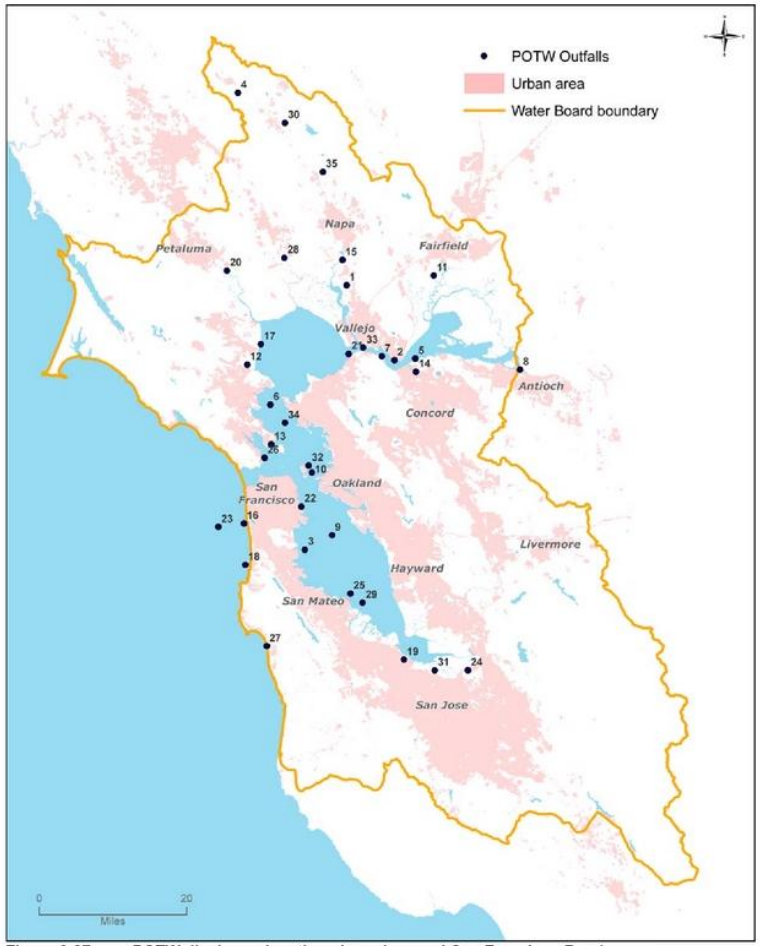

Figure 3-27 **POTW discharge locations in and around San Francisco Bay (source: SFBRWQCB, Basin Plan).**

No comments

- n/a -

Table 3-11
Summary statistics of daily maximum effluent concentrations at the municipal dischargers

Municipal dischargers	Outfall Location (Fig. 3-27)	Mean[1]	S.D.	Min	Max	Count
American Canyon (E-001-S)	1	1.16	0.59	0.2	2	32
City of Benicia	2	0.85	0.51	<0.3	5	98
City of Calistoga (E-001)	4	0.511	0.54	0.25	2.5	19
City of Saint Helena (E-001)[2]	30	<0.5				
Central Contra Costa	5	0.34	0.50	<0.05	4	99
Central Marin Sanitation Agency	6	0.81	0.68	0.17	6.4	99
Delta Diablo	8	4.07	7.54	<1	37	104
EBMUD	10	0.34	0.19	<0.2	1.6	294
Fairfield-Suisun Sewer District	11	0.75	0.38	0	2	95
Las Gallinas Valley SD Permit	12	0.95	0.17	0.5	0.97	15
Marin Co. S.D. no. 5 (Paradise Cove)[2]	13	0.73				
Marin Co. S.D. no. 5 (Tiburon)	13	1.93	1.40	0.5	6	47
Mount View Sanitary District	14	0.67	0.60	<0.02	5	38
Napa Sanitation District (dry)	15	0.57	0.21	<0.5	1	13
Napa Sanitation District (wet)	15	0.27	0.25	0	<1	26
Novato S.D (Ignacio Dry) (Novato Wet)	17	0.475 0.833	0.05 0.32	0.4 0.4	0.5 1	4 4
City of Petaluma	20	0.65	0.23	0.35	1.4	60
Cities of Pinole-Hercules	21	0.91	0.66	<0.1	4	47
Rodeo Sanitary District	21	0.80	0.61	<0.1	3	30
Sausalito-Marin Sanitary District	26	2.46	0.91	0.5	17.5	85
Sewerage Agency of South Marin	13	1.39	2.01	0.15	12	133
Sonoma Valley County S.D.	28	<5.00	0.00	<5	<5	27
US Navy Treasure Island Permit	32	0.48	0.17	<0.25	8.96	46
Vallejo San & Flood Control District (Carquinez deep)	33	0.96	0.52	<0.7	10.6	79
West County/Richmond Permit	34	1.73	0.97	0.25	9	60

1. For values below detection limit, half of the detection limit was used in mean calculation.
2. Concentrations taken from permits

No comments

- n/a -

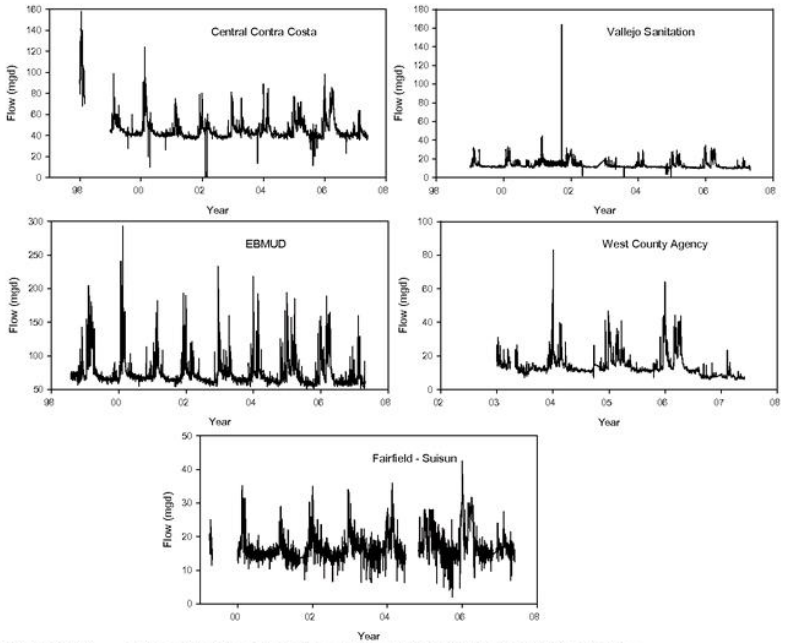

Figure 3-28 **Daily effluent average flow at five largest dischargers in North Bay.**

No comments

- n/a -

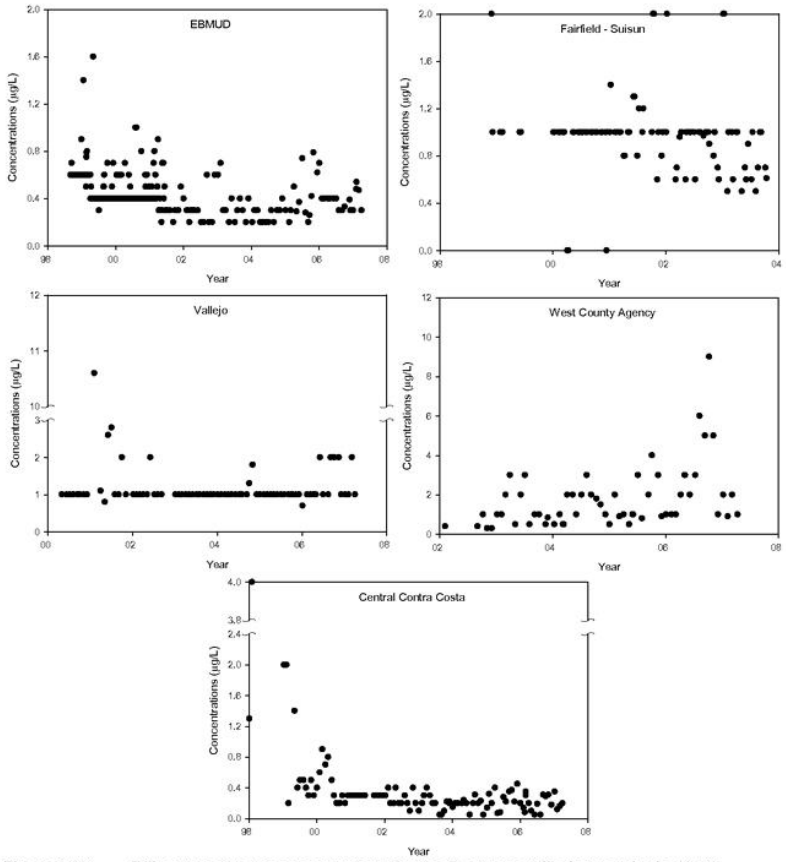

Figure 3-29 **Effluent maximum concentrations for the five largest dischargers in the North Bay.**

No comments

- n/a -

Table 3-12
Estimated total selenium loadings from POTWs in the North Bay

POTW Facility Name	Outfall Location	Average Flow (mgd)	Estimated Se Loadings[1] (kg/yr)	Estimated Se Loadings[2] (kg/yr)
City of American Canyon (E-001 S) (E-003 S)	1	0.89 0.99	1.42 1.46	1.53 1.43
City of Benicia	2	3.0	3.5	3.4
City of Calistoga[3] (E-001 dry) (E-002 wet)	4	0.87 0.65	0.60 0.46	0.20
City of Saint Helena E-001[3]	30	1.11	0.38	
Central Contra Costa S.D.	5	45.8	21.8	15.0
Central Marin Sanitation A.G.	6	11.0	12.3	10.7
Contra Costa Co. S.D. no. 5 (Port Costa)	7	0.02	NA	NA
Delta Diablo	8	11.46	64.5	64.1
East Bay MUD	10	74.6	34.8	36.9
Fairfield Suisun Sewer Dist. (E-001 A) (E-004)	11	17.0 1.44	17.5 1.48	16.8 1.68
Las Gallinas Valley S.D. (E-001) (E-002)	12	3.75 1.44	2.48 0.95	4.0
Marin Co. S.D. no. 5 (Paradise Cove)		0.02	0.73	
Marin Co. S.D. no. 5 (Tiburon)	13	1.02	2.72	1.86
Mount View S.D.	14	2.0	2.3	1.5
Napa S.D. (Dry weather) (Wet weather)	15	3.8 13.98	1.49 2.60	2.94 10.34
Novato S.D. E-001 Ignacio Dry E-002 Novato Wet	17	4.01 2.23	2.63 2.57	2.90 3.19
City of Petaluma	20	7.6	6.88	8.3
Cities of Pinole & Hercules	21	3.2	4.0	4.2
Rodeo S.D.	21	0.8	0.9	0.9
Sausalito-Marin City S.D.	26	1.6	5.5	4.9
Sewerage Agency of South Marin	13	3.3	6.36	5.10
Sonoma Valley County S.D.	28	4.1	--	High DL (5 µg/L)[4]
U.S. Navy Treasure Island	32	0.5	0.4	0.25
Vallejo Sanitation & Flood Control (Carquinez deep) (Mare deep)	33	13.2 2.69	17.5 2.85	15.66 7.56
West County Agency WCA (E-001 DC)	34	14.1	33.7	30.7
Total		243.9	255.3	255.8

1 - Estimated based on overall average concentration and average daily flow
2 - Estimated based on flow and concentrations on all available dates
3.- Not included in total load estimates due to distance from the Bay.
4 - Reported concentrations below high detection limit of 5 µg/L and load not estimated.

No comments

- n/a -

Table 3-13
Estimated selenium loadings from industrial wastewater dischargers in the North Bay

Industrial Facilities	Daily loading (g/day)	Annual loading (kg/yr)
Dow Chemical	6.5	2.4
General Chemical	4.8	1.8
GWF (I)	1.05	0.4
GWF (V)	0.4	0.1
USS-Posco	31.0	11.3
Total	43.7	16.0

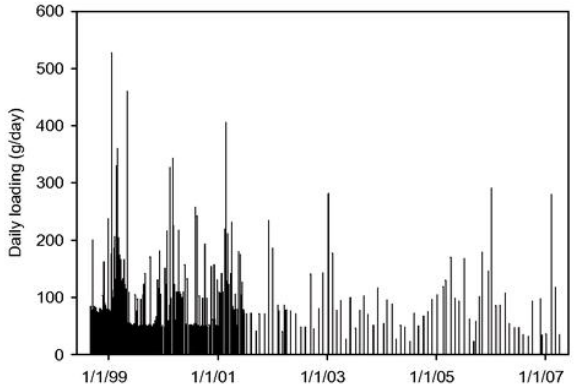

Figure 3-30 Estimated daily total selenium loadings from EBMUD.

3.6. PETROLEUM REFINERIES

Mean selenium concentrations at the refineries range between 11.9 – 27.7 µg/L (Table 3-14). Concentrations show relatively large variations over time (Figure 3-31). Daily flow measurement at the refineries indicates some seasonal high flows, probably due to storm water runoff (Figure 3-32). Concentrations generally show no correlation with flow (Figure 3-33).

For the five petroleum refineries located in the North Bay, daily loadings were estimated based on the continuous daily flow data and the reported effluent daily maximum concentrations on a weekly basis. Mean daily maximum concentrations for the refineries range between 12 – 28 µg/L. No relationship between concentrations and flow were observed. The annual loadings were calculated by summing the daily loadings. The

No comments

- n/a -

estimated total daily loading from these refineries is 1.47 kg/day or an average of 537 kg/yr during 1999-2007 (Table 3-15). Current loadings are significantly lower than the previous years (1,407 – 3,382 kg/yr in 1986 – 1992) following the improvement in waste water treatment practices at the refineries (Presser and Luoma, 2006).

To calculate seasonal loads, daily loads were calculated by multiplying daily flow with weekly concentration extrapolated to the week and then adding up for dry and wet season. Wet season was defined as Oct. 1st to Apr. 30th. The dry season was defined as May 1st to Sep. 30th. Estimated annual selenium loadings are relatively constant throughout the years (Figure 3-34). Average dry season loadings are generally 62-78% of the average wet season loadings at four of the refineries. Average dry season loadings at Tesoro are only 35% of the wet season loadings.

The effluents are dominated by selenate (56%) and organic selenide (30%), with selenite accounting for only 14% on average (compared to 64% in 1987-1988, Cutter and Cutter, 2004). The speciation in refineries is similar to that in municipal wastewater effluents.

Table 3-14
Summary statistics of daily maximum effluent concentrations at the refineries

Refineries	Median	Mean	Standard deviation	Min	Max	Count
Chevron	11.2	12.1	5.9	2.3	48.0	308
ConocoPhillips (at Rodeo)	14.0	15.5	8.5	1.0	49.0	448
Shell Martinez	27.0	27.7	9.4	4.0	82.0	266
Tesoro	11.0	11.9	5.1	1.0	41.0	367
Valero	26.1	26.6	7.4	8.0	50.0	447

Table 3-15
Estimated total selenium loadings from petroleum refineries in the North Bay

Refinery	Flow (mgd)	Mean daily loading[1] (kg/day)	Mean daily loading[2] (kg/day)	Annual loading[1] (kg/yr)	Annual loading[2] (kg/yr)
Chevron	7.1	0.31	0.33	112.6	120.7
Conoco Philips	2.3	0.16	0.16	57.9	58.0
Shell Martinez	5.8	0.61	0.59	224.1	214.9
Tesoro	4.1	0.19	0.19	70.2	69.3
Valero	2.0	0.20	0.20	71.9	75.1
Total	21.3	1.47	1.47	536.7	538

1 – Calculated as continuous daily flow times weekly concentrations extrapolated to the rest of the week
2 – Calculated based on daily flow and concentrations on sampling dates only

No comments

- n/a -

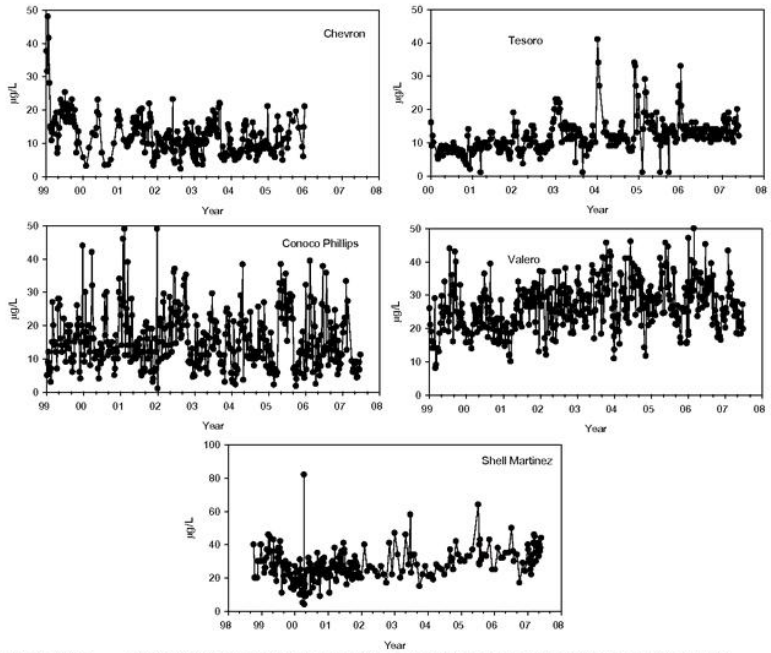

Figure 3-31 **Effluent daily maximum selenium concentrations for the refineries in the North Bay.**

No comments

- n/a -

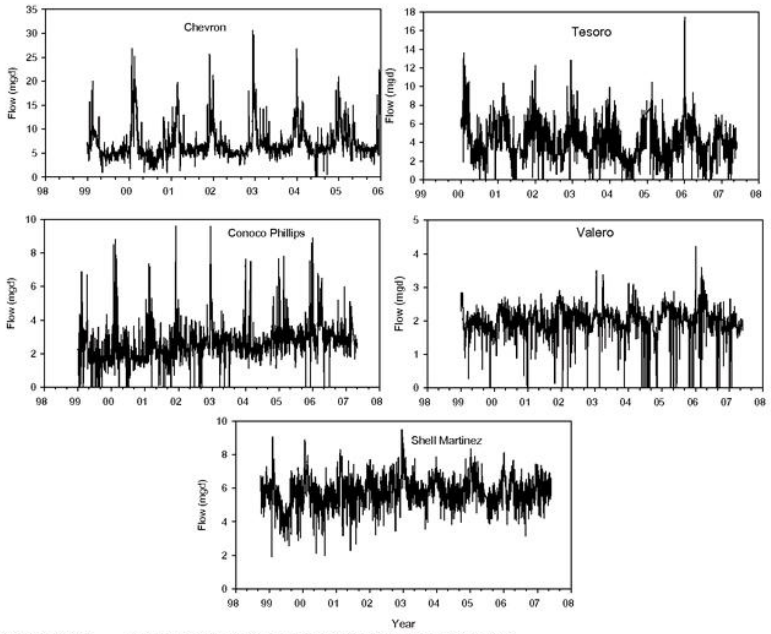

Figure 3-32 **Daily average effluent flow rate from the refineries.**

No comments

- n/a -

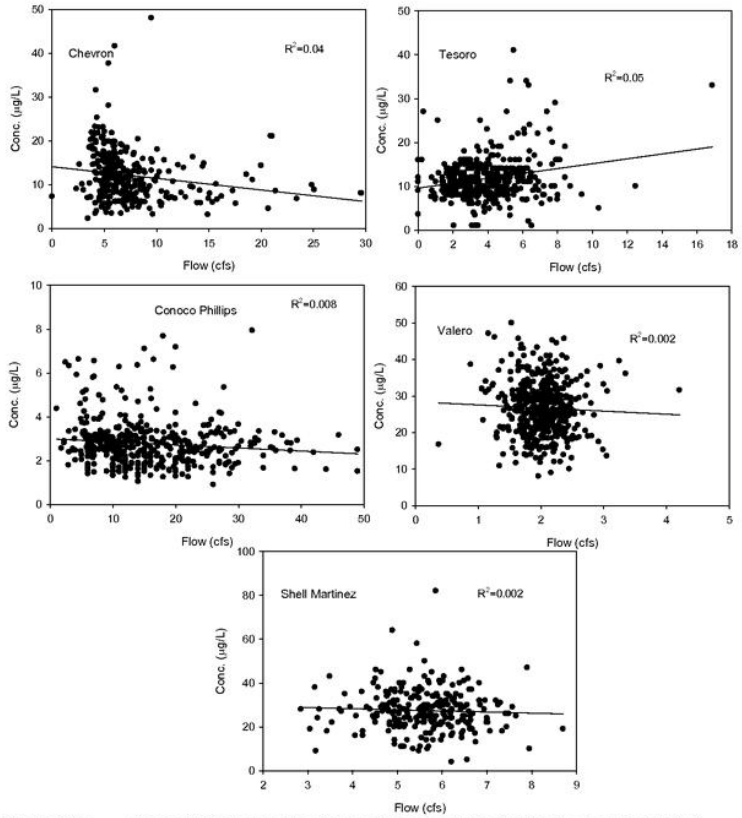

Figure 3-33 **Concentrations and flow for the refineries in the North Bay. No meaningful correlations were found; the regression lines in the plots are to illustrate the lack of a relationship between flows and concentrations.**

No comments

- n/a -

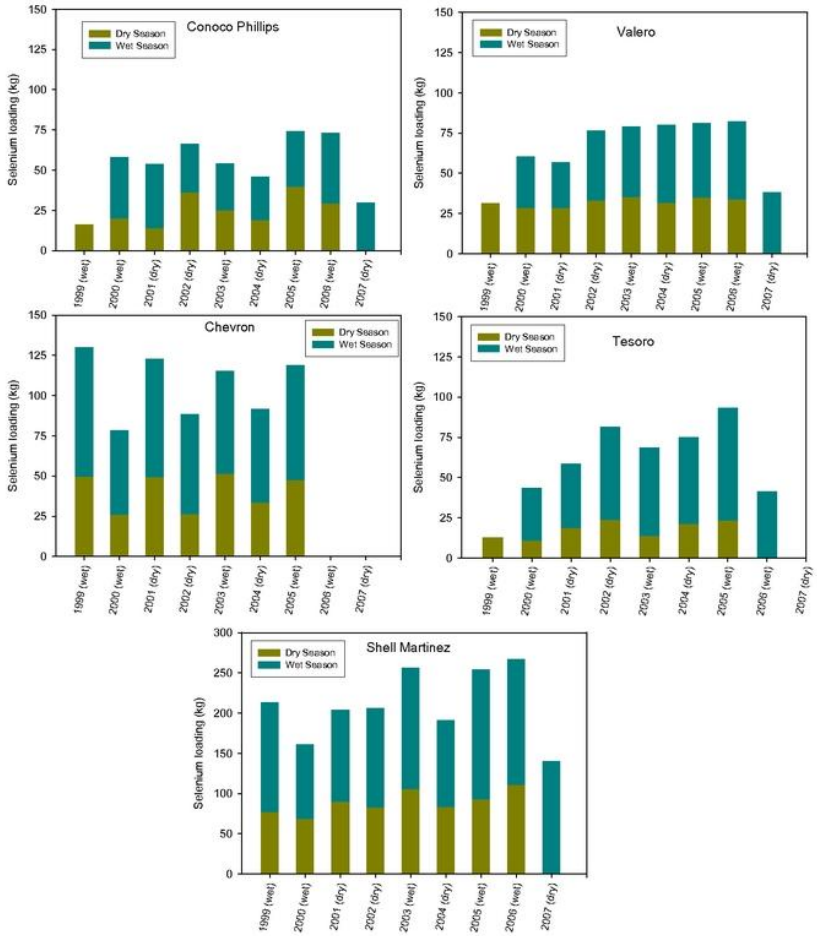

Figure 3-34 **Dry and wet season selenium loadings from refineries for the years of 1999-2007.**

No comments

- n/a -

3.7. INTERNAL SOURCES - SEDIMENT EROSION

Sediments in the North Bay represent a large reservoir of selenium (Abu-Saba and Ogle, 2005). A review of sediment processes in the San Francisco Bay indicated an active sediment mixing layer of 15 cm (Leatherbarrow et al. 2005b). Given the sediment mass for the upper 15 cm of the whole bay (1.4×10^{11} kg; Davis (2003), cited in Abu-Saba and Ogle, 2005) and mean selenium concentrations of 0.25µg/g, the selenium in the upper layer of sediments of North Bay is about 20,000 kg.[5]

Selenium in bottom sediments can be mobilized to the water column through resuspension, erosion, diffusion and bioturbation. Resuspension rates in the San Francisco Bay were found to be 2 to 5 times greater than the accumulation rates, indicating sediment is resuspended 2 to 5 times before settling (Leatherbarrow et al. 2005b). Previous studies indicated sediment residence time in the water column of 5 ± 3 days in San Pablo Bay. It was suggested that during summer low flow months, wind generated and tidal driven resuspension redistributes sediments to a wider area. Localized sediment erosion also occurs due to decreases in sediment supply from the surrounding watersheds. Net sediment erosion was found to occur both in the Suisun Bay and San Pablo Bay. For San Francisco Bay, the abundance of organisms has been found to potentially enhance mobilization of sediments to the water column. Diffusion of dissolved selenium from the sediment porewater to the water column has been found to be a small source, estimated at 18.2 kg/yr for the North Bay (Meseck, 2002). Direct biotic uptake of particulate selenium in bottom sediments by consumer organisms is another pathway of selenium mobilization, but this has not been quantified for the source analysis.

Selenium in sediments can also undergo a series of transformations (Meseck and Cutter, 2006). In deeper layers of sediment, selenate and selenite can be converted to elemental selenium due to microbial reduction. As a result, elemental selenium comprises a large portion of selenium in the sediments and the presence of elemental selenium in bay water can be an indicator of origin from bottom sediments. Organic selenide in surface sediment can also be oxidized to selenite and selenate or methylated by microbes.

Studies in San Pablo and Suisun Bay indicated that more erosion than burial is occurring in these two areas in the recent years (USGS 2001a, b). In Suisun Bay, net sediment erosion was 1-2 Mm^3/yr from 1887 to 1990 (USGS 2001a). During 1942 to 1990, Suisun Bay experienced a net loss of 61 Mm^3 of sediment, with a net loss of 1.27 Mm^3/yr at an erosion rate of 1.2 cm/m^2/yr. Erosion in San Pablo Bay is at a slower rate and only occurred after 1950s. San Pablo Bay lost approximately 7 Mm^3 of sediments between 1951 and 1983 at a rate of 0.22 Mm^3/yr (USGS 2001b). This net loss of sediments can be a potential source of selenium from sediments to the water column. Average selenium concentration in surface sediment is at 0.25 µg/g. Sediment loss of Suisun and San Pablo Bay is estimated to be around 1,100 M kg/yr (SFBRWQCB, 2004). This results in selenium loadings due to sediment erosion of 275 kg/yr.

[5] Assuming North and Central Bay area of 434 km^2 and 214 km^2, over the total area of 1133 km^2 for the whole Bay (Tsai et al. 2001).

No comments

- n/a -

Loss of tidal mudflats occurs both in fringe areas of Suisun Bay and San Pablo Bay (1000 acres in Suisun Bay during 1887 - 1990 and 125 acres/yr in San Pablo Bay). Loss of tidal mudflats may introduce contaminants previously deposited in these areas to the Bay (Marvin-DiPasquale et al., 2003).

Sediment dredging from navigation channels and disposal in locations inside and outside the bay can also influence sediment selenium pool. On average, in each year 1.8 million cubic yards of sediments were disposed in the bay and 2.4 million cubic yards were disposed out of the bay. Assuming a mean concentration of 0.25 µg/g, this represents a net loss of 82.5 kg/yr of selenium from the Bay (Table 3-16). In-bay disposal was estimated to be 248 kg Se /yr, while ocean disposal and upland/wetland reuse are 142.5 kg Se/yr and 225 kg Se/yr respectively. The dry mass of selenium was calculated assuming a particle density of 2.65 kg/L and a 50% solid per unit mass sediment, similar to assumptions used in the recent PCB TMDL for San Francisco Bay (SFBRWQCB, 2007c).

Table 3-16
Estimated selenium mass associated with dredge material disposal (2001-2005)[1]

Disposal site	Total volume 2001-2005 (m^3)	Average volume (m^3/yr)	Average annual estimated Se dry mass (kg/yr)
In-bay disposal	6,800,000	1,380,000	248
Ocean (SF-DODS) disposal	2,900,000	580,000	-142.5
Upland/wetland reuse	6,190,000	1,220,000	-225
Net loads			-82.5

[1]Source of data for volume of dredge material is from SFBRWQCB, 2007c.

3.8. LOADS FROM THE SOUTH BAY

Water in the South Bay and Central Bay is subject to mixing near the Bay Bridge. As a result, selenium loads can enter the Central Bay from South Bay or vice versa. The net inflow of water is assumed to be equal to river flow from the South Bay (Smith and Holibaugh, 2006). To estimate the net effect of exchange between two the two portions of the bay on selenium loads, we assumed selenium concentrations at a station near the boundary of the two bays (BC10 Yerba Buena Island) to be representative of net inflow concentration from the South Bay. Estimated freshwater inputs from local watersheds of South Bay are 664 Mm^3/yr (Davis et al. 2000). With the mean selenium concentration of 0.16 µg/L at Yerba Buena Island (Table A-3), estimated selenium inputs from South Bay to the Central Bay is at 106.2 kg/yr. The estimated load is relatively small compared to other selenium sources to the North Bay.

One of the tributaries in the South Bay, the Guadalupe River can be a major source of selenium to the South Bay because of high concentration. Observed average total selenium concentration at Guadalupe River (BW15) by RMP is at 4.76 µg/L. With the annual flow of 39.9-141.9 cfs for 2003-2007 (USGS11169025), selenium loads from this tributary alone can be 169.6-603.2 kg/yr. Therefore, the estimated 106.2 kg/yr load from South Bay may be at the lower bound of the loads entering from South Bay or suggests that significant removal of selenium via deposition may be occurring in the South Bay.

No comments

- n/a -

3.9. COMPARISON OF SELENIUM CONCENTRATIONS AND LOADS FROM DIFFERENT SOURCES

A comparison of total and dissolved selenium concentrations from several sources of interest is summarized in Table 3-17. In terms of concentrations, the refineries have the highest selenium concentrations compared to other sources such as Delta outflow, atmospheric deposition, municipal wastewater and the bay water, followed by local tributaries.

A comparison of relative importance of loadings from various sources is listed in Table 3-18. Input from Delta represents the largest source of total selenium and exhibits large variation depending on flow. Local tributaries and refineries are other two important sources. Loadings from atmospheric deposition and municipal wastewater are smaller. Bay sediment erosion contributes a notable portion of the particulate selenium loadings.

Table 3-17
Representative selenium concentration in different sources

	Source	Total (µg/L)	Dissolved (µg/L)
Atmospheric deposition	Mosher and Duce (1989)	-	0.1-0.4
Local tributaries (data for individual tributaries)	SFRWCB, 2007a,b	0.4-4.0[1]	0.3-3.9
	BASMAA (1996)	0.46	
Municipal wastewater	Data provided by SFBRWQCB	<1	-
Refineries	Data provided by SFBRWQCB	12-28[2]	12-28
Mallard Island (outflow from Delta) Storm Values	L. McKee, personal communication	0.46	-
San Joaquin River @ Vernalis (1999-2000)	Cutter and Cutter (2004)		0.68
Sacramento River @ Freeport (1999-2000)	Cutter and Cutter (2004)		0.07
San Joaquin River near Mallard Island (BG30)	RMP	0.18	0.16
Sacramento River near Mallard Island (BG20)	RMP	0.15	0.13
Bay water (1993-2005)	RMP	0.18	0.15

1. Mean of downstream sites in North Bay (SFRWCB, 2007a, b), Table 3-2
2. Mean concentrations at individual refineries listed in Table 3-1.

No comments

- n/a -

Table 3-18
Relative importance of loadings from different sources

	Total (kg/yr)	Dissolved (kg/yr)	Particulate (kg/yr)	Uncertainty
Sources:				
Atmospheric deposition	17.8-163.5	13.7 – 78.1	4.1-85.4	High
Local tributaries	354 -1511 (354-834 best estimate)	-	118.2[1]	High
Municipal and industrial wastewater	255	-	-	Low
Refineries	538	-	-	Low
Input from Delta	1,110-11,752 (mean:3,962)	814-9,736 (mean: 3,354)	151-1,509[2] (mean: 698)	Moderate
Sacramento River at Freeport		670-2,693 (mean: 1,577) for 1991-2007		Moderate
San Joaquin River at Vernalis	760-7,270[5] (mean: 2,972) for 1994-2007	838-4,711 (mean: 2,289) for 1991-2007		Moderate
Sediment	293	18.2[4]	275	Moderate
South Bay	106			High
Sinks:				
Outflow	4500[3]	3750[3]	750[3]	Moderate
Sediment Dredging	82.5	82.5		Moderate

[1]Based on TSS loadings by Davis et al. (2000), times selenium content in particulate material of Sacramento River

[2]Based on TSS loadings by McKee et al. (2006) and mean selenium content in particulate material of Sacramento and San Joaquin Rivers

[3]Based on average Delta outflow of 25000 Mm^3. Outflow only includes loads contributed by the northern reach.

[4]Sediment diffusion rate estimated by Meseck (2002).

[5]Based on SWAMP dataset

A comparison of dry and wet season loadings from different sources (Table 3-19) indicates that during the dry season, the major source of selenium loadings is from the Delta. The local tributary contribution during the dry season is minimal. During the wet season, the Delta outflow and local tributaries are the main selenium sources to the Bay. Refineries have a relatively steady input during both dry and wet seasons.

No comments

- n/a -

Table 3-19
Summary of dry and wet season selenium loading from major sources

	Dry season (kg)	Wet season (kg)	Annual total (kg)
Delta (Total, RMP data)	1,007.4	2,930.7	3,938.2 (total)
Delta (Dissolved, assuming 60% removal of San Joaquin River load)	909.5	1,583.1	2,492.6
Sacramento River at Freeport	564.1	1,012.7	1,576.9
San Joaquin River at Vernalis	863.4	1,426.0	2,289.4
Export through aqueducts	664.5	841.7	1,506.1
Delta (dissolved, difference between river loads and export through aqueduct)	855.5	1,840.4	2,595.9
Tributaries[1]	75.8	1,434.8	1,510.6
Refineries	204.2	322.2	526.4

[1] Estimates from Method 2

The estimated selenium loads from different sources were compared to previous studies of Presser and Luoma (2006), Meseck and Cutter (2006) and Abu-Saba and Ogle (2005) (Table 3-20). Selenium loads from refineries compared well to loads estimated by Presser and Luoma (2006) and Abu-Saba and Ogle (2005). Loadings from the Delta on an annual basis were also comparable to estimates of Presser and Luoma and in the same range of Abu-Saba and Ogle (2005), principally because the estimated range is wide. However, dry season Delta to bay loads in this work are substantially higher than previous estimates by Presser and Luoma (2006): over 1,000 kg compared to 200 kg. Loadings from local tributaries were higher than estimates by Abu-Saba and Ogle (2005), most likely due to higher selenium concentrations and runoff values used in the calculation.

No comments

- n/a -

Table 3-20
Comparison of alternative total selenium loadings estimates to North San Francisco Bay.

Source Category	Presser and Luoma (2006)	Meseck and Cutter (2006)	Abu-Saba and Ogle (2005)	This report
All loads in kg				
Refineries: Prior to improved wastewater treatment in 1998, kg/yr	1,850	2,890	610-1,660	No estimate
Refineries: Subsequent to improved wastewater treatment in 1998, kg/yr	620[1]	1,100	204-552	526
Delta loads, kg/yr	200 kg/6 months, critically dry season; 4,500 kg/6 months, high flow season	No estimate reported; value embedded in model calculations.	330-10,200 (Nov 1997- Nov 1999)	3,946 annual average; 1,007 dry months and 2,930 wet months
Selenium inventory in sediment bed, kg	No estimate	No estimate	50,000 in upper 15 cm of entire San Francisco Bay	20,000 kg in top 15 cm in North San Francisco Bay
Sediment erosion	No estimate	No estimate	No estimate	293
Local tributaries and waste water to North San Francisco Bay, kg/yr	No estimate	No estimate	90-900 (to all San Francisco Bay)	Local watershed runoff: 354-834
POTWs	No estimate	No estimate	90-900	Wastewater, other than refineries: 255
Atmospheric deposition, kg/yr	No estimate	No estimate	No estimate	18-164

[1]From the value illustrated in Figure 26 (p93) of Presser and Luoma (2006). The number 506 kg/yr on page 1-1 was from Table 10 (p35) of Presser and Luoma (2006) where the actual loads were estimated for 1999.

3.10. Low Flow vs. High Flow Concentrations

Selenium loadings and concentrations in water column and the suspended particulate material can vary with flow conditions. Under high flow, high loadings from Delta combined with short residence time can result in selenium concentrations in the bay that are similar to those in Delta inflows. During low flow periods, local sources from point dischargers may become a larger source. Under low flow, also due to the longer residence time and warmer temperature, selenium is more likely to accumulate in phytoplankton and bacteria. Zooplankton selenium concentrations have been found to be highest during low flow period (Pukerson et al. 2003). Therefore the low flow season is a critical time period for selenium bioaccumulation. The hydraulic residence time in NSFB can vary from 2 days during high flow to an average of 160 days during low flow (Cutter, 1989).

To forecast the expected selenium concentrations in water column and suspended particulate material, a simple, completely-mixed, one-box model similar to Presser and Luoma (2006) was used to estimate possible concentrations in the bay under several flow conditions: high flow in a wet year (2006), low flow in a wet year (2006), and low flow in a critically dry year (2001). Loadings from various sources estimated in previous sections were used.

No comments

- n/a -

Partition coefficient between dissolved and particulate selenium were derived from data of Doblin et al. (2006).

Several processes besides outflow to ocean that may contribute to the selenium removal: methylation to form dimethylselenide followed by volatilization, influx of dissolved selenium into sediments, reduction followed by adsorption and settling, phytoplankton uptake, and settling of suspended sediment. Previous study has indicated that diffusion into and out of the sediment is negligible (Meseck, 2002). Due to the oxic water, reduction of selenium is less likely to occur in the water column. Sediments in Suisun and San Pablo Bay are erosional, therefore net deposition into sediments are unlikely to be an important removal mechanism. More details of the one-box model are provided in the Appendix.

Predicted mean selenium concentrations using zero removal rates under high flow are generally similar to the observed concentrations from the RMP random sampling during 2002-2005 (0.14 µg/L; Table 3-21), suggesting relatively conservative behavior during high flow. Predicted maximum selenium concentration under low flow of a critically dry year is at higher concentration of 0.36 µg/L. RMP sampling during a representative period in August 2001 indicated a North Bay average of 0.15 µg/L. Because the observed concentrations during this period are significantly lower than predictions with removal rates set to zero, removal process may indeed be significant during these periods. The one-box modeling described here is a preliminary effort to assess the data and will be refined in subsequent work on the conceptual model and detailed mechanistic model.

Table 3-21
Estimated selenium concentrations under different flow conditions (more detailed calculation listed in Appendix A).

	Delta outflow (Mm3/day)	Delta loadings (kg/day)	Loadings from other sources* (kg/day)	Predicted total selenium concentrations (µg/L)	Concentrations in suspended particulate material** (µg/g)
High flow, wet year (2006)	202.2	19.0	9.6	0.14	0.94
Low flow, wet year (2006)	73.0	6.9	3.2	0.14	0.92
Low flow, critically dry year (2001)	14.2	2.0	3.2	0.33	2.20

*includes loadings from refineries, POTWs, local tributaries (proportional to delta outflow), and bed erosion.

**based on average K_d of 7.4 L/g (Cutter and Cutter, 2004).

No comments

- n/a -

4. SUMMARY

In this analysis selenium concentrations in water column and sediment were examined to provide a baseline for future modeling to be performed as part of the selenium TMDL in North San Francisco Bay. Major sources of monitoring data are the RMP and Prof. Greg Cutter's research group at Old Dominion University. The RMP has obtained selenium data at regular intervals at fifteen stations in the North Bay between 1993 and 2002, at 12 random stations for water concentrations and at 24 stations for sediment concentrations between 2002 and 2005. Selenium concentrations are generally low in the Bay water column with a whole North Bay average of 0.12 µg/L. Selenium concentrations in sediments are generally below 0.3 µg/g. Concentrations are lowest near the Golden Gate Bridge, with higher concentrations at lower salinities. More focused data sets that spanned a longer time frame and contained speciation data were also evaluated (Cutter, personal communication, 2007). The data show that there have been significant decreases in dissolved selenium concentrations and selenite in the North Bay since the mid-1980s, particularly in the low-flow season, following the implementation of more stringent controls on refinery discharges. Much of the selenium in the waters of the bay is in dissolved form, and consists of selenate, selenite, and organic selenide.

The quantification of selenium loadings from different point and non-point sources including Sacramento River and San Joaquin River inputs through Delta, local refineries, POTWs, tributaries and sediments, during both dry and wet season, was another major component of this analysis. The results indicated that annual loadings from the Central Valley through the Delta are the largest source of selenium with high variability depending on total flow through the Delta. Concentrations from the RMP stations are weakly correlated to Delta outflows to the bay, and therefore loads in high flow years are estimated to be more than ten times higher than in low flow years. The average Delta load is estimated to be 3,962 kg/yr. Local tributaries draining both urban and non-urban areas are also a large source of selenium (estimated average load of 354-834 kg/yr). Refineries are now estimated to be the third largest source of selenium to the North Bay (538 kg/yr), although these loads may have been higher prior to the late 1990s when wastewater controls were installed. Sediment resuspension/erosion and diffusion (293 kg/yr), other wastewater discharges (250 kg/yr), and atmospheric deposition (18-164 kg/yr) are other, smaller contributors of total selenium load. The point source loads (the refineries and the POTWs) contribute relatively uniform loads over the year, although the non-point source loads (the Delta and the local tributaries) contribute substantially more load in the wet season than in the dry season.

Although numerical values of load estimates are provided here for comparison, it should be acknowledged that this process contains significant uncertainty, and more than one estimation method may be applied, sometimes leading to different answers as described below. This is particularly true of non-point source load estimates. These alternative values are described below for completeness.

Selenium loads at Sacramento and San Joaquin River were estimated based on data collected by Cutter and Cutter (2004). Sacramento River at Freeport was estimated to have an average annual dissolved selenium loading of 1,577 kg/yr for 1991-2007. San Joaquin River at Vernalis has an average of dissolved selenium loading of 2,289 kg/yr for 1991-2007.

No comments

- n/a -

We applied three different methods to compute loads, from the Delta to the bay, depending on available data:

- The first approach used average concentration of two RMP stations in the Delta and multiplies it by the net tidally corrected Delta outflow. This resulted in an annual average load estimate of 3,962 kg/yr of **total selenium** from the Delta to the NSFB (1994-2006).
- The second approach used selenium loadings from the Sacramento and the San Joaquin Rivers separately based on data from Cutter and Cutter (2004) and applied a "Delta removal constant" similar to Meseck (2002) to account for the possible selenium loss in the Delta. These concentrations were reported only as dissolved selenium, not total selenium. This resulted in an annual average load estimate of 2,493 kg/yr of **dissolved selenium** (1993-2003).
- The third approach was independent of the prior two: the loadings from Central Valley to the bay were estimated as the difference between inputs from the two rivers minus the export through aqueducts, and assuming minimal loss processes in the Delta. This resulted in an annual average load estimate of 2,696 kg/yr of **dissolved selenium** (1993 to 2003).

In addition to these loads, the average particulate load was estimated as 698 kg/yr, based on loads of sediment from the Delta to the bay and by application of a constant selenium content in the sediments.

Given the simplifications and assumptions employed in these load calculations, and given that some loads are in terms of dissolved selenium, the range of annual averages is small, and the methods are supportive of one another. Because the data used in the analysis was most abundant for Method 1, and both total and dissolved data were available, and because the flow volumes used in load calculation are tidally corrected, it is recommended that this method be used for describing Delta loads, resulting in an average Delta to bay export of 3,962 kg/yr.

Using the SWAMP selenium data from the tributaries, loads were computed using flow from different sources: modeled annual flows and measured flows from USGS gage stations. The modeled flows were used because of the limited availability of measured flow data. Driven in large part by relatively high concentrations in the tributaries in both the wet and dry seasons, the average annual loads from the tributaries can range from 354 kg/year to 1,511 kg/year depending on the methods used for the load estimation. Much of this load (greater than 95%) is delivered to the bay in the wet months, consistent with the timing of flows, as shown in the calculation using the USGS gage data. The largest single sources of loads are the Napa River, Sonoma Creek, and the Concord hydrological area.

Although the tributary concentration data are different between two datasets (SWAMP and BASMAA), the high average concentrations are not driven by one or two measurements. It is nonetheless clear that the load estimates above are based on a limited amount of data. Furthermore, the SWAMP concentration data are not independently corroborated. Given the underlying data limitations and uncertainty in flows, and the year-to-year variability, the

No comments

- n/a -

wide range in the load estimates are not entirely surprising. For the purpose of this analysis, we recommend using a range of load estimates for the next stage of the analysis of 354-834 kg/yr.

No comments

- n/a -

No comments

- n/a -

5. Key Findings and Implications for Model Development

The analysis presented here is an important first step in the modeling to be performed for the selenium TMDL. Key findings from this analysis, including uncertainties and data gaps, that will carry forward to the next steps are listed below:

- More than two-thirds of the selenium in bay waters is present in the dissolved form, with the majority in the selenate form.
- Selenium concentrations vary according to the freshwater flows moving through the bay, and are highest in the in the mid-estuarine regions in the driest periods of the year.
- Sediment selenium concentrations from the RMP data set, averaged over several years of sampling at fixed stations, vary over a narrow range 0.2 to 0.5 µg/g, with a few exceptions. These concentrations correlate well with TOC and percent fines. Almost all sediment data have been collected near the surface (15 cm deep or less). No data are available to estimate natural background levels of selenium in the bay sediments.
- Refinery load reductions are consistent with reductions in selenium concentrations in NSFB in both wet and dry seasons. Concentrations of selenite, a major component of refinery discharges in the past, show dramatic declines from 1998.
- Local tributary selenium concentrations are high (i.e., closer to San Joaquin River values than Sacramento River values) and result in significant loads to the NSFB, although more than 95% of this load is delivered in the wet months. The data used in this calculation have been collected by the SWAMP program and have not been corroborated by other monitoring programs. The Napa River was estimated to be the largest tributary load contributor. A sediment sample in the bay near the mouth of the Napa River showed significantly elevated concentrations.
- Selenium loads in NSFB are dominated by non-point sources, and therefore correlated with runoff. Because of the region's climate, with distinct seasonal patterns of rainfall, and significant variability from year to year, the non-point loads are highly variable both on a seasonal and annual basis.
- Load estimates of the rivers to the bay showed that both San Joaquin and Sacramento Rivers are significant contributors of selenium to the NSFB. Their load contributions are of similar magnitude and occur in both wet and dry seasons.
- The large Central Valley selenium sources are transported through the Delta, but data within the Delta are limited, and understanding of its role in the removal and/or export of selenium is based on a small amount of data.
- Point source loads (refineries, POTWs, and other industrial dischargers) are among the best characterized loads into NSFB because both flow and concentration are measured simultaneously. These loads are also less variable through the year and the wet season and dry season loads similar. This contrasts with Delta loads and tributary loads which are far larger in the wet months. On an annual basis, point

No comments

- n/a -

source loads are relatively small; on a seasonal basis, point source loads are significant during the dry months.

- POTW discharge concentrations of selenium are much smaller than refinery wastewater concentrations. However, because their flows are larger, on a load basis, POTW loads are about a third of the refinery loads.

No comments

- n/a -

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No comments

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No comments

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No comments

- n/a -

APPENDICES

Table A-1
Parameters and inputs of one-box model

Category	Value	Unit	References
Water depth (mean)	6.1	m	Conomos et al. 1985
Surface area			
North Bay	434	km^2	Tsai et al. 2001
Central Bay	214	km^2	Tsai et al. 2001
Volume			
North Bay+ Central Bay	3953	Mm^3	Calculated
Delta outflow			
Wet year (2006), wet season average	202.2	Mm^3/day	http://iep.water.ca.gov/dayflow/
Wet year (2006), dry season average	73.0	Mm^3/day	http://iep.water.ca.gov/dayflow/
Critically dry year (2001), dry season	14.2	Mm^3/day	http://iep.water.ca.gov/dayflow/
Delta loads			
Wet year (2006), wet season	19.0	kg/day	Average of daily loads
Wet year (2006), dry season	6.9	kg/day	Average of daily loads
Critically dry year (2001), dry season	2.0	kg/day	Average of daily loads
Refineries loads (wet season)	1.53	kg/day	
Refineries loads (dry season)	1.36	kg/day	
Bed erosion	0.75	kg/day	
Local tributaries (wet)	6.80	kg/day	
Local tributaries (dry)	0.57	kg/day	
Local tributaries (dry, 2001)	0.14	kg/day	Scaled from Napa 2001 dry season loads
Wastewater	0.50	kg/day	
Residence time			
Wet year (2006), wet season	19.5	day	Calculated
Wet year (2006), dry season	54.2	day	Calculated
Critically dry year (2001), dry season	278.4	day	Calculated
Predicted mean concentrations (total)			
Wet year (2006), wet season	0.14	µg/L	
Wet year (2006), dry season	0.14	µg/L	
Critically dry year (2001), dry season	0.33	µg/L	
Concentrations in particulates			
Wet year (2006), wet season	0.94	µg/g	
Wet year (2006), dry season	0.92	µg/g	
Critically dry year (2001), dry season	2.2	µg/g	

Equations: Assuming completely mixed and steady state:

(1). C = W/a, where W: loadings from all sources, a: assimilation coefficient, C: concentration

(2). a = Q + kV+ vAs, where Q: outflow, k: degradation/reaction coefficient, v: settling velocity, As: surface area. For simplicity, k and v are assumed to be 0.

No comments

- n/a -

(3) Cs = Kd*Cw, where Cs: concentration in particulate, Kd: partition coefficient, Cw: dissolved concentration. Cw is assumed to be 90% of C.

Table A-2
Summary of dissolved selenium concentrations in water for the period of 1993-2005 for the whole Bay (data source: RMP).

Site Code	Site Name	Median (µg/L)	Mean (µg/L)	Standard Deviation	Count
BA10	Coyote Creek	0.37	0.43	0.21	21
BA20	South Bay	0.33	0.32	0.12	23
BA30	Dumbarton Bridge	0.25	0.26	0.09	28
BA40	Redwood Creek	0.17	0.18	0.05	24
BB15	San Bruno Shoal	0.15	0.16	0.07	20
BB30	Oyster Point	0.13	0.16	0.09	24
BB70	Alameda	0.12	0.16	0.18	19
BC10	Yerba Buena Island	0.11	0.14	0.08	27
BC20	Horseshoe Bay	0.10	0.14	0.10	23
BC30	Richardson Bay	0.13	0.14	0.10	23
BC41	Point Isabel	0.10	0.14	0.09	24
BC60	Red Rock	0.12	0.15	0.10	20
BD15	Petaluma River	0.17	0.18	0.07	21
BD20	San Pablo Bay	0.14	0.15	0.06	24
BD30	Pinole Point	0.15	0.16	0.06	24
BD40	Davis Point	0.16	0.17	0.06	25
BD50	Napa River	0.16	0.16	0.06	24
BF10	Pacheco Creek	0.15	0.17	0.08	24
BF20	Grizzly Bay	0.13	0.14	0.06	25
BF40	Honker Bay	0.11	0.12	0.05	22
BG20	Sacramento River (near Mallard Island)	0.12	0.13	0.09	29
BG30	San Joaquin River (near Mallard Island)	0.14	0.16	0.09	28
BW10	Standish Dam	1.40	1.36	0.63	16
BW15	Guadalupe River	4.72	4.21	2.10	13
C-1-3	Sunnyvale	0.82	1.03	0.59	23
C-3-0	San Jose	0.91	0.86	0.33	23

No comments

- n/a -

Table A-3
Summary of total selenium concentrations in water for the period of 1993-2005 for the whole Bay (data source: RMP).

Site Code	Site Name	Median (µg/L)	Mean (µg/L)	Standard Deviation	Count
BA10	Coyote Creek	0.39	0.47	0.25	17
BA20	South Bay	0.33	0.35	0.15	21
BA30	Dumbarton Bridge	0.26	0.28	0.12	29
BA40	Redwood Creek	0.19	0.20	0.06	20
BB15	San Bruno Shoal	0.16	0.17	0.08	19
BB30	Oyster Point	0.14	0.16	0.08	21
BB70	Alameda	0.16	0.19	0.16	19
BC10	Yerba Buena Island	0.12	0.16	0.09	23
BC20	Horseshoe Bay	0.11	0.17	0.12	19
BC30	Richardson Bay	0.11	0.13	0.08	22
BC41	Point Isabel	0.12	0.14	0.07	20
BC60	Red Rock	0.15	0.18	0.08	16
BD15	Petaluma River	0.25	0.24	0.09	19
BD20	San Pablo Bay	0.17	0.18	0.07	23
BD30	Pinole Point	0.17	0.18	0.08	23
BD40	Davis Point	0.18	0.21	0.08	23
BD50	Napa River	0.19	0.20	0.05	22
BF10	Pacheco Creek	0.19	0.19	0.07	22
BF20	Grizzly Bay	0.17	0.17	0.07	23
BF40	Honker Bay	0.15	0.16	0.05	22
BG20	Sacramento River (near Mallard Island)	0.13	0.15	0.08	27
BG30	San Joaquin River (near Mallard Island)	0.16	0.18	0.09	26
BW10	Standish Dam	1.70	1.65	0.82	14
BW15	Guadalupe River	5.59	4.76	2.58	12
C-1-3	Sunnyvale	1.02	1.14	0.58	23
C-3-0	San Jose	1.10	0.97	0.38	22

No comments

- n/a -

Table A-4
Summary of selenium concentrations in sediments for the period of 1993-2005 for the whole Bay (data source: RMP)

Site code	Site Name	Median (µg/g)	Mean (µg/g)	Standard Deviation (µg/g)	Count
BA10	Coyote Creek	0.32	0.31	0.10	16
BA21	South Bay	0.34	0.44	0.25	16
BA30	Dumbarton Bridge	0.33	0.35	0.10	16
BA41	Redwood Creek	0.32	0.33	0.16	20
BB15	San Bruno Shoal	0.30	0.28	0.07	14
BB30	Oyster Point	0.29	0.33	0.13	16
BB70	Alameda	0.30	0.34	0.11	14
BC11	Yerba Buena Island	0.28	0.30	0.15	20
BC21	Horseshoe Bay	0.19	0.25	0.14	16
BC32	Richardson Bay	0.25	0.27	0.09	16
BC41	Point Isabel	0.30	0.33	0.09	16
BC60	Red Rock	0.07	0.11	0.11	13
BD15	Petaluma River	0.29	0.31	0.12	14
BD22	San Pablo Bay	0.32	0.41	0.32	18
BD31	Pinole Point	0.28	0.36	0.27	20
BD41	Davis Point	0.11	0.15	0.17	16
BD50	Napa River	0.38	0.52	0.47	18
BF10	Pacheco Creek	0.11	0.15	0.12	16
BF21	Grizzly Bay	0.33	0.50	0.68	20
BF40	Honker Bay	0.31	0.38	0.20	14
BG20	Sacramento River (near Mallard Island)	0.10	0.14	0.13	19
BG30	San Joaquin River (near Mallard Island)	0.30	0.29	0.16	20
BW10	Standish Dam	0.51	0.49	0.17	10
BW15	Guadalupe River	0.53	0.54	0.09	8
C-1-3	Sunnyvale	0.31	0.33	0.19	15
C-3-0	San Jose	0.33	0.33	0.11	15

No comments

- n/a -

Table A-5
Detailed Information on Selenium from POTWs in North San Francisco Bay

NPDES	Name	Ports	Flow (mgd)	Period	Count	Conc. (ug/L)	Period	Count	Load	Total	Note
CA0038768	American Canyon	E-001-S (M-001)	0.89	11/02-11/04	355	1.16	12/02-6/05	32	1.42		2 ports, both included in calculation
		E-003-R/S (M-003)	0.99	5/04-12/04	214	1.06	1/03-6/05	31	1.46	2.87	
CA0038091	Benicia	E-001	2.99	8/99-4/07	2830	0.85	10/99-4/07	98.00	3.50		
CA0037648	CCC	E-001	45.81	1/98-5/07	3126	0.34	1/98-3/07	99	21.79		Overflow occured only once in 1998, not regular discharge, not included in load estimate
		OV-001 Overflow & Bypass	102.50	1/98-2/98	55						
CA0038628	Central Marin	E-001/M-001	11.00	5/98-3/07	3076	0.81	5/98-3/07	99	12.26		
CA0038547	Delta Diablo	E-001-D	11.46	1/99-4/07	2829	4.07	1/99-4/07	104	64.50		
CA0037702	EMUD	E-001	74.64	8/98-4/07	3194	0.34	9/98-4/07	294	34.76		
CA0038024	Fairfield-Suisun	E-001-A	16.95	4/99-5/07	2553	0.75	12/98-10/03	95	17.45		Concentrations not reported for E-001-S, E-002, E-003, E-004, used E-001-A conc.
		E-001-S	15.73	12/98-5/07	2675						Some flow record for 001-S are the same to 001-A, E001-S not used for final load calculation
		E-002	0.02	1/00-4/06	1396				0.02		Mostly 0
		E-003	0.01	1/00-4/06	1400				0.01		Mostly 0
		E-004	1.44	12/98-4/07	1583				1.48	18.97	
CA0037851	Las Gallinas	E-001 Dry (May)	3.20	5/03-5/06	50						Dry weather concentration not available
		E-001 Wet (Nov to Apr)	3.75	12/01-4/07	968	0.95	1/01-3/07	15	2.48		

No comments

- n/a -

NPDES	Name	Ports	Flow (mgd)	Period	Count	Conc. (ug/L)	Period	Count	Load	Total	Note
		E-002 Wet (Nov to Apr)	1.44	11/06-4/07	181				0.95	3.43	E-002 concentration not available
CA0037770	Mount View	E-001	1.98	6/99-4/07	2872	0.67	9/99-9/06	38	1.83		
CA0037575	Napa	E-001 Dry (May-October)	3.81	6/02-7/04	398	0.57	9/02-7/04	13	1.49		
		E-001 Wet (Nov - Apr)	13.98	1/99-5/04	573	0.27	1/99-5/04	26	2.60	4.10	
CA0037810	Petaluma	E-001 (Recycling)	4.01	5/02-03/07	773						Recycled water not discharging to the Bay, and not included in the load
		E-001	7.61	1/00-4/07	1377	0.65	1/99-4/07	119	6.88		
CA0037796	Pinole	E-001	3.18	1/00-5/07	2708	0.91	3/00-4/07	47	4.00		
CA0037826	Rodeo	E-001	0.80	3/00-4/07	2613	0.80	3/00-3/07	30	0.89		
CA0038067	Sausalito	E-001	1.63	12/99-4/07	2615	2.46	12/99-4/07	85	5.53		
CA0037800	Sonoma	E-001 (Recycling)	2.701	5/00-11/01	170						Concentration reported with high DL of 5 ug/L, load not calculated
		E-001	4.089	1/99-7/04	1287						
CA0110116	Treasure Island	E-001	0.534	10/00-4/07	2433	0.48	8/00-7/04	46	0.36		
CA0037699	Vallejo	E-001 Carquinez (deep)	13.17	1/99-4/07		0.96	5/00-4/07	79	17.47		EPA PCS database has E-001 and E-002; load is the sum of E-001 and E-002
		E-002 Mare (deep)	2.69	1/00-4/06	154	0.767	1/02-4/06	15	2.85	20.32	
		Mare (shallow)	7.38	1/99-1/99	5						Mare (shallow) only 5 records. Not included.
CA0038539	West County/Richmond	E-001 DC (Combined)	14.14	3/03-5/07	1520	1.727	2/02-4/07	60	33.74		Conc only reported for E-001-DC
		E-001 D1 (West County)	9.33	10/2-5/07	1672						Load is only calculated for E-001-DC

No comments

- n/a -

NPDES	Name	Ports	Flow (mgd)	Period	Count	Conc. (ug/L)	Period	Count	Load	Total	Note
		E-001 D2 (Richmond)	8.37	10/2-5/07	1642						
CA0037958	Novato SD	E-001 Ignacio Dry	4.01	5/99-5/99	31	0.475	5/99-3/04	4	2.63		
		E-001 Ignacio Wet	4.48	11/02-11/02	21						
		E-002 Novato Wet	2.23	5/99-11/04	119	0.833	11/02-3/04	4	2.57		
		E-003 Combined Dry	5.67	5/99-5/99	31						
CA0037711	Sewerage Agency of So. Marin	E-001	3.3	1/99-5/07	3043	1.394	1/99-4/07	133	6.36		
CA0037753	Marin Co. S.D. no. 5 (Tiburon)	E-001	1.02	1/00-4/07	2250	1.93	1/00-4/07	47	2.72		
CA0037966	City of Calistoga	E-001 (Dry)	0.87	1/00-5/05	962	0.51	1/00-1/06	19	0.61		
		E-002 (Wet)	0.65		29						
CA0038016	City of Saint Helena	E-001	1.114	1/04-1/04	31	<0.5			0.38		Concentration taken from permit
		E-001S	1.452								
CA0037885	Contra Costa Co. S.D. No. 5 (Port Costa)		0.02			NA			NA		
CA0037427	Marin Co. S.D. no. 5 (Paradise Cove)		0.02			0.73			0.02		Concentration taken from permit

No comments

- n/a -

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Modeling Fate, Transport, and Biological Uptake of Selenium in North San Francisco Bay

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Abstract Selenium behavior in North San Francisco Bay, the largest estuary on the US Pacific coast, is simulated using a numerical model. This work builds upon a previously published application for simulating selenium in the bay and considers point and non-point sources, transport and mixing of selenium, transformations between different species of selenium, and biological uptake by phytoplankton, bivalves, and higher organisms. An evaluation of the calibrated model suggests that it is able to represent salinity, suspended material, and chlorophyll *a* under different flow conditions beyond the calibration period, through comparison against long-term data, and the distribution of different species of dissolved and particulate selenium. Model-calculated selenium concentrations in bivalves compared well to a long-term dataset, capturing the annual and seasonal variations over a 15-year period. In particular, the observed lower bivalve concentrations in the wet flow periods, corresponding to lower average particulate selenium concentrations in the bay, are well represented by the model, demonstrating the role of loading and hydrology in affecting clam concentrations. Simulated selenium concentrations in higher organisms including white sturgeon and greater scaup also compared well to the observed data in the bay. Finally, a simulation of changing riverine inflows into the bay that might occur as a consequence of proposed hydrologic modifications indicated significant increases in dissolved and particulate selenium concentrations in the bay. The modeling framework allows an examination of the relationship between selenium loads, variations in inflow, in-bay concentrations, and biota concentrations to support management for limiting wildlife impacts.

Keywords Bioaccumulation · Selenium speciation · TMDL · Estuarine modeling · ECoS

Introduction

Selenium is a limiting nutrient to aquatic organisms at low concentrations; however, it becomes toxic when concentrations are elevated (Harrison et al. 1988; Lauchli 1993; Lemly 1996). The element is toxic to fish and birds due to its adverse impacts on the reproductive system (Lemly 1985; Presser and Luoma 2006). Selenium can substitute for sulfur in the structure of proteins and therefore causes deformities in embryos or inhibition of the hatchability of eggs (Skorupa 1998). Under the Clean Water Act of the USA, North San Francisco Bay (NSFB) is listed as being impaired for selenium, due to high concentrations observed in fish tissues (particularly in white sturgeon, *Acipenser transmontanus*, up to 50 μg/g dry weight) and diving ducks (such as greater scaup, *Aythya marila* up to 35 μg/g dry weight in muscle tissues) (White et al. 1988, 1989; Urquhart et al. 1991; SFEI 2006). NSFB is an important water body for the study of selenium biogeochemistry and ecotoxicology, because it is the largest estuary on the Pacific coast of

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No comments

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the USA and receives significant selenium loadings from sources that are directly related to human activity: it is downstream of irrigated selenium-bearing soils of the semi-arid San Joaquin Valley (representing 7 % of total US agricultural production and four of the top five agriculturally productive counties in the US), and it receives selenium discharged from five major oil refineries (which together constitute 5.6 % of the total refining capacity of the USA; based on data from the US Census of Agriculture 2007; California Energy Commission 2012). Selenium has been a contaminant of interest in this region since the discovery of deformed waterfowl in the Kesterson Wildlife Refuge in San Joaquin Valley, which received most of its water from agricultural drainage (Ohlendorf et al. 1988).

Selenium is present in the aquatic environment in several different forms (Cutter 1992). Dissolved forms of selenium include inorganic selenite (SeO_3^{2-}+$HSeO_3^-$), selenate (SeO_4^{2-}), and organic selenides. The particulate forms include elemental selenium, organic selenides, and selenite and selenate adsorbed on particles. Selenium in biogenic particles is principally composed of organic selenide (Cutter and Bruland 1984) with each species being subject to different transformations and biological uptake (Suzuki et al. 1979; Measures et al. 1980; Cutter and Bruland 1984). Particulate organic selenides can decompose and release dissolved organic selenides at relatively fast rates (>0.2/day, Cutter 1982). Organic selenides can be oxidized to selenite and further to selenate and this has been described using pseudo-first-order reactions (Cutter and Bruland 1984). The oxidation of organic selenides to selenite can occur on the order of days, while oxidation from selenite to selenate can take years (Cutter 1992; Meseck and Cutter 2006).

Dissolved forms of selenium can be taken up by phytoplankton and bacterioplankton communities. The uptake of dissolved selenium by these organisms is a key step in selenium entering the food web (Luoma et al. 1992; Wang et al. 1996). The bioavailability of dissolved selenium differs by chemical form, with selenite and organic selenides being taken up more rapidly than selenate (Riedel et al. 1996). Despite low selenium concentrations in the water column, certain species of phytoplankton can concentrate selenium to relatively high concentrations (Baines and Fisher 2001; Doblin et al. 2006). Organic selenides in cells can be released into the environment through excretion, cell lysis, or grazing (Cutter 1982).

The uptake of selenium by invertebrates is mainly through the ingestion of particulates (Luoma et al. 1992; Sanders and Gilmour 1994; Wang and Fisher 1996), especially particulate organic selenides which are more easily assimilated by invertebrates. Measured assimilation efficiencies for elemental selenium range from 2 to 28 % (Schlekat et al. 2000), while assimilation efficiencies for organic selenium range from 53 to 89 % (Schlekat et al. 2002). As with phytoplankton, the accumulation of particulate selenium in invertebrates and zooplankton differs by species. Certain species of invertebrates (e.g., the clam *Corbula amurensis* that is abundant in NSFB) are able to accumulate selenium to relatively high concentrations due to high food ingestion rates and slow excretion (Stewart et al. 2004), resulting in relatively high selenium concentrations in the benthic food web.

Sources of selenium to the NSFB include riverine inputs from the Sacramento and San Joaquin Rivers, tributaries surrounding the NSFB, discharge from refineries, and municipal and industrial wastewater treatment plant discharges. The NSFB water column is characterized by low selenium concentrations (~0.2 μg/L); however, bioaccumulation by *C. amurensis*, may be a pathway leading to high selenium in certain benthic-feeding fish and birds.

The San Francisco Bay Regional Water Quality Control Board is in the process of developing a selenium total maximum daily load (TMDL) for NSFB to address this impairment. Under the Clean Water Act, a TMDL is required when a water body is listed as impaired due to one or more contaminants and sets in motion a process to manage and control the impairment. To effectively address impairment, TMDLs need tools, often in the form of numerical models, to represent the linkage between sources of contamination and biological endpoints, including concentrations in the tissues of target organisms. The objective of the present study is to develop a model representing the transport, fate, and uptake of selenium in the benthic food web of NSFB, focusing on phytoplankton, clams, and fish and bird species that consume these clams. The model is calibrated using the best available data on hydrology, selenium loading from the major rivers, petroleum refineries, municipal wastewater treatment plants, and other industrial sources and selenium speciation in different compartments as reported in monitoring programs and the scientific literature over the last two decades.

The modeling framework builds on a previous study of selenium biogeochemistry in NSFB (Meseck and Cutter 2006), developed using an estuary modeling framework (ECoS3) (Harris and Gorley 1998). The previous study was modified for the TMDL by: (1) using more recent selenium loads from five major refineries and principal riverine sources, Sacramento and San Joaquin Rivers, (2) adding selenium loads from smaller, local tributaries, and all municipal and industrial dischargers with discharge permits; (3) modification of the model to consider particulate selenium, total suspended material (TSM), and phytoplankton inputs from the San Joaquin River; (4) changing the riverine boundary conditions of TSM, chlorophyll *a* and different species of particulate selenium to time-varying inputs; and (5) expanding the model to simulate

No comments

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selenium concentrations in biota (clams, fish, and diving ducks). The final change is especially important because the impairment in NSFB is driven by concentrations in biota. The above changes necessitated a recalibration and extension of the Meseck and Cutter (2006) model, as detailed in the following section while retaining the basic setup of the original work. The updated model was recalibrated for the 1999–2000 water years, and then used to simulate long-term selenium dynamics in NSFB for the period of 1999–2008. Through this development and integration process, the key research questions to be answered are: can we describe the speciation of selenium in the waters of NSFB under different flow and loading conditions, the changing seasonal and long-term concentrations of selenium in the clam *C. amurensis*, monitored at a regular frequency as a sentinel species in the bay over 1995–2010, and concentration patterns in other predator species that consume *C. amurensis*? A reasonable representation of these observations lends credibility to the use of this modeling framework for management of selenium in NSFB over the coming years during which many changes are possible, including changes in land use, upstream water diversions, sea level rise, and modified freshwater outflows. More generally, the framework for integration of data and mechanistic processes presented here may be applicable to the management of selenium in estuaries receiving inflows from urbanized and developed watersheds, although affected species and food webs may differ.

Methods

ECoS Modeling Framework

ECoS3 is a modeling framework developed by the Center for Coastal and Marine Sciences (Plymouth Marine Laboratory, UK) that can be used to simulate transport and dynamics of dissolved and particulate constituents in a one-dimensional (1-D) or 2-D form for an estuary (Harris and Gorley 1998, 2003). By using a single box or a multiple box approach, the model will simulate salinity, nutrients, TSM, and biological productivity once the shape, geometry, and tidal movement in the estuary are established (Harris and Gorley 1998). ECoS3 considers transport due to advection and dispersion, transformations between species through exchange or reactions, and changes through point or non-point inputs and outputs. ECoS3 has been widely applied to simulate different constituents (e.g., salinity, suspended particles, carbon, nitrogen, nutrients, Zn, and Ni) in estuaries including the Humber Estuary in UK (Harris 2003; Tappin et al. 2003), Tweed Estuary (Punt et al. 2003; Uncles et al. 2003), and Tamar Estuary (Liu et al. 1998). Meseck and Cutter (2006) used ECoS3 to focus on simulating transport and biogeochemistry of selenium in 1-D form in the NSFB.

Model Domain and Components

As in Meseck and Cutter (2006), the model was applied starting from the Sacramento River at Rio Vista, extending through NSFB to the Golden Gate Bridge (Fig. 1), with Rio Vista constituting the freshwater boundary, and the Golden Gate Bridge the ocean boundary. The model consists of 33 linked cells, each 3 km wide, representing this domain, with external flows and selenium load inputs at various intermediate locations (Fig. 2). The Sacramento-San Joaquin Delta is not explicitly modeled in this work: Sacramento River flows at Rio Vista are the main freshwater input, with inflows from San Joaquin River added at the confluence 19 km from Rio Vista. Flows at Rio Vista are measured, with the contribution from San Joaquin River estimated as the difference between the Delta outflow and the Rio Vista flow. Tributary flows from 10 local watersheds surrounding NSFB, 5 major refineries, and 23 additional municipal wastewater and industrial point sources were added to the model corresponding to their distance from the head of the estuary at Rio Vista. These sources are identified and their distances from Rio Vista listed in Table 1 in the Electronic supplementary material (ESM).

Meseck and Cutter (2006) used the model to simulated salinity, TSM, phytoplankton, and different species of dissolved and particulate selenium (dissolved selenate, selenite, organic selenide, particulate elemental selenium, particulate organic selenides, and adsorbed selenite and selenate). The modified and recalibrated model presented here simulates these constituents and selenium concentrations in bivalves and higher trophic level organisms (white sturgeon and greater scaup).

As a first step, salinity in the bay is simulated because it represents the advection and dispersion of all dissolved water column constituents in the estuary (Harris and Gorley 1998). Accurate simulation of salinity is an indicator that the advection and dispersion of dissolved species is represented adequately. The simulation of TSM indicates how well the fate and transport of all other constituents associated with particulates in the estuary is simulated. TSM concentrations also affect reactions of selenium with particulates and the distribution of particulate selenium in the estuary. Simulation of phytoplankton greatly affects the fate of selenium, because selenium uptake by phytoplankton is an important first step in subsequent foodweb uptake (Luoma et al. 1992). Loads, transport, and transformations of different species of selenium are important modeling components as bioavailability differs among the different species of selenium. The bioaccumulation of selenium through the foodweb is an important component of this model as it links selenium

No comments

- n/a -

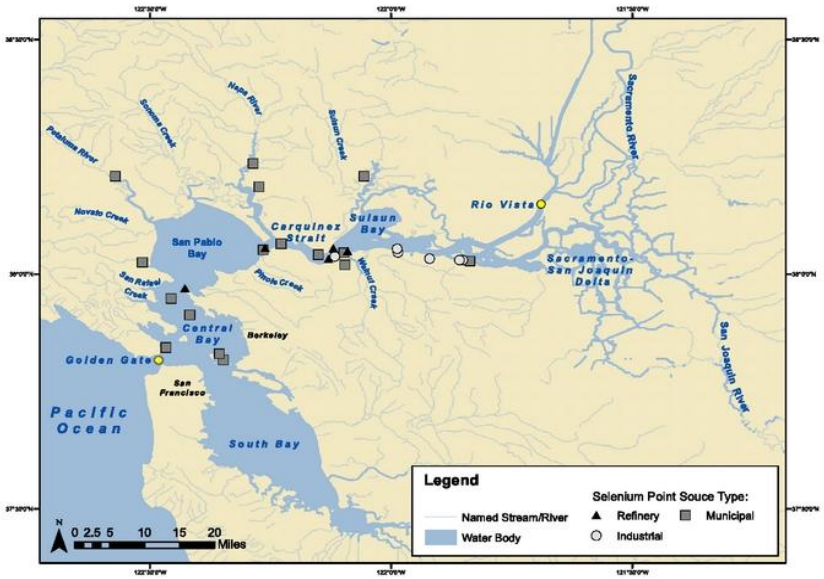

Fig. 1 San Francisco Bay region and surroundings. The model uses Rio Vista on Sacramento River as the starting point of the simulations and spans the region to Golden Gate, following Meseck and Cutter (2006). San Joaquin River inflows are added as a tributary 19 km downstream of Rio Vista. Other tributaries and point sources are also shown and listed in Table 1 in the ESM. The Delta is not explicitly modeled in this application

concentrations in the water column to biota of ecological concern.

To adapt the Meseck and Cutter (2006) model for the present application required some modifications to the loads and model formulation, as outlined here. Refinery loads were updated using daily selenium inputs from five refineries in the NSFB, estimated based on daily flow and weekly concentrations for the period of 1999–2007. These loads were added to model cells based on their discharge locations. In addition, selenium loads from local tributaries to NSFB (i.e., in addition to the major riverine flows through the Delta) were added to the model based on their discharge locations. These loads were not identified in the prior application and may be significant during wet months. Loads from publicly owned treatment works and other point source dischargers in the NSFB were added to the model based on their discharge locations. All sources of selenium are identified in Fig. 1. Besides selenium inputs from the San Joaquin River, TSM loads (with TSM concentrations modeled as a function of flow) and phytoplankton loads (with observed phytoplankton concentrations) from the San Joaquin River were also added to the model. In simulating the TSM, phytoplankton, and particulate selenium, the current model uses observed concentrations as much as possible in defining the riverine boundary conditions.

The transfer of dissolved selenium to particulate selenium through phytoplankton uptake is an important process in its bioaccumulation. Therefore, particulate selenium associated with phytoplankton uptake within the estuary was tracked as a separate constituent and was added to the total particulate selenium. At the boundaries, the input of phytoplankton and all other forms of particulate selenium were estimated separately through calibration. Simulated Se/C ratio in phytoplankton was also tracked by the model and was compared with data observed for species found in the bay. Finally, a dynamic multi-pathway bioaccumulation model

No comments

- n/a -

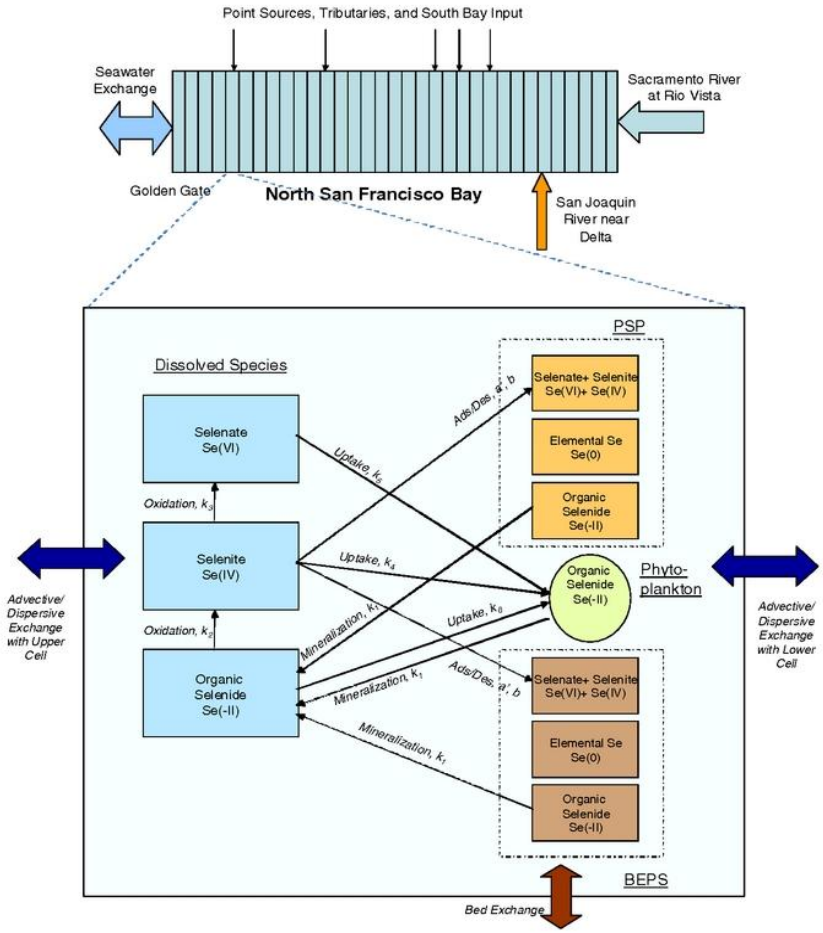

Fig. 2 Schematic of model representation of the NSFB, showing model cells or nodes (*vertical boxes*), boundary conditions, and external loads. Each cell is 3 km wide. The locations of the external loads are illustrative and are added in the model location at the approximate location they enter the estuary

(DYMBAM; Presser and Luoma 2006) was added to predict tissue selenium concentrations in bivalves; previously developed relationships between prey and predator concentrations by Presser and Luoma (2006)

No comments

- n/a -

Table 1 DYMBAM model parameters for *Corbula amurensis*

K_u (L g^{-1} day^{-1})	IR (g g^{-1} day^{-1})	AE (%)	K_e (day^{-1})	Growth rate (per day)	Tissue Se concentration (mg/kg)	References
0.003	0.25	45–80	0.025		2.1–12.0	Stewart et al. (2004)
0.009	0.1–1.0	36 (sediment) 54 (algae)	0.023	0.005	3.9–20.0	Lee et al. (2006)

DYMBAM dynamic multi-pathway bioaccumulation model, *AE* assimilation efficiencies

were used to predict bioaccumulation of selenium to the higher trophic levels (bivalves, benthic-feeding fish, and diving ducks).

The above changes entailed a recalibration of the model and evaluation against the most recently available data in NSFB including salinity, TSM, chlorophyll *a*, dissolved and particulate selenium, and selenium concentrations in clams for the period beyond 1999 (US Geological Survey (USGS) monthly cruises in the bay; SFEI 2006; Doblin et al. 2006; Kleckner et al. 2010). The complete modeling framework development, calibration, and application to NSFB are detailed in a report prepared for the TMDL effort (Tetra Tech 2010; available on the Internet at: http://www.swrcb.ca.gov/rwqcb2//water_issues/programs/TMDLs/seleniumtmdl.shtml).

Selenium Transformations Simulated

While in the water column, different species of selenium can undergo biological and chemical transformations, and these transformations were simulated by the model (Cutter 1982; Cutter 1992). Transformations of dissolved selenite simulated by the model include oxidation to selenate, uptake by phytoplankton, and adsorption and desorption from minerals. Transformations of dissolved organic selenide include oxidation to selenite and uptake by phytoplankton. Particulate organic selenides can undergo mineralization to form dissolved organic selenide (Cutter 1982). The exchange of selenium between different compartments simulated by the model is shown schematically in Fig. 2, identifying the different dissolved and particulate species, and the exchanges between them. In this formulation, particulates are tracked as three phases, permanently suspended particulates (PSP), composed of fine material that remains in suspension, bed exchangeable particles (BEPS), composed of larger particles that originate from sediment resuspension, and phytoplankton. The transformations among different species of dissolved and particulate selenium are modeled as a set of first-order reactions, labeled with rate constants from k_1 to k_6, an approach similar to that by Meseck and Cutter (2006). Under oxic conditions, such as those occurring in the waters of the NSFB, the key transformations include oxidation of organic selenide to selenite, and further oxidation of selenite to selenate, as well as uptake of all dissolved species by particulate phases (PSP, BEPS, and phytoplankton). Values of the rate constants were estimated from the literature and are listed in Table 2 in the ESM. These ranges were used as a starting point for the modeling, and where the range was broad, the parameters were adjusted to obtain a best fit to the data from the NSFB. In the work, the rate constants k_1 and k_2 were estimated through calibration, whereas k_3 through k_6 were based on literature estimates. In general, these rate constants indicate that the oxidation of organic selenide is relatively rapid, although oxidation of selenite to selenate is a very slow process. Also, uptake of selenide and selenite onto particulate phases was more rapid than for selenate.

Selenium Bioaccumulation Through the Foodweb

Selenium Uptake by Bacteria and Phytoplankton

Dissolved selenium in the water column can be directly taken up by phytoplankton and bacteria. After uptake, selenium exists in reduced organic forms within algal or bacterial cells or is exuded as dissolved organic selenium to the water column. Organic selenium in algal cells is highly bioavailable to organisms that consume them, such as zooplankton and bivalves (Luoma et al. 1992; Schlekat et al. 2000). Therefore, the uptake of selenium by bacterial and planktonic organisms is important in evaluating selenium bioaccumulation in the foodweb. The uptake of selenium by bacteria and phytoplankton is modeled using first-order reactions.

Selenium Bioaccumulation Through Bivalves

Bioaccumulation of particulate selenium to lower trophic level organisms (e.g., bivalves) is simulated using a DYMBAM (Luoma et al. 1992; Stewart et al. 2004; Presser and Luoma 2006). The model predicts metal concentrations in bivalve tissues using concentrations in food, food ingestion rate, metal assimilation efficiency, and elimination rate.

The dynamic form of the DYMBAM model is as follows:

$$\frac{dC_{mss}}{dt} = k_u \times C_w + AE \times IR \times C_f - k_e \times C_{mss} \quad (1)$$

where C_{mss} is selenium concentration in tissue (in micrograms per gram), k_u is the dissolved metal uptake rate

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constant (in liters per gram per day), C_w is the dissolved metal concentrations in water (in micrograms per liter), AE is the assimilation efficiency (in percent), IR is the ingestion rate (in grams per gram per day), C_f is the metal concentration in food (e.g., phytoplankton, suspended particulate matter, and sediment; in micrograms per gram), and k_e is the efflux rate (in day^{-1}). Uptake through the waterborne pathway was found to be negligible (Luoma et al. 1992) and not considered. Parameter values in Eq (1) for uptake of selenium by *C. amurensis* are derived from Stewart et al. (2004) and shown in Table 1. Parameters for different metals and different species of organisms have been quantified in previous studies (summarized in Luoma and Rainbow 2005). The filter-feeding organism *C. amurensis* was found to have a higher assimilation efficiency and lower elimination rate, and thus accumulating selenium to higher concentrations than other bivalve species common in the bay, such as *Corbicula fluminea* (Lee et al. 2006; Linville et al. 2002). Bioaccumulation into bivalves considers different efficiencies of absorption for different selenium species (Table 2). Assimilation efficiencies (AE) measured by Schlekat et al. (2002) for organic selenide are in a relatively narrow range for different species of algae and are generally high (53–89 %). AE for elemental selenium are generally low (2–28 %), with biogenic particulate elemental selenium showing higher AE. In developing model predictions in this work, an AE of 0.2 or 20 % was used for particulate elemental selenium, an AE of 45 % was used for particulate adsorbed selenite+selenate, and an AE of 80 % was used for particulate organic selenium (Fig. 3).

A range of ingestion rates has also been estimated for *C. amurensis* by Lee et al. (2006) and covers a wide range from 0.1 to 1.0 $g g^{-1}$ day^{-1} (Table 1). The ranges in assimilation efficiency and ingestion rates were used to forecast the range of selenium concentrations in bivalves. The predicted selenium concentrations in bivalves were compared with observed data by Stewart et al. (2004). In forecasting the long-term selenium concentrations in bivalves, an ingestion rate of 0.65 $g g^{-1}$ day^{-1} (roughly the midpoint value) was used in model predictions.

Selenium Bioaccumulation to Higher Trophic Levels (Fish and Diving Ducks)

A ratio between selenium concentrations in the tissues and diet of organisms, the trophic transfer factor (TTF) can be used in estimating bioaccumulation of selenium through the food web, once dietary concentrations are known (Presser and Luoma 2010). The ratio can be derived based on kinetic uptake rates or observed concentrations of diet and tissue. For example, the TTF for invertebrates can be derived as: TTF=(AE)(IR)/k_e, where AE is the assimilation efficiency; IR is the ingestion rate, and k_e is the elimination rate. The TTFs are a relatively simple and effective way to incorporate the complex processes of biological uptake from bivalves (e.g., clams) to predator species (e.g., sturgeon and scaup) in this model. The significance of clams in the diet of these species has been reported previously (Stewart et al. 2004). TTFs for fish have been found to vary over a relatively narrow range across species and habitats, based on an examination of data from 29 field studies (Presser and Luoma 2010). For several fish species studied the TTFs for selenium range from 0.52 to 1.6 (Presser and Luoma 2010), and a value of 1.3 was reported for white sturgeon. A TTF of 1.8 has been reported for bird egg concentrations in mallards (Presser and Luoma 2010).

Table 2 Literature values of assimilation efficiencies (AE) for different selenium species for *Corbula amurensis*

Species	AE	Origin	References
Se(0)[a]	2 %	AA—reduction of SeO_3^{2-} to Se(0) through ascorbic acid (AA)	Schlekat et al. (2000)
Se(0)	7±1 %	SES— reduction of SeO_3^{2-} to Se(0) through pure bacteria culture (SES)	Schlekat et al. (2000)
Se(0)	28± 15 %	SED—reduction of SeO_3^{2-} to Se(0) through sediment microbial consortium (SED), biogenic origin	Schlekat et al. (2000)
Selenoanions	11 %	Reoxidized sediment slurries	Schlekat et al. (2000)
Organoselenium	53 %	Ph. Tricornutum	Schlekat et al. (2000)
Cryptomonas sp.	88.9 %	Algae cells	Schlekat et al. (2002)
Gymnodinium sanguinem	82.6 %	Algae cells	Schlekat et al. (2002)
Phaeodactylum tricornutum	80 %	Algae cells	Schlekat et al. (2002)
Synechococcus sp.	78.3 %	Algae cells	Schlekat et al. (2002)
Thalassiosira pseudonana	87.3 %	Algae cells	Schlekat et al. (2002)
Sediment	36 %	Fresh water stream, San Jose, CA	Lee et al. (2006)
Algae (mixed with sediment)	54 %	Diatan, *P. tricornutum*	Lee et al. (2006)

[a]This form of elemental selenium does not occur in nature and was synthesized in the laboratory

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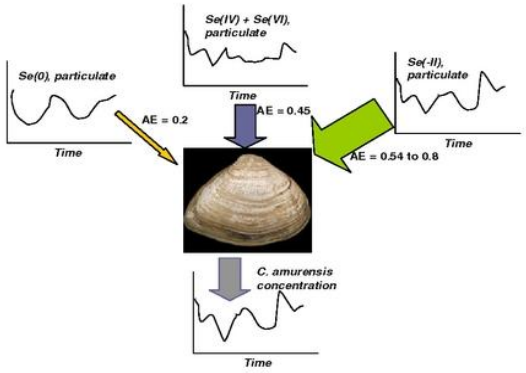

Fig. 3 Bioaccumulation of particulate selenium in bivalves

Model Boundary Conditions and External Loads

Riverine Inputs of TSM and Chlorophyll a

Riverine inputs of flow from the Sacramento River at Rio Vista are daily records from the Interagency Ecological Program (IEP 2010) for the period of 1999–2008. The San Joaquin River is modeled as a tributary to the Sacramento River, with flow derived as the difference between Net Delta Outflow Index and flow from the Sacramento River at Rio Vista.

Riverine inputs (Sacramento and San Joaquin Rivers) of TSM and chlorophyll *a* were estimated as flow at the Sacramento River at Rio Vista and San Joaquin River multiplied by concentrations.

The riverine concentrations of TSM were modeled as a function of flow:

$$\mathrm{TSM}_{\mathrm{river}} = a + b * Q_{\mathrm{river}}{}^{c} \quad (2)$$

where a is the minimum concentration in the river water, b and c are calibration coefficients, and Q_{river} is the riverine flow rate.

Riverine chlorophyll *a* concentrations were observed data obtained from the USGS and Bay Delta and Tributary Project (BDAT) for the Sacramento River at Rio Vista for the period of 1999–2008. For the San Joaquin River, BDAT data for San Joaquin River at Twitchell Island were used.

Selenium Loads from Refineries and Municipal and Industrial Wastewater

Selenium loads to the NSFB include point sources from refineries, municipal and industrial dischargers and tributaries. Point and nonpoint sources of selenium were added to the model cells at their corresponding discharge locations (Table 1 in the ESM).

Daily refinery loads over 1999–2007 from five refineries in the NSFB estimated in Tetra Tech (2008) were used in the model calibration. For the refinery effluent data, only total selenium was reported, and for the purpose of the modeling, the speciation was held constant at values reported by Cutter and Cutter (2004): selenite (13 %), organic selenide (30 %), and selenate (57 %). The daily load varied from day to day depending on the effluent data reported and was 558.8 kg/year for 1999 for all five refineries combined.

Daily selenium loads from local tributaries estimated in a previous assessment (Tetra Tech 2008) were added to the model using the annual load for each hydrological area multiplied by a time series scaling factor, derived from daily flow record at Napa River (USGS station 11458000). No selenium speciation data exist for local tributaries. The speciation from local tributaries is assumed to be the same as from the Sacramento River reported by Cutter and Cutter (2004): selenite (9 %), organic selenide (35 %), and selenate (56 %). The total selenium load from tributaries estimated in the model varies depending on the volume of runoff each year and was 819.7 kg/year for 1999.

Selenium loads from other point sources including municipal and industrial wastewater discharges were also added to the model. Speciation for municipal wastewater discharges used is organic selenide (15 %), selenite (25 %), and selenate (60 %). For 1999, the total loads from these sources were 175.8 kg/year.

Riverine Dissolved Selenium Loads

Dissolved selenium loads for selenate, selenite, and organic selenide were specified from the rivers as a product of flow and selenium concentrations by species. Different species of selenium concentrations were derived using fitted functions

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based on observed data by Cutter and Cutter (2004) at the Sacramento and San Joaquin River stations, similar to the approach used in Meseck and Cutter (2006). A Delta removal constant was used in converting observed selenium concentrations in the San Joaquin River at Vernalis to concentrations at the confluence with Sacramento River. This constant represents exports of San Joaquin River through the aqueducts in the Delta and also the biogeochemical processes of selenium removal within the Delta.

Particulate Selenium Loads

Riverine particulates are assumed to exist in two forms: PSP and BEPS, the latter representing sediment bed-load transport. Riverine particulate selenium inputs are estimated as selenium concentrations associated with PSP and BEPS (both in micrograms per gram), multiplied by riverine inputs of PSP and BEPS (in milligrams per liter). Also added to the particulate loads are the riverine phytoplankton Se loads using a Se/C ratio and chlorophyll *a* concentrations.

Particulate selenium concentrations associated with PSP were measured by Doblin et al. (2006) and showed a range of values. Particulate elemental selenium ranged from 0.08 to 0.40 μg/g (mean, 0.149±0.108 μg/g), particulate selenite and selenate range from nondetectable to 0.25 μg/g (mean, 0.270±0.137 μg/g), and organic selenide concentrations ranged from 0.015 to 0.74 μg/g (mean, 0.134±0.238 μg/g) at Sacramento River at Rio Vista (Doblin et al. 2006). Particulate selenium concentrations associated with BEPS are data from Meseck and Cutter (2012). The total particulate selenium at Rio Vista is 0.46 μg/g (the sum of particulate organic, inorganic, and elemental selenium). Higher selenium content on particulates may be expected during low flows (e.g., 0.75 μg/g in November 1999). Therefore, the model was also run using a higher riverine particulate selenium concentration of 0.75 μg/g for a low flow period (river flow, $<1.5\times10^{10}$ l/day) (Table 3). Particulate selenium concentrations at the seawater end of the model domain observed by Doblin et al. (2006) ranged between 0.84 and 1.18 μg/g at Golden Gate Bridge. A seawater end member concentration for each species of particulate selenium was specified corresponding to measured values at Golden Gate.

Model Calibration and Evaluation

Model Calibration

Before the model is used to predict selenium concentrations on particulates and bivalves, it was calibrated for physical parameters (salinity and TSM), phytoplankton, and dissolved and particulate selenium species, using observed general water quality data (from cruises conducted by the USGS, http://sfbay.wr.usgs.gov/access/wqdata/) and selenium speciation data sampled by Cutter and Cutter (2004) for 1999. Calibration for the general water quality parameters was conducted based on data from 19 USGS monitoring stations located in the NSFB and was roughly on monthly intervals from January 1999 to December 1999. The use of the USGS dataset supplements data used in the previous study by Meseck and Cutter (2006), which was mainly based on Cutter and Cutter (2004) data. Selenium speciation data collected during two time periods in 1999 (April and November) by Cutter and Cutter (2004) were used in model calibration for selenium. Water year 1999 was selected for calibration because detailed refinery discharge data and selenium speciation data are available for this year, and selenium loads from refineries decreased by about two thirds in mid-1998 and have stayed at approximately those levels since that time. The 1999 estuary data thus represent conditions following refinery load reductions. Key model calibration parameters are those that affect advection and dispersion of PSP and BEPS, phytoplankton growth rate and grazing rate, selenium transformation rates, and Delta removal constants for selenium inputs from the San Joaquin River.

Model Evaluation Criteria (Goodness of Fit)

The model goodness of fit was evaluated using two measures: the correlation coefficient (r) between predicted and observed values, a goodness of fit defined in Perrin et al. (2001).

$$\mathrm{GOF}(\%) = 100^{*}\left(1 - \left|\sqrt{\frac{\sum X_{\mathrm{cal}}}{\sum X_{\mathrm{obs}}}} - \sqrt{\frac{\sum X_{\mathrm{obs}}}{\sum X_{\mathrm{cal}}}}\right|\right) \qquad (4)$$

where X_{cal} is the model simulated concentration and X_{obs} is the

Table 3 Lower and higher boundary of riverine and seawater endmember concentrations (Doblin et al. 2006; Meseck 2002; Baines et al. 2004)

	Riverine boundary				Seawater boundary
	PSP PSe (μg/g)	BEPS PSe (μg/g)	Se/C in phytoplankton (μg/g)	PSP PSe (μg/g)	Se/C in phytoplankton (μg/g)
Lower boundary	0.46	0.25	15.9	0.84	21.0
Higher boundary (applied when Net Delta Outflow Index, $<1.5\times10^{10}$ l/day)	0.75	0.50	15.9	1.18	21.0

No comments

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observed concentration. A 100 % goodness of fit indicates a perfect fit between simulated and observed values.

Model Evaluation

The model evaluation was conducted using long-term data available for years after 1999, which include several low and high flow years, for the period of 1999–2008. The calibrated model was evaluated against estuarine profile data collected by USGS for salinity, TSM, and phytoplankton for two specific water years 2001 and 2005, and long-term total selenium data collected by the San Francisco Bay Regional Monitoring Program (RMP) for water year 2001 through water year 2007 (RMP 2010). The RMP dataset reports dissolved and total selenium and does not include characterization of selenium speciation and the separation of dissolved and particulate selenium. The difference between total and dissolved selenium, although in principle an approximation of particulate selenium, is not an accurate representation of particulate selenium, and sometimes negative values may result. Water year 2001 was selected because it was a dry year, with flows much lower than 1999 and water year 2005 was selected because it was a relatively wet year based on the commonly used classification by the California Department of Water Resources (DWR 2010). The evaluation was for both simulations along the length of the estuary and at fixed locations over long-term time periods, for both physical and biological parameters and selenium species concentrations.

Model Hindcast

Model hindcasting is another form of evaluation and provides insight on model's capability to simulate conditions that are different from the calibration period in terms of hydrology and internal selenium loading. The calibrated model was run to hindcast selenium concentrations during two time periods prior to refinery load reductions in 1986 and 1998. To simulate selenium concentrations in 1986 and 1998, river discharges from the Sacramento River at Rio Vista and the San Joaquin River at Jersey Point for 1986 and 1998 were used (obtained from IEP 2010). Selenium loads of different species from the refineries for 1986 and 1998 were based on data from Meseck (2002).

Results

Model Evaluation for the Post-1999 Period

The calibrated model was evaluated against estuarine profile data on salinity, TSM, and phytoplankton for water years 2001 and 2005 collected by USGS, and long-term total selenium data collected by RMP for water year 2001 through water year 2005 (RMP 2010). The water year 2001 represents a dry year, with flows much lower than 1999 and water year 2005 represents a relatively wet year, as noted above.

Evaluation of salinity, TSM, and chlorophyll *a* for the low flow year 2001 suggested good agreement of simulated salinity versus observed values for different months across the year (Figs. 1, 2, and 3 in the ESM). Overall values for goodness of fit for these months are between 71.5 and 97.9 % for salinity, 36.4 and 99.4 % for TSM, and 53.7 and 95.7 % for chlorophyll *a*. The location of the estuarine turbidity maximum (ETM) was simulated well for most months in 2001, particularly for June and July 2001. For about 2 months, chlorophyll *a* concentrations were under-predicted near the Central Bay, similar to the pattern in the calibration. For the evaluation period, the simulated correlation coefficient (r) is 0.92–1.00 for salinity in 2001, 0.68–0.97 for TSM in 2001, and 0.02–0.79 for chlorophyll *a* in 2001.

A similar evaluation of salinity, TSM, and chlorophyll *a* was performed for an above-normal flow year (2005) (Figs. 4, 5, and 6 in the ESM). Salinity predictions showed very good agreement with the observed data (GOF=50.4–99.7 %). The evaluation of TSM for 2005 shows good agreement for the first several months, particularly for January, March, and June 2005. For April and May 2005, the ETM was under-predicted (GOF=48.2–97.7 %). This is similar to the results in the calibration phase where the ETM was under-predicted on some occasions. Chlorophyll *a* predictions were able to represent the average values through the estuary but did not capture the peaks (GOF=25.2–98.5 %).

Simulated TSM and chlorophyll *a* concentrations were also evaluated for longer time periods at fixed locations, using data from the USGS long-term monitoring stations (Figs. 7 and 8 in the ESM). The model-simulated chlorophyll *a* and TSM concentrations were compared with long-term data at four stations, stations 3 (Suisun Bay), 6 (Suisun Bay), 14 (San Pablo Bay), and 18 (Central Bay), respectively. The results suggest that the model is able to capture the seasonal variations in chlorophyll *a* and TSM relatively well.

Although the calibration process for the general water quality parameters was extensive, and generally described key constituents of interest across a range of years, seasons, and loading conditions using a relatively small number of adjustable parameters, several features could not be fully captured by the model. This includes peaks in concentrations for constituents such as TSM and phytoplankton, represented by chlorophyll *a* concentrations. This is likely attributable to the limitations of the 1-D model in capturing the complexities of processes in the NSFB, and also to seasonal changes that were not fully parameterized during calibration.

Comparison of simulated selenium concentrations against the RMP transect sampling data for the period of 2000–2005 suggested that the model simulates profiles of

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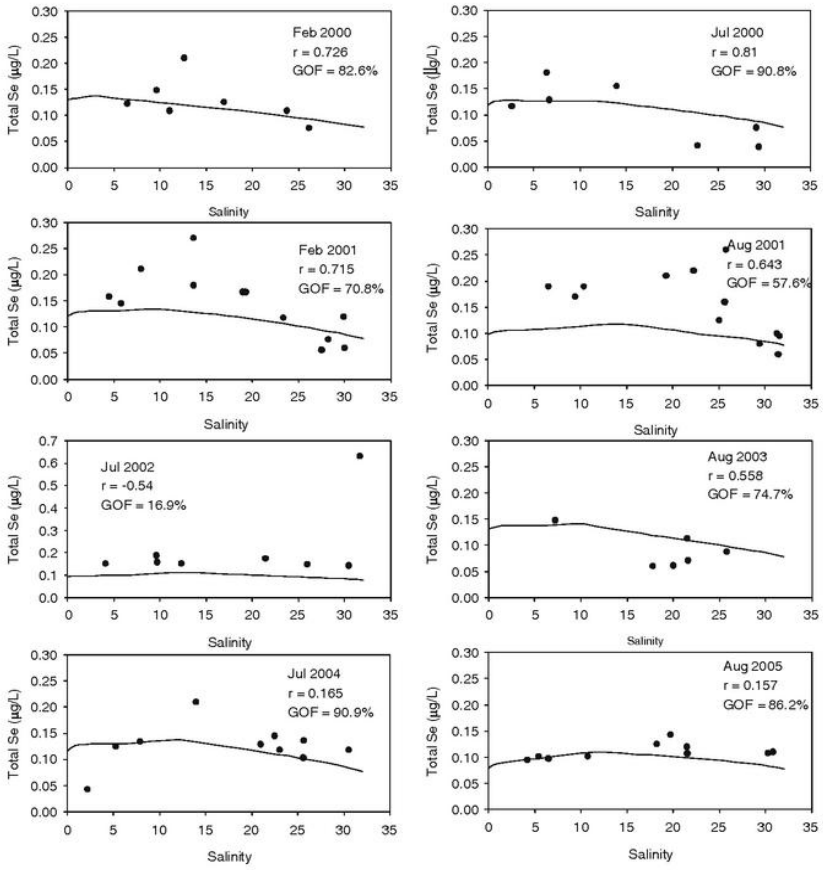

Fig. 4 Model simulated total selenium concentrations (dissolved+particulate) compared with selenium data collected by the San Francisco Bay RMP. Note that the RMP dataset does not report selenium species information, and no selenium speciation data are available for this period in NSFB. RMP data on the Internet at: http://www.sfei.org/rmp/data

selenium concentrations along the estuarine longitude well for a range of hydrological and load input conditions during 2000–2005, including both dry and wet years, and dry and wet season conditions (Fig. 4), and the long-term variations in selenium concentrations at fixed locations (Fig. 5).

Model Hindcast

The model hindcast (prior to refinery selenium load reductions) suggests that the model-simulated salinity, TSM and chlorophyll *a* compared well with the observed values for both high and low

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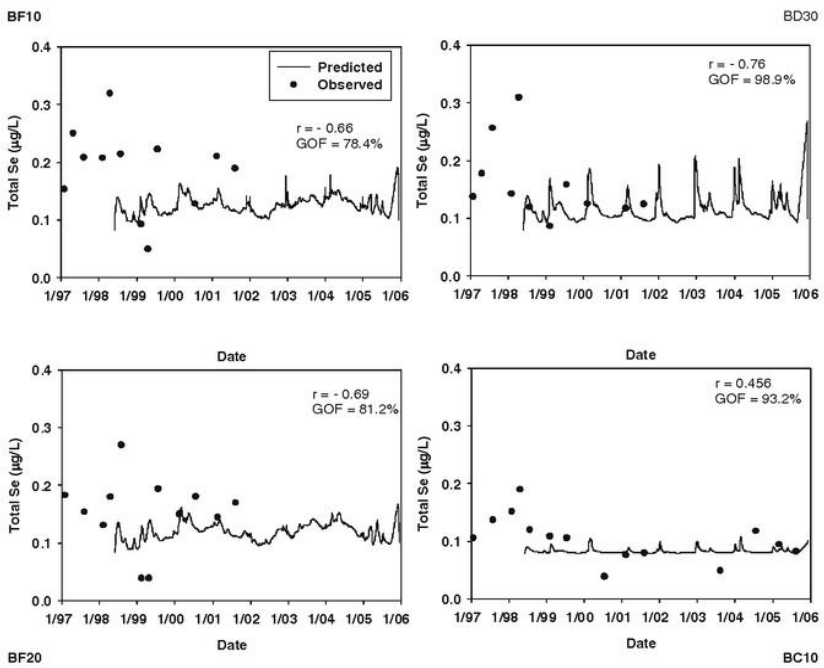

Fig. 5 Model simulated total selenium concentrations at BF10 (Suisun Bay), BF20 (Suisun Bay), BD30 (San Pablo Bay), and at BC10 (Central Bay) compared with observed total selenium by RMP. RMP data on the Internet at: http://www.sfei.org/rmp/data

flow. The model is able to simulate the ETM that occurred during October 1998. The hindcast of dissolved selenium suggests that the model is able to simulate the relatively conservative mixing behavior of selenium during high flow periods and the mid-estuarine peaks during low flow, a result similar to that previously reported in Meseck and Cutter (2006). Simulated selenium concentrations on particulates for the hindcast period compared well with the observed particulate selenium values, and suggested that the model can represent the behavior of selenium on particulates in different periods (Fig. 6).

Simulated Selenium Concentrations on Particulates and Biota

Simulated selenium concentrations on particulate matter (in micrograms per gram) for 11 November 1999 were compared with the observed data from Doblin et al. (2006; Fig. 7). The predicted mean particulate selenium concentrations for NSFB for 11 November 1999 is 0.77±0.35 µg/g, compared with the observed value of 0.735±0.25 µg/g (r=0.45).

Predicted selenium concentrations in *C. amurensis* near Carquinez Strait as a function of time were compared with data from Stewart et al. (2004) and are shown in Fig. 8 for a range of ingestion rates and different assimilation efficiencies of organic selenium used.

Clam selenium concentrations are also available for a longer time period of 1995–2010 from USGS (Kleckner et al. 2010). Simulated clam selenium concentrations at Carquinez Strait for the time period prior to refinery load reductions (1995–1998) and following refinery load reductions (1999–2010) using an ingestion rate of 0.65 gg^{-1} day^{-1} and a seawater particulate selenium boundary of 1.05 µg/g were compared with these data (Fig. 9). The model is generally able to capture the seasonal and long-term patterns in clam selenium concentrations over a period with variability in hydrology and loading. Lower

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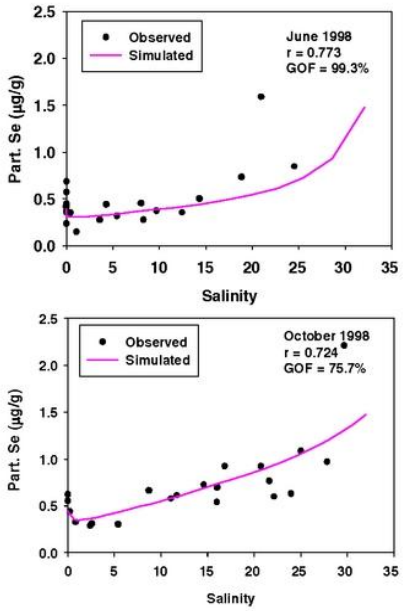

Fig. 6 Model simulated hindcast values of particulate selenium for June and October 1998

selenium concentrations in bivalves are coincident with high flow periods (e.g., April) and wet years (e.g., 2005 and 2006).

Simulated selenium concentrations in muscle and liver tissues of white sturgeon and greater scaup using TTF and regression equations from Presser and Luoma (2006) were compared with observed values in the NSFB (Figs. 10 and 11). White sturgeon sampled from San Francisco Bay-Delta between 1986 and 1990 contained selenium at concentrations ranging from 9 to 30 µg/g dw (mean, 26.55 µg/g) in liver and 7 to 15 µg/g in muscle tissue (mean, 12.57 µg/g; Urquhart and Regalado 1991; White et al. 1988). Lower selenium concentrations in livers of white sturgeon were reported by another study (mean: 9.75 µg/g) between 2002 and 2004 (Linares et al. 2004, cited in Linville 2006). Predicted selenium concentrations in muscle tissue of white sturgeon are 10.7 µg/g using a TTF of 1.3.

Evaluation of Future Management Scenarios

To test the changes in particulate selenium as a result of load changes from the rivers, particularly from the San Joaquin River, the model was run assuming that all the San Joaquin River flow at Vernalis will reach the Bay. This is in contrast with current conditions, where a significant part of the San Joaquin flow is withdrawn from the Delta into aqueducts. Under the elevated flow condition, it was assumed that the residence time of San Joaquin River water in the Delta significantly decreases, and, as a worst-case from the standpoint of selenium loading to NSFB, the Delta removal effect of selenium on San Joaquin River water was considered to be zero. Therefore, the scenario assumes higher inputs of selenium as a result of both increase in flow from the San Joaquin River and the loss of the Delta removal effects on selenium.

Model simulations using San Joaquin River flow at Vernalis were compared with simulation results using normal San Joaquin River flow (base case). Under the base case, flow from the San Joaquin River was estimated as the difference between Delta outflow and flow from the Sacramento River at Rio Vista. Simulated dissolved and particulate selenium concentrations were higher under the scenario of increased San Joaquin River flow than the base case, for both high- and low-flow periods (Fig. 12).

Predicted model-simulated selenium concentrations on particulates (in micrograms per gram) are significantly higher under the scenario of increased San Joaquin River flow, particularly for the upper estuary. Setting the flow of the San Joaquin River to the measured flow at Vernalis, particulate selenium concentrations are nearly doubled with increases greater than 0.4 µg/g predicted in the upper estuary (Fig. 12). These increases may lead to corresponding increases in clam concentrations. The application of this modeling framework to a wider range of loading and flow scenarios is presented in a technical memorandum developed as part of the selenium TMDL process (Tetra Tech 2010).

Discussion

Model Uncertainties

Model calibration involved the selection of the principal transformation rates that pertain to flow, salinity, sediment transport, phytoplankton growth, and selenium chemistry. Many of these were based on values reported in the scientific literature, although about half the parameters were estimated by adjusting values to fit observed data. The model was calibrated to data primarily from 1999, for which detailed selenium speciation data in the estuary were available.

For the simulation period, the model is able to capture key aspects of physical and biological constituents that affect selenium concentrations. The model simulates salinity

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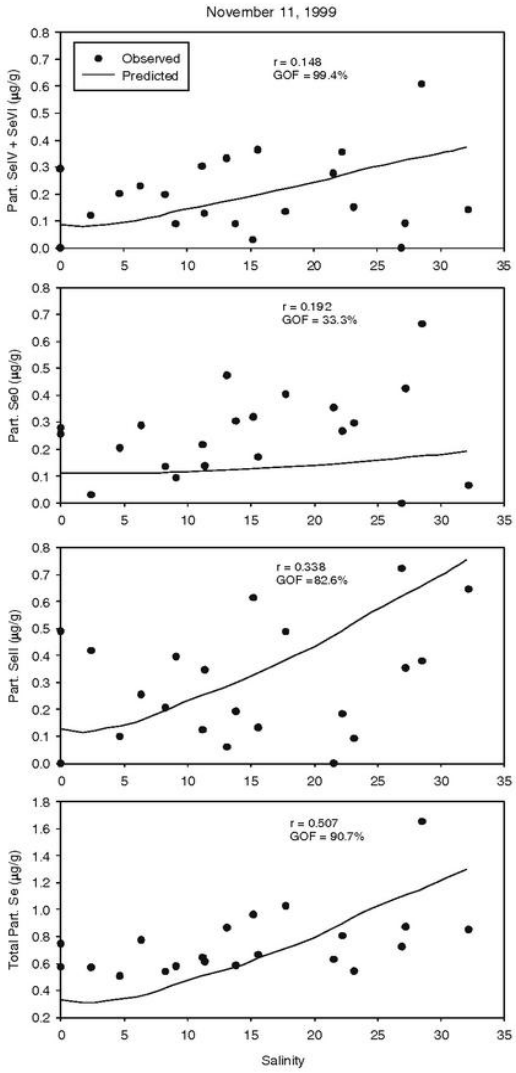

Fig. 7 Simulated particulate selenium compared with the observed data from Doblin et al. (2006) for November 1999

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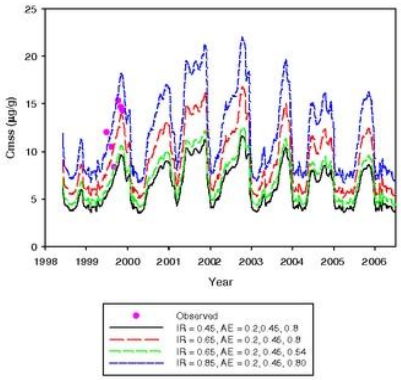

Fig. 8 Simulated selenium concentrations in bivalve *C. amurensis* near the Carquinez Strait compared with observed values from Stewart et al. (2004; station 8.1)

along the estuary well for different hydrological conditions. The evaluation results for phytoplankton and TSM over short-time periods (during specific sampling events for selected years) and long-term periods for multiple years indicated that the model is able to simulate the general temporal and spatial pattern in TSM and phytoplankton, although specific-day peaks may not match very well. For phytoplankton, a few spring blooms are not captured by the model as the model uses a single light limitation function to simulate growth, which limits phytoplankton growth in spring months. Overall, for ancillary parameters, especially TSM and phytoplankton, the model does better at fitting average concentrations than peak concentrations. To some extent this is a consequence of the 1-D formulation of the model, although local variability in driving parameters cannot be ruled out. However, given the hydrodynamic complexities of San Francisco Bay, the inter-annual and seasonal variability in hydrology, this 1-D model produces reasonable results of the ancillary variables for use in computing selenium fate and transport.

The simulated selenium species include dissolved forms such as selenite, selenate and organic selenide and particulate species such as adsorbed selenite and selenate, particulate organic selenide and particulate elemental selenium. The transfer of dissolved selenium to particulate selenium is simulated through kinetic adsorption and phytoplankton uptake and not through equilibrium partitioning. Uptake of selenium by phytoplankton included kinetic uptake of selenite, organic selenide, and selenate, in decreasing order of importance. The uptake rates used in the model simulations are similar to rates used in Meseck and Cutter (2006). During calibration, the model was able to fit the patterns in concentrations of dissolved selenate and selenite well, although it performed less well for dissolved organic selenide. This may be due to the method used for determining dissolved organic selenide (estimated as the difference of total dissolved selenium minus the dissolved selenite+selenate). Therefore the errors and uncertainty in the dissolved organic selenide may be larger. This also may be due to local variations in phytoplankton abundance and species, which may affect uptake of selenium and releases of dissolved organic selenium.

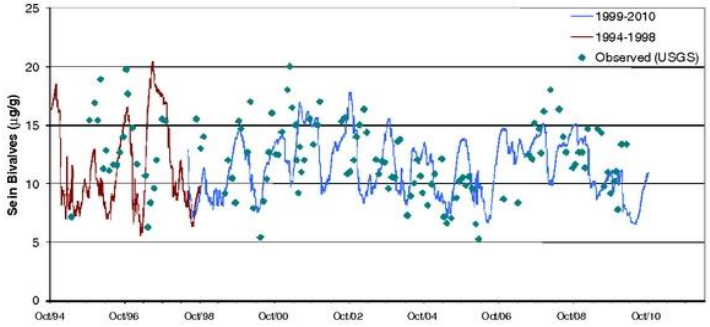

Fig. 9 Simulated selenium concentrations in bivalve *C. amurensis* compared with long-term data from USGS at the Carquinez Strait for the period of 1995–2010 (Kleckner et al. 2010). Flow data used—DAYFLOW records from the California Department of Water Resources; refinery data used—daily data for 1999–2007, constant loads after 2007; San Joaquin River Selenium—observed data at Vernalis, multiplied by Delta removal constants with fixed speciation—selenite (SeIV), 0.028; Se(VI), 0.658; and OrgSe, 0.314

No comments

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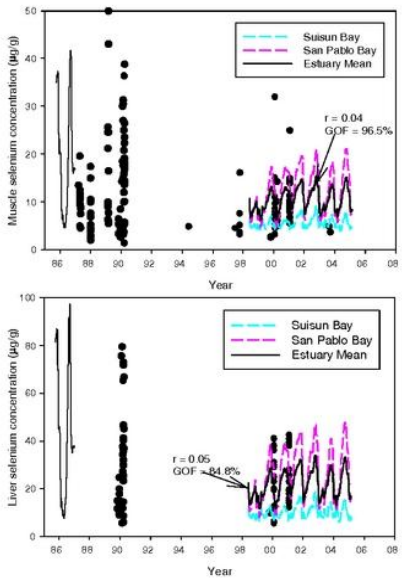

Fig. 10 Simulated selenium concentrations in muscle tissue and liver of white sturgeon at Suisun Bay and San Pablo Bay compared with observed values (White et al. 1988, 1989; Urquhart et al. 1991, USGS and SFEI), using TTF = 1.3 for muscle tissue(Presser and Luoma 2010) and regression equation from Presser and Luoma (2006; for liver concentrations)

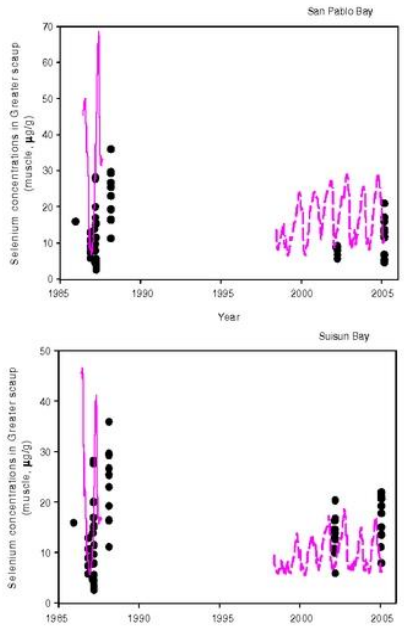

Fig. 11 Simulated selenium concentrations muscle tissue of diving ducks (dry weight; Greater Scaup) compared with observed data in San Pablo Bay and Suisun Bay, respectively (White et al. 1988, 1989; Urquhart et al. 1991; SFEI), using TTF = 1.8

Similarly, the model was able to fit the particulate selenate plus selenite better than the particulate organic selenide. In general, the model was better able to represent the broad trends in concentration better than the localized spatial variation. The reasons underlying this behavior are not fully understood and may relate to local variability or to small scale processes that are not captured in the 1-D model with 33 cells representing a 100-km long modeling domain.

Future model development may seek to address some of the shortcomings of the modeling presented here, such as the occasional inability to represent the estuarine turbidity maximum and the chlorophyll *a* peaks, the uncertainties in riverine and ocean boundary conditions and their effect on the conclusions, and the difficulty in capturing large local-scale variability in organic selenium concentrations, which may be partly due to the complexity and limited understanding of phytoplankton growth dynamics and species distribution.

A sensitivity analysis of the various model parameters was performed. The analysis indicated that the model is relatively sensitive to parameters that affect the location and magnitude of the TSM. Dissolved and particulate selenium concentrations are most sensitive to the riverine input parameters (Table 3 in the ESM). Particulate selenium concentrations are sensitive to selenium content on particulates at the riverine boundary. Dissolved and particulate selenium are less sensitive to selenium transformation coefficients such as phytoplankton uptake and selenite adsorption rates. Particulate organic selenide and particulate selenium are also sensitive to increases in phytoplankton growth rates. The relatively high sensitivity of particulate organic selenium, particulate selenium, and dissolved selenite to increases in phytoplankton growth rate (also as an indicator of phytoplankton concentrations) underscores how certain species of selenium are closely tied to phytoplankton concentrations. In addition, particulate organic selenide is also sensitive

No comments

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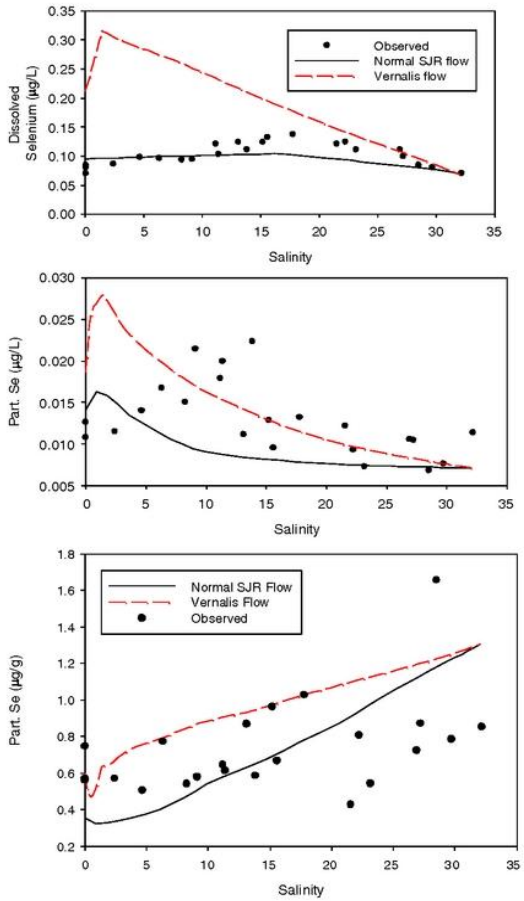

Fig. 12 Predicted dissolved and particulate selenium for different San Joaquin River discharge rates during a low flow period (11 November 1999)

to its mineralization rate. Through adjustment of several of these parameters, the ECoS framework was able to capture the essential behavior of selenium and ancillary parameters in NSFB. Future work in the bay focusing on these components of selenium behavior, including characterization of the riverine boundary and phytoplankton growth and uptake, may enhance the robustness of the modeling.

Temporal Variations in Selenium Concentrations in Clams

The recently reported *C. amurensis* concentration data from San Francisco Bay (Kleckner et al. 2010) illustrate internannual and inter-seasonal patterns in clam concentrations from 1995 to 2010, a period over which there have been variations in freshwater inflows as well as changes in the

No comments

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selenium loading, particularly changes in refinery wastewater loading in 1998, and a general reduction in San Joaquin River loads through selenium source control actions in the San Joaquin River watershed. Over this period of record, two features stand out in the observed clam data: there has not been a large reduction in clam concentrations despite the load changes, and there is a significant amount of inter-seasonal and inter-annual variability, with the lowest concentrations in each year occurring during the high flow months, and the highest concentrations occurring in the low-flow months. Seasonal high concentrations are almost a factor of two as high as the low concentrations.

The seasonal pattern is a feature of the clam data and cannot be explained by the dissolved selenium concentration data alone, as the dissolved data do not show a similar seasonal pattern. However, the modeling framework presented in this study does provide a plausible hypothesis, as outlined below. Particulates in the bay, especially phytoplankton, can have higher selenium concentrations (on a microgram-per-gram basis), than particulates originating in the riverine source in Rio Vista (with a greater mineral fraction). High flow periods are associated with high particulate loads from Rio Vista, largely made up of Sacramento River flows, resulting in lower average selenium concentrations in the bay than during low-flow periods. Thus, changes in selenium concentrations in clams from one year to the next appear to be influenced significantly by hydrology, with wet years (such as 2005 and 2006) resulting in lower clam concentrations. This hypothesis does not consider changes in the rate of selenium uptake as a function of the clam's life cycle, although such a process may also be a factor in the overall variation. There are, however, insufficient data to independently evaluate the significance of the growth effect at this time. An evaluation of the Kleckner et al. (2010) data showed no consistent relationships between clam size (as represented by mean shell length) and selenium concentrations. The hypothesis developed here through the integration of best-available data and modeling provides insight into the future management of selenium concerns in NSFB, although it must be re-evaluated as new data and process-level information become available.

The long-term trends in selenium concentrations in clams (1995–2010) suggest the importance of in-estuary transformations in affecting particulate and biota selenium concentrations in addition to the external loads. Given the decreases in external loads over the study period (both from the refineries and the San Joaquin River), dissolved selenium concentrations in the bay have shown a more direct response to these changes. However, the corresponding changes in particulate selenium are generally minimal, as reported previously in Doblin et al. (2006). As shown through the modeling framework presented here, this could be due to the fact that phytoplankton in the estuary are still able to concentrate relatively high selenium concentrations, which contribute to relatively high particulate selenium concentrations that enter the food web, and result in continued high concentrations in the clams. In effect, this framework indicates that particulate selenium concentrations, and therefore the concentrations in filter feeders, such as clams, are not a simple linear function of dissolved concentrations. Accurate predictions of concentrations in the food web require accurate characterization of particulate concentrations, through observations where possible, or through adequate characterization of uptake by the particulate phases. The model developed here is a tool for supporting such predictions.

Summary and Conclusions

The ECoS model framework was applied to the NSFB for computing salinity, TSM, and chlorophyll *a*, and for selenium concentrations. The model was calibrated to data from 1999, because this is the most recent year for which speciated selenium data in the water column of the NSFB are available. The three ancillary constituents, salinity, TSM, and chlorophyll *a*, were calibrated using monthly water quality cruise data reported by the USGS. Although the ancillary water quality data in the bay are relatively abundant for the calibration of a 1-D model, the calibration period was limited by the availability of selenium data. Following calibration, where model parameters, especially the first-order rate constants that represent selenium transformation and uptake were estimated, the model was applied to different years for evaluating its performance. The calibrated model performed well under different hydrological and load conditions, and was able to simulate salinity, TSM, and chlorophyll *a* profiles for both dry years (e.g., 2001) and wet years (2005), and long-term TSM and chlorophyll *a* concentrations variations. The calibrated model was also run in a hindcast mode using hydrological and refinery loads for 1998. Selenium species and loads in this period were different from current loads, and the hindcast was another test of the credibility of the model. The simulated dissolved selenium concentrations compared well with the observed data. The model was able to simulate the mid-estuarine peaks in selenite for low flow of 1998. This indicates the location and magnitude of the selenium input from point sources and the transport and transformation of selenium are represented well in the model. Simulated particulate selenium concentrations also compared well with the observed values.

The model was able to simulate different selenium speciation and the bioavailability of each species, therefore is able to simulate selenium concentrations on particulates relatively well for different time periods (e.g., 1999 and 1998). The model could also represent the long-term variations (inter-annual and seasonal) in clam selenium concentrations for both prior-to refinery clean up (1994–1998) and post-refinery clean

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up time periods (1998–2010), including years with high and low clam selenium concentrations. The accumulation of selenium to higher trophic organisms is simulated using a TTF approach, which is able to represent selenium concentrations in white sturgeon and greater scaup in the bay.

A scenario of increasing flow and selenium loads from the San Joaquin River was also examined using the calibrated model. The results suggest that when flow from the San Joaquin River is a greater contributor to outflow from the Delta, significant increases in dissolved and particulate selenium, and selenium on particulates, are predicted in the bay. This would be expected to increase clam concentrations. This is of interest for long term planning for selenium management in NSFB, because there are plans being evaluated by the state of California to make changes in the way water is exported from the Delta through intakes further upstream in the Sacramento River, and by use of an isolated conveyance facility (CALFED 2008). Manipulations to the Delta system, especially those that increase San Joaquin flow into the bay, will also have selenium impacts to the bay that must be evaluated.

Although simplified through a 1-D representation, the modeling approach presented here is able to capture key features of selenium behavior at a level of complexity that is consistent with data that can be measured in the bay in future years. A benefit of the model is its ability to link sources to biota concentrations under a range of hydrologic conditions, and with mechanistic representations of transport, transformation and uptake processes. The mechanistic representation allows consideration of selenium uptake under future conditions, with changes in background water quality, hydrology, and the food web structure, which may be related to human interventions or natural causes. The modeling framework as developed, or with changes to reflect underlying processes and Delta modifications, can be used to explore selenium management options in San Francisco Bay in the context of the TMDL.

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No comments

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No comments

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APPENDIX D
TOXINS

WORKING DRAFT
BAY DELTA CONSERVATION PLAN

January 2012

ICF INTERNATIONAL

No comments

- n/a -

Working Draft

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Appendix D
Toxins

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No comments

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No comments

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Figures

Appear at the end of the appendix.

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Figure D-2 Methylmercury Cycling in Aqueous System

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Acronyms and Abbreviations

µg/g	micrograms per gram
µg/L	micrograms per liter
AWQC	ambient water quality criteria
Bay-Delta	San Francisco Bay–Sacramento–San Joaquin River Delta
BDCP	Bay-Delta Conservation Plan
cfs	cubic feet per second
CM	Conservation Measure
CRT	Criterion Total Recoverable
Cu	copper
Cu^{2+}	cupric ion
DBW	California Department of Boating and Waterways
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
Delta	Sacramento–San Joaquin River Delta
DOC	dissolved organic carbon
DRERIP	Delta Regional Ecosystem Restoration Implementation Plan
EDC	Endocrine-disrupting compounds
EEQ	estradiol equivalent
EIS/EIR	environmental impact statement/environmental impact report
EPA	U.S. Environmental Protection Agency
FRV	Final Residual Value
kg/yr	kilograms per year
LLT	late-long-term
ng/L	nanograms per liter (equivalent to1 part per trillion, or ppt)
NH3+	ammonia (also referred to as un-ionized ammonia)
NH4+	ammonium ion
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NTR	National Toxics Rule
OEHHA	Office of Environmental Health Hazard Assessment
PCBs	Polychlorinated biphenyls
POD	pelagic organism decline
ROAs	restoration opportunity areas
Se	selenium
Se^{2-}	selenides
Se^{4+}	selenites
Se^{6+}	selenates
TMDL	total maximum daily load
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WWTP	wastewater treatment plant

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No comments

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Appendix D
Toxins

D.1 Executive Summary

Toxins have been identified as adverse stressors in the Delta ecosystem and have been associated with pelagic organism decline (POD) (Baxter et al. 2010; Glibert 2010; Glibert et al. 2011). Some of these toxins are contaminants that have been introduced to the ecosystem, and others are naturally occurring constituents in the Delta that have been mobilized and/or concentrated by anthropogenic activities. Although contaminants in water can be directly lethal to biota at very high concentrations, toxins usually occur at concentrations much below lethal levels, enter the food chain at lower trophic levels, and can become more concentrated higher up in the food chain. Sublethal levels in fish result in various effects, including impaired growth and reproduction, and increase in the organism's susceptibility to disease (Werner et al. 2008).

The preliminary proposal (PP) will not introduce new toxins or increase the concentrations of toxins in the Plan Area directly. , with the exception of herbicides, which would be applied in limited and safe concentrations to control invasive aquatics weeds. However, the PP includes restoration and changes in water operations that have the potential to change how toxins already present in the Plan Area are mobilized and transported in the Plan Area . To determine whether PP actions would influence the exposure to and effects of toxins on covered fish species, potential mechanisms for PP actions to result in increased concentrations and bioavailability of toxins first were identified and evaluated. This was achieved by developing conceptual models that included all factors that influence the environmental fate and transport, mobility in an aquatic system, and bioavailability to covered fish species for each toxin. Quantitative analyses are applied where they were useful in describing factors within the conceptual models, and if data inputs and available analytical and modeling tools were deemed sufficient to provide reliable results. As discussed in this appendix, given the complex nature of toxin biogeochemistry, area hydrology, and behavior and physiology of covered fish species that together determine the effects of toxins, quantitative analyses alone were not sufficient to fully examine potential effects. The environmental toxins evaluated in this appendix were selected based on historical and current land use along with published literature regarding water quality in the Delta and the types of toxins that have effects on fish.

- Mercury and methylmercury
- Selenium
- Copper
- Ammonia/um
- Pesticides
  - Pyrethroids
  - Organochlorines
  - Organophosphates

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No comments

- n/a -

Based on results of the evaluation presented in this appendix, PP water operations are not expected to affect toxins significantly in the Sacramento–San Joaquin River Delta (Delta) through either increased mobilization or transport. Two primary pathways of effects on toxins were examined in connection with water operations, an increase in the proportional amount of flow from the San Joaquin River and a reduction in flow in the Sacramento River.

The first pathway is the potential for increased loading of selenium from increased contributions of water from the San Joaquin watershed as Sacramento River inputs were diverted by north Delta intakes. Based on the evaluation of current and expected future reductions in selenium from the San Joaquin watershed, and source-water fingerprinting that indicates no increase of San Joaquin water contribution at Suisun Marsh and a only a slight increase in the south Delta, minimal effects on selenium or associated effects on covered fish species are expected.

The second issue connected to PP water operations is the potential for decreased dilution capacity of the Sacramento River, especially for Sacramento Regional Wastewater Treatment Plant (WWTP) effluent, and more specifically for ammonia and pyrethroids. Modeling results presented in Appendix C indicate that reduced dilution capacity in the Sacramento River at the Sacramento WWTP will result from changes in upstream reservoir operations associated with the PP, not from diversion of water to the Yolo Bypass or from north Delta intakes located downstream of the WWTP. Quantitative analysis presented in this appendix indicates that the Sacramento River will have sufficient dilution capacity under the PP for both ammonia and pyrethroids to avoid adverse effects from these toxins on the covered fish.

Restoration actions will result in some level of mobilization and increased bioavailability of methylmercury, copper, and pesticides (including organophosphate, organochlorine and pyrethroid pesticides). Given current information, it is not possible to estimate the concentrations of these constituents that will become available to covered fish species, but review of the conceptual models for each of these toxins indicates that the effects should be limited both temporally and spatially. The most problematic of these potential effects is methylmercury. To address this issue, the Plan includes Conservation Measure (CM) 12 Methylmercury Management, which provides for site-specific assessment of restoration areas, integration of design measures to minimize methylmercury production, and site monitoring and reporting. The areas with the highest potential for methylmercury generation are the Yolo Bypass, and to a lesser extent, the Mokelumne-Cosumnes River. With the implementation of CM12, effects of methylmercury mobilization on covered fish at the tidal wetland restoration sites are expected to be minimized.

In general, the following conclusions can be drawn.

- Preliminary proposal water operations will have few to no effects on toxins in the Delta.
- Preliminary proposal restoration will increase bioavailability of certain toxins, especially methylmercury, but the overall effects on covered fish species are expected to be localized and of low magnitude.
- Available data suggest that species exposure to toxins would be below sublethal and lethal levels.
- The long-term benefits of restoration will reduce exposure to existing toxins in the environment and eliminate sources.

A summary of conclusions from the toxins analysis is presented in Table D-1. The color coding in the table is based on consideration of the potential for an increase in the bioavailability of toxins due to

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No comments

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preliminary proposal actions, presence of covered fish species/life stages, and expected potential for effects on covered species/life stage. Based on this analysis, none of the scenarios was rated as *High* potential for effects.

- **None—**Areas with potential for increase in toxins due to the PP, but susceptible life stage of covered species is absent (also applies if there is fish occurrence, but no toxins).
- **Low—**Areas with potential for increase in toxins due to PP and susceptible life stage of covered species present, but evaluation shows little potential for effects.
- **Moderate—**Same as *Low*, but evaluation shows moderate potential for effects.
- **High—**Same as *Moderate*, but evaluation shows high potential for effects based on mobilization of toxins into the foodweb and effects on covered fish species.

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No comments

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2 **Table D-1. Potential for Effects of Toxins on Covered Fish Species from the Preliminary Proposal**

Species	Life Stage	BDCP Regions							
		Yolo Bypass	Cache Slough	North Delta	West Delta	Sulsun Bay	Sulsun Marsh	East Delta	South Delta
Delta smelt	Eggs	M, C	M, C	C, S, P*	C, S, P		M, S*	M*	S, P*
	Larva	M, C	M, C	C, S, P*	C, S, P	S	M, S*	M*	S, P*
	Juvenile	M, C	M, C	C, S, P*	C, S, P	S	M, S*	M*	S, P*
	Adult	M, C	M, C	C, S, P*	C, S, P	S	M, S*	M*	S, P*
Longfin smelt	Eggs	M, C	M, C	C, S, P*	C, S, P		M, S		
	Larva	M, C	M, C	C, S, P*	C, S, P	S	M, S	M*	S, P
	Juvenile	M, C	M, C	C, S, P*	C, S, P	S	M, S		S, P
	Adult	M, C	M, C	C, S, P*	C, S, P	S	M, S		S, P
Steelhead	Egg/Embryo								
	Fry								
	Juvenile	M, C	M, C	C, S, P	C, S, P	S	M, S	M	S, P
	Adult	M, C	M, C	C, S, P	C, S, P	S	M, S	M	S, P
Winter-run Chinook salmon	Egg/Embryo								
	Fry	M, C	M, C	C, S, P	C, S, P				
	Juvenile	M, C	M, C	C, S, P	C, S, P	S	M, S	M	S, P
	Adult	M, C	M, C	C, S, P	C, S, P	S	M, S	M	
Spring-run Chinook salmon	Egg/Embryo								
	Fry	M, C	M, C	C, S, P	C, S, P				
	Juvenile	M, C	M, C	C, S, P	C, S, P	S	M, S	M	S, P
	Adult	M, C	M, C	C, S, P	C, S, P	S	M, S	M	
Fall-/late fall-run Chinook salmon	Egg/Embryo								
	Fry	M, C	M, C	C, S, P	C, S, P	S	M, S	M	S, P
	Juvenile	M, C	M, C	C, S, P	C, S, P	S	M, S	M	S, P
	Adult	M, C	M, C	C, S, P	C, S, P	S	M, S	M	S, P

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No comments

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Species	Life Stage	BDCP Regions							
		Yolo Bypass	Cache Slough	North Delta	West Delta	Sulsun Bay	Sulsun Marsh	East Delta	South Delta
Sacramento splittail	Egg/Embryo	M		C, S, P*			M, S	M	S, P
	Larvae	M		C, S, P*			M, S	M	S, P
	Juvenile	M	M	C, S, P*	C, S, P	S	M, S	M	S, P
	Adult	M	M	C, S, P*	C, S, P	S	M, S	M	S, P
White sturgeon	Egg/Embryo								
	Larva	M	M	C, S, P*	C, S, P			M	S, P
	Juvenile	M	M	C, S, P*	C, S, P	S	M, S	M	S, P
	Adult	M	M	C, S, P*	C, S, P	S	M, S	M	S, P
Green sturgeon	Egg/Embryo								
	Larva								
	Juvenile	M, C	M, C	C, S, P*	C, S, P*	S*	M, S*	M*	S, P*
	Adult	M, C	M, C	C, S, P*	C, S, P*	S*	M, S*	M*	S, P*
Pacific lamprey	Egg/Embryo								
	Ammocoete	M, C	M, C	C, S, P*	C, S, P*			M	S, P*
	Macropthalmia	M, C	M, C	C, S, P*	C, S, P*	S*	S*	M*	S, P*
	Adult	M, C	M, C	C, S, P*	C, S, P*	S*	M, S*	M*	S, P*
River lamprey	Egg/Embryo								
	Ammocoete	M, C	M, C					M	
	Macropthalmia	M, C	M, C	C, S, P*	C, S, P*	S*	M, S*	M*	S, P*
	Adult	M, C	M, C	C, S, P*	C, S, P*	S*	M, S*	M*	S, P*

* Scoring partially based on low abundance of species/life stage in the area.
M = mercury, P = pesticides, S = selenium, C = copper
Categories of effect of toxin as result of BDCP:

	None
	Low
	Medium
	High

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No comments

- n/a -

D.2 Organization of Appendix

This appendix presents a discussion of the toxins that are widely recognized as significant to determining the potential of the Delta ecosystem to support covered fish species, and how potential changes to toxins caused by the preliminary proposal could affect covered fish species. To do this, the appendix provides a general overview of toxic constituents currently present in the Delta aquatic ecosystem, identifies and assesses changes in toxins that could result from implementation of the preliminary proposal, and describes how those changes could result in changes in exposure of covered fish species to toxins. The analysis focuses only on changes in toxins that are directly attributable to the preliminary proposal actions that could affect covered fish species.

Water quality parameters, including salinity, turbidity, and temperature, are integrated with the hydrologic flow analyses and are discussed in Appendix C. Results of the flow analysis are included in this appendix where they support analysis of toxins. This appendix discusses only covered fish species. Ecological effects, including food chain and organisms other than covered fish species, are evaluated in Appendix F, *Ecological Effects*.

The approach in this toxins analysis is to develop a complete picture of all factors that contribute to the bioavailability and effects of these toxins on covered fish species. Qualitative conceptual models are presented that capture and describe all determining factors. The conceptual models draw from those developed by the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP), along with other relevant information sources. Quantitative analyses are used where they are useful in describing factors within the conceptual models, and if data inputs and available analytical and modeling tools are deemed sufficient to provide reliable results. As discussed in this appendix, given the complex nature of toxin biogeochemistry, area hydrology, and behavior and physiology of covered fish species that together determine the effects of toxins, quantitative analyses alone were not sufficient to fully examine potential effects.

The analyses in this appendix are presented in two steps. The first step identifies effects on toxins that are directly attributable to preliminary proposal actions. The second step evaluates the potential for these changes in toxins to affect covered fish species, at what life stages, and where in the preliminary proposal study area. The general approach to the analysis for each toxic constituent is outlined below.

1. Determine effects of preliminary proposal actions on potentially toxic constituents in the Delta ecosystem.
    a. Describe the environmental chemistry of each parameter, the source of the element, how it is transported in the environment, and where it tends to accumulate.
    b. Discuss preliminary proposal actions that could result in changes in toxic water constituents, at what locations and when (if there is a seasonal component).
2. Determine effects of changes in potentially toxic constituents on covered fish species.
    a. Compare the spatial/temporal occurrence of each covered fish species/life stage with changes in toxins, identifying where changes in toxins coincide temporally and spatially with the presence of covered fish species.
    b. Discuss how preliminary proposal–induced changes to toxins could affect covered fish species/life stages in the Delta.

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No comments

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D.3 Overview of Toxins as Stressors

Stressors act on the environment by changing flow, water quality, temperature, or other attributes that determine the suitability of habitat for a species. Toxins have been identified as adverse stressors in the Delta ecosystem and have been associated with POD (Baxter et al. 2010; Glibert 2010; Glibert et al. 2011). Some of these toxins are contaminants that have been introduced to the ecosystem, and others are naturally occurring constituents in the Delta that have been mobilized and/or concentrated by anthropogenic activities. Although contaminants in water can be directly lethal to biota at very high concentrations, contaminants usually occur at concentrations much below lethal levels, enter the food chain at lower trophic levels, and can become more concentrated higher up in the food chain. Sublethal levels in fish result in various effects, including impaired growth and reproduction, and increase in the organism's susceptibility to disease (Werner et al. 2008).

D.3.1 Selection of Toxin Stressors for Analysis

Water quality characteristics and the presence of contaminants (toxins) in the environment are determined by both natural conditions and land use. The primary land uses affecting toxins in the Delta include historical mining operations in the mountains drained by Delta tributaries, agriculture in the Delta and tributaries, discharges related primarily to rural human habitation (wastewater), and discharges related to urban development (stormwater runoff, municipal wastewater, industrial wastewater). The types of contaminant issues typically associated with these land uses are presented in Table D-2 and discussed further in the following paragraphs.

Table D-2. Land Use and Typically Associated Contaminant Issues

Land Use	Typical Discharges/Operations	Typical Contamination Issues
Mining (historical)	Concentrated mining waste	Mercury and copper (specific to mining operations local to Delta)
Agriculture	Fertilizers	Nutrients (ammonia)
	Pesticides	Copper
	Drainage	Pesticides
		Selenium*
Rural human habitation	Wastewater discharge	Nutrients (ammonia)
Urban development	Municipal wastewater treatment plant discharge	Nutrients (ammonia), pesticides, endocrine disruptors
	Stormwater runoff	Metals, pesticides, petroleum residues (PAHs)
	Industrial waste discharges	Metals, PCBs (from historical discharges)
* Selenium from agricultural drainage is specific to locations like the Delta that have high levels of naturally occurring selenium in soils, which are concentrated in agricultural drainage.		

Historical mining of mercury and gold resulted in concentrating and mobilizing certain metals that occur naturally in the mountains of the upper tributaries. Metals are present in rocks, soils, and sediments to varying degrees, dependent on the source rocks. During the mining process, naturally occurring metals were mobilized, transported via streams, and deposited in sediments of the Delta marshes, wetlands, and streambeds.

No comments

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Agriculture has been the primary land use in the Delta for more than a century (Wood et al. 2010). In the Plan Area, 503,779 acres (59%) are used for agriculture (see Chapter 2, *Existing Conditions*). The pesticides, herbicides, and fertilizers applied to agricultural lands throughout the Delta are present in the soils where they were applied but also have migrated off the farmed properties via air, groundwater, runoff, and rivers and are dispersed throughout all environmental media in the Delta ecosystem. The majority of pesticides used in the Delta fall into three families of pesticides—organochlorides (including dichlorodiphenyltrichloroethane [DDT]) were used historically and now are banned, and pyrethroids and organophosphates are currently in use.

Rural developments associated with agricultural land use have minimal discharge of toxins. The main types of discharges are relatively small volumes of wastewater, typically through local septic systems.

Cities and towns account for only 8% of the Plan Area (70,174 acres). The main urban centers are the cities of Sacramento and West Sacramento located on the Sacramento River, and the city of Stockton located on the San Joaquin River (Wood et al. 2010). Although urban development accounts for a small percentage of land use in the Delta, urban discharges have affected the aqueous environment. Release of toxins to water typically associated with urban development is related to stormwater and WWTP discharges.

Stormwater typically is characterized by varying levels of metals, pesticides, and hydrocarbons that can accumulate in river sediments over time. Historically, polychlorinated biphenyls (PCBs) often were associated with urban discharge, and these contaminants have been detected in fish tissues in San Francisco Bay, although there is little research on PCB levels in the Delta.

Wastewater discharges from WWTPs also are associated with urban and suburban land use. Wastewater contains high levels of nutrients, and the concentrations in effluent are dependent on the level of the treatment system. In the Delta, ammonia historically has been problematic in both the Sacramento and San Joaquin Rivers; however, planned and functioning upgrades to WWTPs have resulted or will result in reductions in ammonia (discussed later in this appendix). Both stormwater runoff and effluent from the Sacramento WWTP have been shown to contain pesticides, including pyrethroids (Weston et al. 2010). Although this will be discussed further, it should be noted that the north Delta intakes are downstream of the Sacramento WWTP discharge and would not affect dilution of effluent.

Endocrine-disrupting compounds (EDCs), which include many of the pesticides, are also referred to as *emerging contaminants* and also are found in urban runoff and wastewater discharges. EDCs include many different types of chemicals from a wide range of sources with widely varying chemical attributes, and their distribution in the Delta is not yet fully understood.

The environmental toxins discussed in this appendix were selected based both on land use discussed above and on other literature that identifies primary constituents of concern to fish in the Delta. The U.S. Environmental Protection Agency (EPA) identified ammonia, selenium, pesticides, and contaminants of emerging concern (including endocrine disruptors) for more focused evaluation in *Water Quality Challenges in the San Francisco Bay/Sacramento–San Joaquin Delta Estuary* (U.S. Environmental Protection Agency 2011). Toxins of concern also are identified under the Clean Water Act Section 303(d) list provided in Table D-3. Those for which total maximum daily load (TMDL) studies have been completed are listed in Table D-4. These lists identify the same toxins listed above plus furans, dioxins, PCBs, mercury/methylmercury, and pathogens. Dioxin, furans, and pathogens are listed only for Stockton, and *E. coli* (a pathogen) is listed for the east Delta.

No comments

- n/a -

Table D-3. Clean Water Act 2010 Section 303(d) Listed Pollutants and Sources in the Plan Area

Pollutant/Stressor	Listing Region	Listed Source	Delta Location of Listing
Chlordane	Central Valley	Agriculture, Nonpoint Source	N, W
Chlorpyrifos	Central Valley	Agriculture, Urban Runoff/Storm Sewers	N, S, E, W, NW, C, Exp, Stk
DDT	Central Valley	Agriculture, Nonpoint Source	N, S, E, W, NW, C, Exp, Stk
Diazinon	Central Valley	Agriculture, Urban Runoff/Storm Sewers	N, S, E, W, NW, C, Exp, Stk
Dioxin Compounds	Central Valley	Source Unknown, Atmospheric Deposition	Stk
E. Coli	Central Valley	Source Unknown	E
Invasive Species	Central Valley	Source Unknown, Ballast Water	N, S, E, W, NW, C, Exp, Stk
Furan Compounds	Central Valley	Contaminated Sediments, Atmospheric Deposition	Stk
Group A Pesticides[a]	Central Valley	Agriculture	N, S, E, W, NW, C, Exp, Stk
Mercury	Central Valley	Resource Extraction	N, S, E, W, NW, C, Exp, Stk
Pathogens	Central Valley	Recreational and Tourism Activities (non-boating), Urban Runoff/Storm Sewers	Stk
PCBs	Central Valley	Source Unknown	N, Stk
Unknown Toxicity[b]	Central Valley	Source Unknown	N, S, E, W, NW, C, Exp, Stk
Electrical Conductivity	Central Valley	Agriculture	S, W, NW, Stk
Organic Enrichment/ Low Dissolved Oxygen	Central Valley	Municipal Point Sources, Urban Runoff/Storm Sewers	Stk
Sediment Toxicity	Central Valley	Agriculture	E
Total Dissolved Solids	Central Valley		S

Source: <http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml>. Accessed: November 16, 2011.

DDT = dichlorodiphenyltrichloroethane , PCB = polychlorinated biphenyls.

Delta Locations: C = central, E = east, Exp = export area, N = north, NW = northwest, S = south, STK = Stockton Deep Water Ship Channel, W = west.

[a] Group A pesticides include aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, BHC (including lindane), endosulfan, and toxaphene.

[b] Toxicity is known to occur, but the constituent(s) causing toxicity is unknown.

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No comments

- n/a -

Table D-4. Summary of Completed and Ongoing Total Maximum Daily Loads in the Delta

Pollutant/Stressor	Water Bodies Addressed	Total Maximum Daily Load Status
Chlorpyrifos and Diazinon	Sacramento County urban creeks	TMDL report completed—September 2004 State-federal approval—November 2004
	Sacramento and San Joaquin Rivers and Delta	TMDL report completed—June 2006 State-federal approval—October 2007
	Sacramento and Feather Rivers	TMDL report completed—May 2007 State-federal approval—August 2008
	Lower San Joaquin River	TMDL report completed—October 2005 State-federal approval—December 2006
Methylmercury	Delta	TMDL report completed—April 2010
Pathogens	Five-Mile Slough, Lower Calaveras River, Mormon Slough, Mosher Slough, Smith Canal, and Walker Slough	TMDL report completed—March 2008 State-federal approval—May 2008
Pesticides	Central Valley	Ongoing
Organochlorine Pesticides	Central Valley	Ongoing
Salt and Boron	Lower San Joaquin River	TMDL report completed—October 2005 State-federal approval—February 2007
Selenium	San Joaquin River	TMDL report completed—August 2001 State-federal approval—March 2002
Low Dissolved Oxygen	Stockton Deep Water Ship Channel	TMDL report completed—February 2005 State-federal approval—January 2007
Source: <http://www.swrcb.ca.gov/water_issues/programs/tmdl/#rb5>. Accessed: November 17, 2011.		

The environmental toxins evaluated in this appendix were selected based on historical and current land use along with published literature regarding water quality in the Delta and the types of toxins that have effects on fish.

- Mercury and methylmercury
- Selenium
- Copper
- Ammonia/um
- Pesticides
  - Pyrethroids
  - Organochlorines
  - Organophosphates

Working Draft

No comments

- n/a -

D.4 Methods

To evaluate effects on covered species, published data on occurrence, biogeochemical behavior, mass balances, quantitative modeling tools, and studies of impacts of specific toxic constituents on covered fish species were reviewed. There are a broad range of available studies specific to the Central Valley and Delta region, many of which are referenced in this appendix. The objective of the analysis in this appendix is to provide an overview of how these constituents could become more bioavailable to covered fish species in the Plan Area and whether there is potential for preliminary proposal actions to result in effects on covered species.

A qualitative framework or conceptual model is presented to evaluate the potential effects of BDCP conservation measures on toxins in the Delta environment, and the possible effects on covered fish species. The effects on covered fish species are dependent more on the increase in both bioavailability and concentration of a given toxin than on just the increase in concentration of the toxin in the water. Given the currently available analytical tools, available occurrence data, and the breadth of the Plan Area, a purely quantitative approach is unable to capture the environmental/ chemical factors that result in transformation of a chemical to a form that is more bioavailable and toxic in the ecosystem. Where available field data and quantitative modeling tools were deemed sufficient to capture the relevant aspects of the constituent in estimating impacts, quantitative model results are presented along with a full discussion of the conceptual model for each constituent. Where quantification would lead to results with very high margins of error and uncertainty and would not appropriately inform or define the effects on covered species, effects were discussed only qualitatively with the objective of determining the probability of effects on covered species.

For reference, the EPA Ambient Water Quality Criteria (AWQC) for chronic exposures (AWQC-Fresh Water-Chronic) are included in the discussions of each toxin for context. The AWQC-Fresh Water-Chronic is expressed as the highest concentration of a substance in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. It should be emphasized that the role of the effects analysis is to evaluate effects on covered species, and not compliance with the Clean Water Act, Basin Plans, or other regulatory guidelines. However, ecological benchmarks are provided where they are useful in evaluating effects.

Presented below is a more detailed description of the components that were examined to develop the qualitative conceptual models, and the quantitative tools that were used to more fully describe the potential effects of toxins on covered fish species. The models were developed to describe the biogeochemistry that determines how these toxins partition in the aqueous system (to sediment, water, or biota), how they are taken into the foodweb, and the potential effects on the covered fish species.

D.4.1 Problem Formulation

Historical and current land use in the Delta has resulted in the release of potentially toxic constituents into the environment. The effects of toxic constituents on the Delta ecosystem have been identified as contributing to the POD described by Baxter (2010). Preliminary proposal actions may serve to increase or decrease the presence and effects of the toxic constituents already present in the Delta and are deserving of attention in this effects analysis.

No comments

- n/a -

D.4.2 Conceptual Model

Multiple chemical-specific, environmental, and species-specific factors contribute to determining whether a constituent will cause toxic effects on biota. The general conceptual model outlined below and illustrated in Figure D-1 is intended to provide a framework to evaluate these factors and a full description of the potential for each toxin to affect covered fish species under preliminary proposal actions.

The textual explanations in the following sections are meant to provide definitions of factors included in the conceptual model shown in Figure D-1 and information on how the factors work together to determine the ultimate effects on covered fish species. The conceptual model is meant to summarize and synthesize a complex system that integrates chemical-specific biogeochemistry with site-specific environmental factors and species/life stage–specific physiology.

D.4.2.1 Conceptual Model Components—Toxin Biogeochemistry

The toxins identified in the Delta environment and the fate and transport of these chemicals, along with the propensity for these chemicals to enter the food chain, are evaluated through analysis of the factors discussed below.

D.4.2.1.1 Fate and Transport

The conceptual model for toxins includes a discussion of the biogeochemistry of the chemical and the fate and transport characteristics. The analysis of fate and transport involves identifying the source of the toxin in the Delta, how the constituent is transported and accumulates in the ecosystem, and the chemical properties that cause it to partition to sediment/water/air/biota. This analysis integrates the environmental setting and hydrology to determine how and where the toxin is transported from its source area to other parts of the Delta.

The basic chemical characteristics that determine how a toxin is transported and partitions in the environment include solubility in water, tendency to sorb to particulates, and volatility (tendency to occur as a vapor). A toxin with high water-solubility can migrate dissolved in rivers. Alternatively, metals and some pesticides often have low solubility in water and tend to sorb to particulates and organic carbon, so they typically are found in sediments closer to the source.

Chemicals can be broken down in the environment by chemical or biological processes. The rate of this degradation is measured by a chemical-specific half-life, which is the time it takes for half of the mass to break down. Chemical degradation includes photodegradation, where the toxin is chemically broken down by sunlight. Biological degradation is usually a product of bacterial degradation of organic chemicals.

Water chemistry also affects the fate, transport, partitioning, and bioavailability of a toxin in an aqueous system. Salinity, hardness, temperature, pH, organic carbon, and redox potential (in sediments) influence the form that a chemical will take. In many cases, certain forms of a given toxin (species or ionic state) determine partitioning and the ultimate toxicity. For example, copper is more toxic in the cupric species (2+), than in the cuprous species (1+).

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No comments

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D.4.2.1.2 Bioavailability, Bioaccumulation

Bioavailability is a measure of the ability of a toxic to cross the cellular membrane of an organism, to become incorporated in that organism, and to enter the food chain (Semple 2004). Not all toxins are in a form that can be taken up by an organism. Bioavailability is not only chemical-specific, but it also can be specific to the chemical form that a constituent takes. For instance, copper in the 2+ state is more bioavailable than copper in the 1+ state, making the first form much more toxic than the second. Mercury in an organic complex as methylmercury is much more bioavailable and toxic than elemental mercury or mercury complexed with an inorganic compound.

In addition to the availability of the chemical to be taken up by biota, some chemicals are magnified more through the food chain. *Bioaccumulation* often is loosely used interchangeably with the term *biomagnification*. Strictly speaking, bioaccumulation occurs at any one trophic level or in any one species (and age-class) as a pollutant is ingested inside of food items or absorbed from the environment and thereby *accumulates* to some concentration in tissues of organisms at that particular trophic level or in that particular species (and age-class). In contrast, *biomagnification* more properly refers to increases in tissue concentrations of a pollutant as it passes upward through the food chain, from prey to predator, to the topmost, mature predators. In these top predators tissue concentrations may be harmful both to the animal (especially to offspring) and to those that consume it. A common example of a pollutant bioaccumulating and biomagnifying to harmful levels is the buildup of mercury in large game fish such as tuna or striped bass. In summary, bioaccumulation happens within a specific trophic level; biomagnification occurs over multiple trophic levels.

Bioaccumulation is a function of the chemical's specific characteristics and the way that the organism metabolizes the chemical—such as whether it is metabolized and excreted, or stored in fat. Toxins that are bioavailable and lipophilic (tend to accumulate in fatty tissue of an organism and are not very water soluble) typically bioaccumulate at higher rates. If stored, the chemical can biomagnify in the food chain, for example, mercury and some pesticides.

D.4.2.2 Conceptual Model Components—Effects of Preliminary Proposal Actions on Toxins

For the purposes of this analysis, the BDCP conservation measures are grouped as either water operations or restoration, as depicted on Figure D-1. The mercury mitigation conservation measure also will be discussed within the restoration actions.

The primary concern with the BDCP habitat restoration measures regarding toxins is the potential for mobilizing toxins sequestered in sediments of the newly inundated floodplains and marshes. This appendix provides an overview of what toxins are known to be present in these areas and the biogeochemical behaviors that will determine whether they could be mobilized into the aquatic environment and the food chain by restoration actions.

The greatest potential for effects on toxins related to the preliminary proposal water operations is the potential for changes in dilution and mixing of existing toxins. For instance, certain toxins, such as selenium, are known to be present in the San Joaquin watershed. A change in the proportion of San Joaquin water inputs to the Delta relative to the Sacramento River could result in diminished dilution (and increased concentrations) in the Delta of toxins from the San Joaquin watershed. Reduction of flows in the Sacramento River downstream of north Delta intakes also may result in decreased dilution of toxins in the Delta.

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No comments

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D.4.2.3 Conceptual Model Components—Effects of Changes in Toxins on Covered Fish Species

The previous steps determine if and where preliminary proposal actions potentially could change the amounts and bioavailability of toxins. This step looks at how these changes could affect covered fish species. The toxic effects of a chemical are determined by how it works on a biochemical level. Some of the types of effects are listed in Figure D-1 under *Toxic Effects*. Toxins can target specific tissues, organs, or organ systems. For example, toxins that affect the neurological, immune, or endocrine systems typically lead to potential effects on behavior, ability to combat disease, and reproduction, respectively. Certain toxins tend to accumulate in particular tissues or organs, such as the fatty tissues, liver, or kidneys; those that accumulate in fatty tissues have a greater potential to bioaccumulate. These factors determine the overall effect of the toxin on the organism, and whether it will affect reproductive, developmental, or adult life stages. Effects of a particular toxic chemical can vary between species, and also between life stages within a species. The conceptual model for this effects analysis considers all these factors.

D.5 Results—Effects of Preliminary Proposal Conservation Measures on Toxins

D.5.1 Mercury

D.5.1.1 Mercury—Location, Environmental Fate, and Transport

Mining operations in the mountains drained by Central Valley tributaries resulted in transport and widespread deposition of mercury into the water and sediments of the Delta ecosystem. Mercury, in the form of the mineral cinnabar, was mined mainly from the Coastal Range. In the Sierra Nevada and Klamath-Trinity Mountains, mercury was used for gold recovery in placer and hard-rock mining operations (Alpers and Hunerlach 2000; Alpers et al. 2005). Inorganic mercury was transported with sediment loads by creeks and rivers draining the mountains and became distributed throughout the riverbed, marsh, wetland, and floodplain sediments of the Delta, with highest concentrations in upper tributaries.

The Sacramento River is the primary transport route of methylmercury to the Delta and contributes about 80% of riverborne mercury inputs (Stephenson 2007; Wood 2010). The amounts of methylmercury, or organic mercury, will correspond roughly with these percentages. In the Sacramento River watershed, the highest concentrations of mercury are found in Cache Creek and the Yolo Bypass where Cache Creek terminates. Cache Creek, which drains a former mining area, is the largest contributor of mercury to the Delta, as it drains 2% of the area in the Central Valley and contributes 54% of the mercury (Foe 2008). Methylmercury concentrations decrease significantly (by 30% to 60%) downstream of Rio Vista, where concentrations were at or below 0.05 nanograms per liter (ng/L) (Foe 2003; Woods 2010).

Relative to the Sacramento River, the San Joaquin River is a relatively minor contributor of methylmercury to the Delta. Methylmercury water concentrations in some waters of the San Joaquin watershed are comparable or higher than the Sacramento River, but overall loading is minor because of the low flows. The Mokelumne-Cosumnes River is the greatest contributor of mercury in the San Joaquin watershed, but accounts for only 2.1% of the total methylmercury in the Delta, with

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an average concentration of 0.17 ng/L (Woods 2010). Marsh Creek, which drains the Mt. Diablo mining area, contributes a small percentage (0.04%) because of its size, but it does have relatively high average concentrations of methylmercury estimated at 0.25 ng/L (Woods 2010). Bear Creek and Mosher Creek, which drain a former mining area, are also high in mercury, with concentrations reported at 0.31 ng/L (Woods 2010). These creeks are also small and contribute a relatively small percentage to the overall mercury budget in the Delta.

For reference, the current Criterion Continuous Concentration (AWQC-Fresh Water-Chronic) for mercury in fresh water is 770 ng/L (0.77 micrograms per liter [µg/L]). The criteria can be applied to total mercury (organic plus inorganic mercury), but they are derived from data for inorganic mercury (III) and therefore should be considered underprotective if a substantial portion of mercury occurs as methylmercury. The Delta is listed on the Clean Water Act Section 303(d) list as an impaired water body for mercury in fish tissues (State Water Resources Control Board 2011).The TMDLs for methylmercury in the Delta and in San Francisco Bay are provided in Table D-5. The TMDL for the Delta was approved recently.

Table D-5. Mercury and Methylmercury TMDLs in the Delta and San Francisco Bay

Analyte	CTR[a]	EPA Recommended Criteria[b]	Delta Methylmercury TMDL[c]	San Francisco Bay Mercury TMDL[d]
Mercury (ng/L)	50	770	–	25
Methylmercury (ng/L)	–	–	0.06	–

CTR = California Toxics Rule.
[a] Criterion for the protection of human health from total recoverable mercury in fresh water (U.S. Environmental Protection Agency 2006c).
[b] Criterion for the protection of chronic exposure from total mercury to freshwater aquatic life (U.S. Environmental Protection Agency 2006c).
[c] The recommended water column TMDL concentration of methylmercury for the protection of fish bioaccumulation (Central Valley Regional Water Quality Control Board 2011).
[d] The recommended water column 4-day average TMDL concentration for total mercury (U.S. Environmental Protection Agency 2006c).

The chemistry of mercury in the environment is complex (Figure D-2). Elemental mercury and mercury in the form of inorganic compounds have relatively low water solubility and tend to accumulate in soils and sediments. When mercury forms an organic complex called monomethylmercury (commonly referred to as methylmercury), it becomes more water soluble and the toxicity and bioavailability are greatly enhanced, making it a primary concern for ecosystem effects. The toxicity of methylmercury is amplified as it biomagnifies through the foodweb. Because of the widespread presence of toxic methylmercury in the Delta, much recent research has been completed on the cycling of methylmercury through the physical environment and biota of the area. The biogeochemistry of mercury in an aqueous system is illustrated on Figure D-2.

Conversion of inorganic mercury to methylmercury occurs in flooded fine sediments subjected to periodic drying-out periods and is associated with anaerobic (oxygen-depleted), reducing environments (Alpers et al. 2008; Ackerman and Eagles-Smith 2010). Methylmercury production is higher in high marshes that are subjected to wet and dry periods over the highest monthly tidal cycles; production appears to be lower in low marshes that are always inundated and not subject to dry periods (Alpers et al. 2008). Relatively high rates of methylmercury production also have been

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attributed to agricultural wetlands, mainly rice fields (Windham-Myers et al. 2010). Numerous other factors affect methylation of mercury in estuarine environments in addition to inundation regime; they include vegetation, grain size, pH, availability of binding constituents (iron, sulfur, organic matter), and factors influencing success of the microbes responsible for the methylation process (nutrients and dissolved oxygen) (Alpers et al. 2008; Wood et al. 2010).

In-situ production of methylmercury in Delta sediments is an important source of this toxin to the Delta ecosystem. Several investigators have quantified inputs of methylmercury to the Delta from sediments, with varying results (Stephenson 2007; Byington 2007; Foe 2008; Wood et al. 2010). Results of the CALFED Mercury Project Annual Report for 2007 (Stephenson 2007) indicate that river inputs (11.5 grams per day [g/day] methylmercury) and in-situ production from wetland/marsh sediments (11.3 g/day methylmercury) are the leading sources of methylmercury to the Delta waters, and have roughly comparable levels of input. Wood (2010) estimates that in-situ methylmercury production in open water and wetlands contributes approximately 36% of the overall methylmercury load to the Delta (approximately 5 g/day) but is less than riverine/tributary inputs (8 g/day). The higher estimate of methylmercury production from sediments reported by Stephenson is based on periods of higher water (wet) and may be more representative of what might occur when new restoration opportunity areas (ROAs) are opened for inundation, especially when combined with the effects of sea level rise.

Despite all sources of methylation, the Delta remains a net sink for waterborne methylmercury, and photodegradation that results in demethylation of mercury may be an important factor in methylmercury losses from the system (Stephenson et al. 2008).

In the methylmercury budgets developed by Woods (2010), Foe (2008), Byington (2007), and Stephenson (2007), photodegradation rates are higher than sediment production rates for methylmercury. Gill (2008) identified photodegradation of methylmercury as potentially the most effective mercury detoxification mechanism in the Delta.

Specific photodegradation rates vary on daily and monthly timescales, as the process is dependent on light intensity (Gill 2008). Photodegradation of methylmercury occurs in the photic zone of the water column (the depth of water within which natural light penetrates) and as such can be expected to occur in a large portion of the shallow, newly inundated ROAs. At the 1% light level, the mean depth for the photic zone in the Delta was calculated to be 2.6 meters, with measured depths ranging from 1.9 meters to 3.6 meters (Gill 2008; Byington 2007). Gill and Byington also conclude that photodegradation may be most active in the top half-meter of the water column in the Delta.

Mediated by sunlight, photodegradation occurs at higher levels in the dry season than in the wet season, with minimum photodegradation rates occurring December through February and maximum degradation rates occurring in May and June (Byington 2007). Research by Byington indicates that photodegradation of methylmercury in marshes and tules in the Delta is severely diminished by reduced light penetration resulting from the presence of high dissolved organic carbon (DOC), turbidity, and aquatic vegetation.

Atmospheric deposition also may contribute to the mercury load; however, estimated daily loads are an order of magnitude lower than most other sources to the Delta and constitute approximately 1% of the entire methylmercury load contributed from external and in-Delta sources (Wood et al. 2010). In addition, atmospheric contributions are not anticipated to be altered by preliminary proposal actions. Therefore, atmospheric deposition can be considered an insignificant source from the perspective of assessing preliminary proposal effects.

No comments

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D.5.1.2 Mercury—Effects of Preliminary Proposal Conservation Measures

Quantitative modeling was performed to estimate the effects of preliminary proposal water operations on mercury and methylmercury in the aquatic system and on covered species. Modeling was based on DSM2 output that estimated changes in water flows under preliminary proposed actions. Results were considered in the context of a qualitative discussion to fully capture some of the factors that were not quantified, including mercury methylation in ROAs and biogeochemical factors that affect concentrations, environmental partitioning, degradation, and bioavailability.

D.5.1.2.1 Water Operations

Modeling Methods

Average waterborne methylmercury concentrations are compared to co-located fish tissue mercury concentrations to construct a simple regression model to predict future fish concentrations from water, as was done for the Delta methylmercury TMDL (Central Valley Regional Water Board 2011). In the case of the current study, the model is based on the DSM2-predicted blending of various source waters with known, measured average concentrations of total and methylmercury, and the known relationship between modeled methylmercury and largemouth bass fillet concentrations of mercury. The resulting model allows the prediction of future, altered average fish tissue mercury concentrations under the preliminary proposal water operations. For this modeling effort, largemouth bass was used as the example fish. Although this is not a covered fish species, there are sufficient data to develop relationships between water and fish concentrations, and largemouth bass is a high level consumer relative to the covered fish species and would show effects from bioaccumulation.

The source-water concentrations used in the model are listed in Table D-6. Modeling methods are more fully described in Attachment D.A.

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No comments

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1 **Table D-6. Historical Methylmercury Concentrations in the Five Delta Source Waters for the Period 2000–2008**

Data Parameters	Source Water									
	Sacramento River*		San Joaquin River*		San Francisco Bay*		East Side Tributaries*		Agriculture in the Delta*	
Mean (ng/L)	0.10	0.03	0.15	0.03	0.032	-	0.22	0.08	0.25	-
Minimum (ng/L)	0.05	0.03	0.09	0.01	-	-	0.02	0.02	-	-
Maximum (ng/L)	0.24	0.03	0.26	0.08	-	-	0.32	0.41	-	-
75th Percentile (ng/L)	0.12	0.03	0.18	0.06	-	-	0.20	0.15	-	-
99th Percentile (ng/L)	0.23	0.03	0.26	0.08	-	-	0.31	0.39	-	-
Data Source	Central Valley Water Board 2008a		BDAT 2010; Central Valley Water Board 2008a	USGS 2010	SFEI 2010	-	Central Valley Water Board 2008a	USGS 2010	Central Valley Water Board 2008a	-
Station(s)	Sacramento River at Freeport		San Joaquin River at Vernalis		Martinez		Mokelumne and Calaveras Rivers		Mid-Delta locations, median	
Date Range	2000–2003	2000	2000–2001; 2003–2004	2000–2002	2007	-	2000–2001; 2003–2004	2000; 2002	2008	-
ND Replaced with RL	Not Applicable		Not Applicable	Yes	-		Yes		Not Applicable	
Data Omitted	None		None		-		None		None	
No. of Data Points	36	1	49	25	-	-	27	9	-	-

Sources: BDAT Website 2010; Central Valley Regional Water Quality Control Board 2008a; San Francisco Estuary Institute Website 2010; U.S. Geological Survey Website 2010.

Notes:

Means are geometric means. ng/L = nanograms per liter.

* The total recoverable concentration of the analyte is presented in first cell and the dissolved concentration of the analyte is presented in the second column.

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No comments

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Modeling Results—Water Operations

Modeling showed small, insignificant changes in total mercury and methylmercury levels in water and fish tissues due to PP water operations.

Under current conditions, total mercury and methylmercury concentrations in water exceed TMDL target values, and PP water operations will not change this condition. Estimated concentrations of mercury in water under EBC2_ELT and the PP_ELT are shown in Table D-7 (for total mercury) and Table D-8 (for methylmercury). Estimated concentrations for the late-long-term (LLT) scenario are provided in Table D-10 and Table D-11.

Currently, mercury concentrations in fish tissues exceed Delta TMDL guidance targets, which are set for human health rather than effects on fish, and the PP is not expected to substantially alter this condition through water operations. Modeled concentrations of total mercury in fish are presented in Table D-9 and Table D-12.

Table D-7. Modeled Mercury Concentrations in Water: Early Long-Term

Location	Period*	Period Average Concentration (µg/L)		
		Existing Conditions (EBC2)	EBC2_ELT	PP_ELT
Delta Interior				
Mokelumne River at Staten Island	All	0.0052	0.0052	0.0054
	Drought	0.0046	0.0047	0.0048
San Joaquin River at Buckley Cove	All	0.0075	0.0076	0.0075
	Drought	0.0073	0.0075	0.0074
Old River at Rancho del Rio	All	0.0051	0.0051	0.0052
	Drought	0.0046	0.0046	0.0045
Western Delta				
Sacramento River above Pt. Sacramento	All	0.0044	0.0044	0.0045
	Drought	0.0044	0.0045	0.0045
San Joaquin River at Antioch Ship Channel	All	0.0050	0.0051	0.0052
	Drought	0.0049	0.0050	0.0049
Sacramento River at Mallard Island	All	0.0056	0.0056	0.0058
	Drought	0.0058	0.0059	0.0059
	Drought	0.0058	0.0060	0.0057

Notes:
The recommended water column 4-day average TMDL concentration for total mercury = 0.025 µg/L. (U.S. Environmental Protection Agency 2006c.)
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of drought and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

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No comments

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Table D-8. Modeled Methylmercury Concentrations in Water: Early Long-Term

Location	Period*	Period Average Concentration (µg/L)		
		Existing Conditions (EBC2)	EBC2_ELT	PP_ELT
Delta Interior				
Mokelumne River at Staten Island	All	*0.000136*	*0.000135*	*0.000145*
	Drought	*0.000122*	*0.000122*	*0.000127*
San Joaquin River at Buckley Cove	All	*0.000159*	*0.000164*	*0.000166*
	Drought	*0.000161*	*0.000168*	*0.000172*
Old River at Rancho del Rio	All	*0.000122*	*0.000122*	*0.000124*
	Drought	*0.000113*	*0.000114*	*0.000115*
Western Delta				
Sacramento River above Pt. Sacramento	All	*0.000103*	*0.000103*	*0.000104*
	Drought	*0.000101*	*0.000101*	*0.000101*
San Joaquin River at Antioch Ship Channel	All	*0.000104*	*0.000103*	*0.000105*
	Drought	*0.000094*	*0.000093*	*0.000094*
Sacramento River at Mallard Island	All	*0.000083*	*0.000083*	*0.000083*
	Drought	*0.000073*	*0.000072*	*0.000072*
	Drought	*0.000135*	*0.000136*	*0.000133*

Notes:
The recommended water column TMDL concentration of methylmercury for the protection of fish bioaccumulation = 0.06 ng/L (.00006 µg/L). (Central Valley Regional Water Quality Control Board 2008a.)
Exceedances are shaded and in italics.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of drought and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

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No comments

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Table D-9. Modeled Mercury Concentrations in Largemouth Bass Fillets: Early Long-Term

Location	Period*	ELT Period Average Largemouth Bass Fillet Mercury Concentrations (mg/kg ww)		
		Existing Conditions (EBC2)	EBC2_ELT	PP_ELT
Delta Interior				
Mokelumne River at Staten Island	All	*0.521*	*0.516*	*0.561*
	Drought	*0.459*	*0.459*	*0.481*
San Joaquin River at Buckley Cove	All	*0.624*	*0.647*	*0.656*
	Drought	*0.633*	*0.666*	*0.684*
Old River at Rancho del Rio	All	*0.459*	*0.459*	*0.467*
	Drought	*0.420*	*0.424*	*0.428*
Western Delta				
Sacramento River above Pt. Sacramento	All	*0.377*	*0.377*	*0.381*
	Drought	*0.368*	*0.368*	*0.368*
San Joaquin River at Antioch Ship Channel	All	*0.381*	*0.377*	*0.385*
	Drought	*0.339*	*0.334*	*0.339*
Sacramento River at Mallard Island	All	*0.293*	*0.293*	*0.293*
	Drought	*0.252*	*0.248*	*0.248*

Notes:
Fish tissue concentrations were evaluated in relation to the Delta methylmercury TMDL tissue targets of 0.24 mg mercury/kg wet-weight of largemouth bass fillets (muscle tissue) for fish normalized to a standard 350 mm total length (Central Valley Regional Water Quality Control Board 2008a). Exceedances are shaded and in italics.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of drought and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

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No comments

- n/a -

Table D-10. Modeled Mercury Concentrations in Water: Late Long-Term

Location	Period*	Period Average Concentration (µg/L)		
		Existing Conditions (EBC)	EBC2_LLT	PP_LLT
Delta Interior				
Mokelumne River at Staten Island	All	*0.0052*	*0.0051*	*0.0053*
	Drought	*0.0046*	*0.0046*	*0.0047*
San Joaquin River at Buckley Cove	All	*0.0075*	*0.0075*	*0.0075*
	Drought	*0.0073*	*0.0073*	*0.0074*
Old River at Rancho del Rio	All	*0.0051*	*0.0051*	*0.0053*
	Drought	*0.0046*	*0.0046*	*0.0047*
Western Delta				
Sacramento River above Pt. Sacramento	All	*0.0044*	*0.0045*	*0.0045*
	Drought	*0.0044*	*0.0045*	*0.0045*
San Joaquin River at Antioch Ship Channel	All	*0.0050*	*0.0050*	*0.0052*
	Drought	*0.0049*	*0.0049*	*0.0049*
Sacramento River at Mallard Island	All	*0.0056*	*0.0056*	*0.0058*
	Drought	*0.0058*	*0.0059*	*0.0059*
	Drought	*0.0058*	*0.0060*	*0.0058*

Notes:
The recommended water column 4-day average TMDL concentration for total mercury = 0.025 µg/L. (U.S. Environmental Protection Agency 2006c.) Exceedances are shaded and in italics.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of drought and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

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No comments

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Table D-11. Modeled Methylmercury Concentrations in Water: Late Long-Term

Location	Period*	Period Average Concentration (µg/L)		
		EBC	EBC2_LLT	PP_LLT
Delta Interior				
Mokelumne River at Staten Island	All	*0.000136*	*0.000134*	*0.000142*
	Drought	*0.000122*	*0.000121*	*0.000126*
San Joaquin River at Buckley Cove	All	*0.000159*	*0.000164*	*0.000162*
	Drought	*0.000161*	*0.000168*	*0.000167*
Old River at Rancho del Rio	All	*0.000122*	*0.000123*	*0.000126*
	Drought	*0.000113*	*0.000116*	*0.000118*
Western Delta				
Sacramento River above Pt. Sacramento	All	*0.000103*	*0.000103*	*0.000103*
	Drought	*0.000101*	*0.000101*	*0.000100*
San Joaquin River at Antioch Ship Channel	All	*0.000104*	*0.000103*	*0.000105*
	Drought	*0.000094*	*0.000094*	*0.000094*
Sacramento River at Mallard Island	All	*0.000083*	*0.000083*	*0.000082*
	Drought	*0.000073*	*0.000073*	*0.000072*
	Drought	*0.000135*	*0.000138*	*0.000136*

Notes:
The recommended water column TMDL concentration of methylmercury for the protection of fish bioaccumulation = 0.06 ng/L (0.00006 µg/L). (Central Valley Regional Water Quality Control Board 2008a.)
Exceedances are shaded an in italics.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of drought and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

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No comments

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Table D-12. Modeled Mercury Concentrations in Largemouth Bass Fillets: Late Long-Term

Location	Period*	LLT Period Average Largemouth Bass Fillet Mercury Concentration (mg/kg ww)		
		EBC	EBC2_LLT	PP_LLT
Delta Interior				
Mokelumne River at Staten Island	All	*0.521*	*0.512*	*0.547*
	Drought	*0.459*	*0.454*	*0.476*
San Joaquin River at Buckley Cove	All	*0.624*	*0.647*	*0.638*
	Drought	*0.633*	*0.666*	*0.661*
Old River at Rancho del Rio	All	*0.459*	*0.463*	*0.476*
	Drought	*0.420*	*0.433*	*0.441*
Western Delta				
Sacramento River above Pt. Sacramento	All	*0.377*	*0.377*	*0.377*
	Drought	*0.368*	*0.368*	*0.364*
San Joaquin River at Antioch Ship Channel	All	*0.381*	*0.377*	*0.385*
	Drought	*0.339*	*0.339*	*0.339*
Sacramento River at Mallard Island	All	*0.293*	*0.293*	*0.289*
	Drought	*0.252*	*0.252*	*0.248*

Notes:
Fish tissue concentrations were evaluated in relation to the Delta methylmercury TMDL tissue targets of 0.24 mg mercury/kg wet-weight of largemouth bass fillets (muscle tissue) for fish normalized to a standard 350 mm total length (Central Valley Regional Water Quality Control Board 2008a). Exceedances are shaded an in italics.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5–consecutive year (water years 1987–1991) drought period consisting of drought and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

Uncertainty Analysis

The model captures effects due to preliminary proposal water operations but does not estimate the potential for methylation in existing or newly created environments (e.g., ROAs). The detailed, site-specific information needed to construct such a model, with acceptable margins of error, is lacking but may be developed as part of specific, future evaluations of actions (see discussion above concerning key processes controlling mercury fate, transport, and risk determination). Agricultural and existing wetlands may be very different in production of methylmercury and uptake into various trophic levels and are not easily generalized or modeled (Windham-Myers et al. 2010).

D.5.1.2.2 Restoration

As discussed above, in-situ conversion of mercury to methylmercury occurs at highest rates in intermittently flooded marshes and floodplains, as well as flooded agricultural areas. Preliminary proposal restoration actions will expand intermittently wetted areas by converting managed marshes, diked wetlands, agricultural areas, and other upland areas to tidal, open-water, and floodplain habitats (see Chapter 3, *Conservation Strategy*, for details of restoration), resulting in new areas with the potential to increase methylmercury in the aquatic system.

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No comments

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Woods and coauthors (2010) estimated rates of methylmercury generation for intertidal and floodplain areas (0.0369 g/acre/year) and for open-water production (0.01476 g/acre/year). However, methylmercury generation rates ultimately are dependent on the concentrations of mercury in the soils and on the specific biogeochemistry of the system. For this effects analysis, the margin of error on applying these estimated production rates across a wide geographic area with varying hydrology and concentrations of sequestered mercury was deemed to be too large to produce a reliable estimate of methylmercury generation at the scale of the ROAs.

The Sacramento River watershed, and specifically the Yolo Bypass, is the primary source of mercury in the Delta. The highest concentrations of mercury and methylmercury are in the Cache Creek area and the Yolo Bypass. The amount of methylmercury produced in the Yolo Bypass has been estimated to represent 40% of the total methylmercury production for the entire Sacramento watershed (Foe et al. 2008). Water discharging from the Yolo Bypass at Prospect Slough has a reported average annual methylmercury concentration of 0.27 ng/L, compared to the 0.06 ng/L TMDL (set for human health from bioaccumulation effects in fish).

The highest levels of methylmercury generation, mobilization, and bioavailability are expected in the Yolo Bypass, which will be subjected to more frequent and wider areas of inundation under the preliminary proposal actions. The concentrations of methylmercury in water exiting the Yolo Bypass will depend on many variables. Recent studies in the Yolo Wildlife Management Area showed that methylmercury increased with increased flow rates and increased residence time (Windham-Myer 2010). This same study also noted that the residence time in Cache Settling Basin, seasonality, and agricultural practices all factor into methylmercury production and cycling through the system in the Yolo Bypass. Marvin-DiPasquale and coauthors (2009) also identified a wide range of site-specific factors that determine methylmercury production, as well as variability in distribution and speciation of mercury in wetlands in the Yolo Bypass. Foe and coauthors (2008) developed an empirical relationship between net methylmercury production in the Yolo Bypass and outflow (methylmercury production = $0.0042*(\text{flow})^{0.782}$), but given the varied factors controlling methylmercury cycling, this calculation will not provide an estimate of methylmercury production in the Yolo Bypass that can be relied on with any certainty.

The preliminary proposal for the Yolo Bypass has the potential to increase the loading, concentrations, and bioavailability of methylmercury in the aquatic system in the Yolo Bypass. Currently, the methylmercury in water discharging from the Yolo Bypass to the Sacramento River is 0.27 ng/L (annual average) (Foe et al. 2008). This concentration likely will increase under the preliminary proposal, but will be mitigated to some extent by CM12, as discussed below. The current and future concentrations of methylmercury will exceed the TMDL (set for human health from bioaccumulation effects in fish) concentration of 0.06 ng/L. Also, decreased flows in the Sacramento River due to preliminary proposal upstream water operations may reduce the dilution capacity of the Sacramento River and result in increased concentrations of methylmercury in the river.

As part of the preliminary proposal, measures will be implemented to mitigate the production of methylmercury in ROAs. These measures may include construction and grading that minimize exposure of mercury-containing soils to the water column, design to support photodegradation, and pre-design field studies to identify depositional areas where mercury accumulation is most likely and characterization and/or design that avoids these areas. Recent studies performed by Heim with others (in press) indicate that integrating permanent ponds into restoration designs may reduce mercury methylation and mobilization. CM12 provides for consideration of new information as it develops that could effectively minimize methylmercury production and mobilization. Also, the

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Delta TMDL for methylmercury was adopted recently (Central Valley Regional Water Quality Control Board 2011) and will be integrated into the overall preliminary proposal through CM12 (discussed below) and adaptive management.

Photodegradation may be an important factor in reducing methylmercury generation, and design to enhance photodegradation has been included in CM12. Recent research has indicated that photodegradation of methylmercury in shallow waters can remove an amount of methylmercury similar to that produced in sediments of the Delta system (Byington 2008). Photodegradation has high potential to remove a percentage of the methylmercury produced in newly restored areas, with the rates partially dependent on the turbidity of the water column and the resultant depth of the photic zone. However, demethylation by photodegradation still leaves the less toxic inorganic mercury in the system. More research into the fate of mercury following photodegradation is needed.

As discussed throughout this section, the biogeochemistry and fate and transport of mercury and methylmercury are very complex. Restoration will involve inundation of areas where mercury has been sequestered in soils, and if methylation occurs, the methylmercury will be mobilized into the aquatic system. Once in the aquatic system, the methylmercury can be transported with water flow, taken up by biota, volatilized, demethylated, and returned to sediment (but not necessarily at the original restoration site). As a result of these processes, the mercury may be transported away from the restoration site, resulting in an overall decrease of mercury in the soils, which will reduce the source at the ROA. Based on this conceptual model, the mercury available for methylation at the ROA may decrease over time. However, the length of time for this to be quantifiable is not known.

D.5.1.2.3 Mercury Summary

Preliminary proposal restoration actions are likely to result in increased production, mobilization, and bioavailability of methylmercury in the aquatic system. Modeling of water operations effects showed little changes in methylmercury concentrations in water or fish tissue, although methylmercury concentrations in both media would continue to exceed criteria under the preliminary proposal.

Methylmercury likely would be generated by inundation of restoration areas, with highest concentrations expected in the Yolo Bypass, Cosumnes and Mokelumne Rivers, and at other ROAs closest to these source areas.

CM12 Methylmercury Management will help to minimize the increased mobilization of methylmercury at restoration areas. It describes pre-design characterization, design elements, and best management practices to mitigate methylation of mercury, and requires monitoring and reporting of observed methylmercury levels.

D.5.2 Selenium

D.5.2.1 Selenium—Location, Environmental Fate, and Transport

Selenium is a naturally occurring micronutrient that can have significant ecological effects at elevated concentrations. Selenium has been identified as an important toxin in the Delta, especially in the San Joaquin watershed where irrigation practices mobilize naturally occurring selenium from the soils. In the Delta watershed, selenium is most enriched in marine sedimentary rocks of the Coast Ranges on the western side of the San Joaquin Valley (Presser and Piper 1998). Irrigation of

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soils derived from the marine rocks leaches the selenium, and the subsequent practice by farmers to drain excess shallow groundwater from the root zone to protect their crops results in elevated concentrations of selenium in groundwater and receiving rivers (McCarthy and Grober 2001).

For reference, the current AWQC-Fresh Water-Chronic for selenium in fresh water is 5.0 µg/L and is expressed as the total recoverable metal in the water column. In the Grassland waterways and Salt Slough, a more protective chronic value of 2 µg/L applies, in consideration of sensitive listed species. The lentic conditions of water in the marshes were also a factor in setting these site-specific objectives. Available criteria, standards, and objectives for selenium are presented in Table D-13.

Table D-13. Applicable Federal Criteria, State Standards/Objectives, and Other Relevant Effect Thresholds for Selenium

	Region 5 Basin Plan[a]	Region 2 Basin Plan[b]	CTR[c]	Drinking Water MCL[d]	EPA Recommended Criteria[e]	Other Relevant Thresholds[f]
Selenium (µg/L)	5/12	5/20	5/20	50	5/variable	2

[a] Objectives apply to the lower San Joaquin River from the mouth of the Merced River to Vernalis as 5 µg/L (4-day average) and 12 µg/L (maximum concentration) total selenium concentration (Central Valley Regional Water Quality Control Board 2009a).

[b] Selenium criteria were promulgated as total recoverable concentrations for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR) (U.S. Environmental Protection Agency 1992; San Francisco Bay Regional Water Quality Control Board 2007).

[c] Standard is Criterion Continuous Concentration as 5 µg/L total recoverable selenium; California Toxics Rule (CTR) deferred to the NTR for San Francisco Bay/Delta waters and San Joaquin River (U.S. Environmental Protection Agency 2000).

[d] In addition, the California Office of Environmental Health Hazard Assessment (2010) has recommended a Public Health Goal of 30 µg/L.

[e] Criteria for protection of freshwater aquatic life are 5 µg/L (continuous concentration, 4-day average) total recoverable selenium and they vary for the Criterion Maximum Concentration (CMC) (24-hour average) (U.S. Environmental Protection Agency 2010). The CMC = 1/[(f1/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively.

[f] Concentration as total recoverable selenium identified as a Level of Concern for the Grassland Bypass Project (Beckon et al. 2008) and the site-specific objective for the Grassland (Central Valley Regional Water Quality Control Board 1996).

It should be noted that in addition to the adopted water quality objectives shown here, at the national level, EPA plans to propose Clean Water Act Section 304(a) selenium guidance criteria for aquatic life for freshwater chronic values only, and will distinguish between flowing and standing waters (U.S. Environmental Protection Agency 2011). These guidance criteria will form the basis for adopting protective water quality standards expressed as tissue concentration of selenium in fish egg or ovary and a corresponding water column concentration, where tissue concentration data are not available. Concentrations in tissue, such as bird eggs or fish tissue, better indicate actual exposure and, in combination with foodweb information, provide a basis for deriving site-specific numeric water column values. The revised national guidance criteria will be supplemented by regional efforts. EPA Region 9, in conjunction with the U.S. Geological Survey (USGS), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS) and pursuant to its obligations under the Endangered Species Act, is developing criteria to protect threatened and endangered wildlife species, aquatic-dependent species, and aquatic life in California. The first phase of this effort addresses San Francisco Bay and the Delta. It uses data on affected species and relies on

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the Presser-Luoma (2010) ecosystem-based model, a model that accounts for foodweb processes and site-specific conditions. This phase is scheduled for completion in 2011, followed by a second phase for statewide criteria (including the San Joaquin River and its tributaries).

Selenium is highly bioaccumulative and can cause chronic toxicity (especially impaired reproduction) in fish and aquatic birds (Ohlendorf 2003; San Francisco Bay Regional Water Quality Control Board 2009). Developmental effects on fish from selenium are well-documented; locally, significant ecosystem effects were described in the early 1980s from water management practices that discharged groundwater containing selenium to the Kesterson Reservoir in the San Joaquin Valley, California. The fate and transport section below provides an overview of selenium sources in the Delta, and the biogeochemical processes that result in increased bioavailability of selenium in an aqueous system. The discussion focuses on the San Joaquin watershed and how selenium could be mobilized by preliminary proposal actions.

The main controllable sources of selenium in the Bay-Delta estuary are agricultural drainage (generated by irrigation of seleniferous soils in the western side of the San Joaquin basin) and discharges from North Bay refineries (in processing selenium-rich crude oil). Both the San Joaquin River and North Bay selenium loads have declined in the last 15 years in response to, first, a control program in the San Joaquin Grassland area, and, second, National Pollutant Discharge Elimination System (NPDES) permit requirements established for refineries in the late 1990s. The annual loads of selenium (mostly as selenate) entering the Bay-Delta estuary from the San Joaquin and Sacramento Rivers vary by water year (that is, by flow), but dissolved selenium loadings averaged 2,380 kg/year from the San Joaquin and 1,630 kg/year from the Sacramento in the 1990–2007 period. The Sacramento River selenium concentration, however, is essentially at background levels (.06 +/-.02 µ/L), without evidence of significant controllable sources (U.S. Environmental Protection Agency 2011).

The San Joaquin watershed, and specifically the Grassland section of the watershed, historically has been identified as a source of selenium to the Delta. However, mitigation measures have been put into place to manage selenium discharges to meet regulatory requirements. According to the Grassland Project Report for 2006–2007, selenium loads already had been reduced by 75% in 2007 relative to 1996 levels (San Francisco Estuary Institute for the Oversight of the Grassland Project Subcommittee—Chapter 2, 2006–2007). Concentrations of selenium in Salt Slough reportedly met the monthly mean goal of 2 µg/L (U.S. Environmental Protection Agency 2011b). Selenium concentrations measured in the San Joaquin River were consistently below 5 µg/L (San Francisco Estuary Institute for the Oversight of the Grassland Project Subcommittee—Chapter 2, 2006–2007). As selenium discharge from the Grassland continues to decrease as the 5 µg/L goal is approached, concentrations in the San Joaquin River also can be expected to decrease.

Under the Grassland Bypass Project, selenium discharges to Mud Slough (in the San Joaquin watershed) must be reduced to 5 µg/L (4-day average) by December 31, 2019. Further, the Central Valley Regional Water Quality Control Board (2010a) recently approved an amendment to the basin plan in light of this project. The amendment requires that agricultural drainage be halted after December 31, 2019, unless water quality objectives are met in Mud Slough (north) and the San Joaquin River between Mud Slough (north) and the mouth of the Merced River. Also, if the State Water Resources Control Board (State Water Board) finds that timely and adequate mitigation is not being implemented, it can prohibit discharge any time before December 31, 2019. As a result, a substantial reduction in selenium inputs (unrelated to the preliminary proposal) to the San Joaquin

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River by 2019 would be expected to result in lower selenium inputs to the Delta from the San Joaquin River.

Elevated selenium concentrations also have been identified in Suisun Bay. Although particulate concentrations of selenium (the most bioavailable) in this region are considered low, typically between 0.5 and 1.5 micrograms per gram (µg/g), the bivalve *C. amurensis* contains elevated levels of selenium that range from 5 to 20 µg/g (Stewart 2004). Given the fact that *C. amurensis* may occur in abundances of up to 50,000 per m^2, this area can be considered a sink for selenium because 95% of the biota in some areas are made up of this clam.

Selenium can occur in four oxidation stages as selenates (Se^{6+}), selenites (Se^{4+}), selenides (Se^{2-}), and elemental selenium. The oxidized state, selenates (Se^{6+}), is soluble and the predominant species in alkaline surface waters and oxidizing soil conditions. Selenates are readily reduced to selenites (Se^{4+}) and selenides (Se^{2-}), which are more bioavailable than selenate. Further reduction to elemental selenium can result in an insoluble precipitate, which is not bioavailable.

Although selenium is soluble in an oxidized state, the majority typically becomes reduced and partitions into the sediment/particulate phases in an aqueous system; these reduced sediment/particulate phases are the most bioavailable (Presser and Luoma 2010). Selenium in soils is taken up by plant roots and microbes and enters the food chain through uptake by lower organisms. A portion of the selenium also is recycled into sediments as biological detritus. Lemly and Smith (1987) indicate that up to 90% of the total selenium in an aquatic system may be in the upper few centimeters of sediment and overlying detritus (Lemly 1998).

Oxidized forms of selenium (selenates and selenites) may reduce further to precipitate as elemental selenium or complex with particulates. Selenate reduces to elemental selenium through dissimilatory reduction through reactions with bacteria. These reactions reduce selenium from surface waters, resulting in an increase in selenium concentrations in sediment over time. In wetlands in particular, the organic-rich stagnant waters create a chemically reducing environment in which dissolved selenate is able to convert to selenite or elemental selenium (Werner et al. 2008). The longer the residence time of surface waters, the higher the particulate concentration resulting in higher selenium concentrations in wetlands and shallows (Presser and Luoma 2006). Aquatic systems in shallow, slow-moving water with low flushing rates are thought to accumulate selenium most efficiently (Presser and Luoma 2006; Lemly 1998). However, the ratio of selenium in particulates (which is more bioavailable) to selenium in the water column is a complex relationship that can vary across different hydrologic regimes and seasons (Presser and Luoma 2010).

Because bioaccumulation can be an important component of selenium toxicity, water column selenium concentrations are not reliable indicators of risk to biota (Presser and Luoma 2010). Selenium enters the food chain at a low trophic level and, under certain conditions, is magnified up the food chain. Lower trophic organisms can bioaccumulate hundreds of times the waterborne concentration of selenium, especially where a food chain is based on sessile filter feeders. However, research has demonstrated that bioaccumulation is less important when the food chain is based on plankton rather than on sessile filter feeders, because plankton excrete most of the selenium they consume (Stewart 2004). This is an important factor that mitigates bioaccumulation in some of the preliminary proposal covered fish species, and is more fully discussed in later sections of this appendix.

No comments

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D.5.2.2 Selenium—Effects of Preliminary Proposal Conservation Measures

Because the San Joaquin River historically has been a major contributor of selenium to the Delta system, there is concern that the increased contribution to the Delta from the San Joaquin River relative to the Sacramento River as a result of preliminary proposal operations would result in an increase in selenium transport and bioaccumulation in the Delta.

Quantitative modeling was performed to estimate the effects of preliminary proposal water operations on selenium in the aquatic system and on covered fish species. Modeling was based on DSM2 output that estimated changes in water flows under the preliminary proposed actions, and estimated selenium concentrations in source waters that discharge into the Delta. Results were considered in the context of a qualitative discussion to fully capture some of the factors that were not quantified.

D.5.2.2.1 Water Operations

Modeling Methods

Quantitative models were used to estimate the concentrations of selenium in the water column and expected resultant concentrations of selenium in fish tissue. Modeling methods for estimating selenium concentrations in water and in fish tissue for EBC, EBC2_ELT/LLT and PP_ELT/LLT are described in Attachment D.B to this appendix. The modeling is based on water and fish tissue sample data and DSM2 model results, and provides an analysis of the effects of preliminary proposal water operations on selenium concentrations.

The output from the DSM2 model (expressed as percent inflow from different sources) was used in combination with the available measured waterborne selenium concentrations to model concentrations of selenium at locations throughout the Delta. These modeled waterborne selenium concentrations were used in the relationship model to estimate bioaccumulation of selenium in whole-body fish and bird eggs. Selenium concentrations in fish fillets then were estimated from those in whole-body fish.

Selenium concentrations in whole-body fish and bird eggs were calculated using ecosystem-scale models developed by Presser and Luoma (2010). The models were developed using biogeochemical and physiological factors from laboratory and field studies; information on loading, speciation, and transformation to particulate material; bioavailability; bioaccumulation in invertebrates; and trophic transfer to predators. Important components of the methods included (1) empirically determined environmental partitioning factors between water and particulate material that quantify the effects of dissolved speciation and phase transformation; (2) concentrations of selenium in living and non-living particulates at the base of the foodweb that determine selenium bioavailability to invertebrates; and (3) selenium biodynamic foodweb transfer factors that quantify the physiological potential for bioaccumulation from particulate matter to consumer organisms and prey to their predators.

For this modeling effort, largemouth bass was used as the example fish. Although this is not a covered fish species, there are sufficient data to develop relationships between water and fish concentrations, and largemouth bass is a voracious consumer—a high level consumer relative to the covered fish species—and would show effects of bioaccumulation.

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The source-water concentrations used in the model are listed in Table D-14. Modeling methods are described more fully in Attachment D.B.

Table D-14. Historical Selenium Concentrations in the Five Delta Source Waters for the Period 1996–2010

Source Water	Sacramento River[a]	San Joaquin River[b]	San Francisco Bay[a]	East Side Tributaries[c]	Agriculture in the Delta[a]
Mean (µg/L)[d]	0.32	0.84	0.09	0.1	0.11
Minimum (µg/L)	0.04	0.40	0.03	0.1	0.11
Maximum (µg/L)	1.00	2.80	0.45	0.1	0.11
75th percentile (µg/L)	1.00	1.20	0.11	0.1	0.11
99th percentile (µg/L)	1.00	2.60	0.41	0.1	0.11
Data Source	USGS Website 2010	SWAMP Website 2009	SFEI Website 2010	None	Lucas and Stewart 2007
Station(s)	Sacramento River at Freeport	San Joaquin River at Vernalis (Airport Way)	Central-West; San Joaquin River near Mallard Is. (BG30)	None	Mildred Island, Center
Date Range	1996–2001, 2007–2010	1999–2007	2000–2008	None	2000, 2003–2004
ND Replaced with RL	Yes	Yes	Yes	Not applicable	No
Data Omitted	None	Pending Data	None	Not applicable	No
No. of Data Points	62	453	11	None	1

Sources: U.S. Geological Survey Website 2010; SWAMP Website 2009; San Francisco Estuary Institute Website 2010; Lucas and Stewart 2007.

[a] Dissolved selenium concentration.

[b] Not specified whether total or dissolved selenium.

[c] Dissolved selenium concentration in Mokelumne, Calaveras, and Cosumnes Rivers is assumed to be 0.1 µg/L because of lack of available data and lack of sources that would be expected to result in concentrations greater than 0.1 µg/L.

[d] Means are geometric means.

D.5.2.2.2 Modeling Results—Selenium

Note to reviewers: these modeling results will be finalized in the EIR/EIS. The information below is preliminary and subject to update.

Selenium concentrations in the water column for the EBC2_ELT/LLT, and for the preliminary proposal (PP_ELT and PP_LLT) are listed in Table D-15 and Table D-16. These tables also provide estimates for drought years only, when there is potential for greater effects. Generally, concentrations for both the early and late long-term were slightly lower for the preliminary proposal scenarios than the existing conditions. None of the resultant water concentrations of selenium exceeded 2 µg/L, which is considered protective of fish species and is the lowest identified benchmark for selenium in water (see Table D-15 and Table D-16).

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Table D-15. Modeled Selenium Concentrations in Water for Early Long-Term

Location	Period*	Period Average Concentration (µg/L)		
		EBC	EBC2_ELT	PP_ELT
Delta Interior				
Mokelumne River (SF) at Staten Island	All	0.260	0.261	0.247
	Drought	0.286	0.285	0.278
San Joaquin River at Buckley Cove	All	0.756	0.710	0.673
	Drought	0.721	0.649	0.595
Old River at Rancho del Rio	All	0.393	0.389	0.411
	Drought	0.315	0.313	0.304
Western Delta				
Sacramento River above Pt. Sacramento	All	0.312	0.311	0.312
	Drought	0.299	0.297	0.295
San Joaquin River at Antioch Ship Channel	All	0.312	0.310	0.324
	Drought	0.273	0.270	0.268
Sacramento River at Mallard Island	All	0.252	0.251	0.254
	Drought	0.213	0.210	0.209
	Drought	0.511	0.512	0.484

Notes:
µg/L = microgram(s) per liter.
Results compared to lowest of relevant thresholds—Level of Concern for the Grassland Bypass Project = 2 µg/L. (Beckon et al. 2008.) Exceedances would be shaded and in italics—there are no exceedances.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of dry and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

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No comments

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Table D-16. Modeled Selenium Concentrations in Water for Late Long-Term

Location	Period*	Period Average Concentration (µg/L)		
		Existing Conditions	EBC2_LLT	PP_LLT
Delta Interior				
Mokelumne River (SF) at Staten Island	All	0.260	0.263	0.251
	Drought	0.286	0.287	0.279
San Joaquin River at Buckley Cove	All	0.756	0.693	0.700
	Drought	0.721	0.623	0.643
Old River at Rancho del Rio	All	0.393	0.388	0.411
	Drought	0.315	0.319	0.311
Western Delta				
Sacramento River above Pt. Sacramento	All	0.312	0.312	0.310
	Drought	0.299	0.297	0.295
San Joaquin River at Antioch Ship Channel	All	0.312	0.309	0.323
	Drought	0.273	0.272	0.270
Sacramento River at Mallard Island	All	0.252	0.251	0.250
	Drought	0.213	0.212	0.208
	Drought	0.511	0.531	0.499

Notes:
µg/L = microgram(s) per liter.
Results compared to lowest of relevant thresholds—Level of Concern for the Grassland Bypass Project = 2 µg/L. (Beckon et al. 2008.) Exceedances would be shaded and in italics—there are no exceedances.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of dry and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

Selenium concentrations in fish tissue fillets (largemouth bass) for both the EBC_ELT/LLT and preliminary proposal (PP_ELT and PP_LLT) are listed in Table D-17 and Table D-18. These tables also provide estimates for drought years only, when there is potential for greater effects. Generally, concentrations for both the early and late long-term were slightly lower than the EBC. None of the fish tissue concentrations exceeded the Advisory Tissue Level (Office of Environmental Health Hazard Assessment 2008) of 2.5 mg/kg.

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No comments

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Table D-17. Modeled Selenium Concentrations in Fish Fillets for Early Long-Term

Location	Period*	Period Average Concentration (mg/kg, ww)		
		Existing Conditions	EBC2_ELT	PP_ELT
Delta Interior				
Mokelumne River (SF) at Staten Island	All	0.35	0.35	0.32
	Drought	0.70	0.70	0.68
San Joaquin River at Buckley Cove	All	1.22	1.14	1.08
	Drought	1.95	1.74	1.59
Old River at Rancho del Rio	All	0.58	0.57	0.61
	Drought	0.79	0.78	0.75
Western Delta				
Sacramento River above Pt. Sacramento	All	0.44	0.44	0.44
	Drought	0.74	0.73	0.73
San Joaquin River at Antioch Ship Channel	All	0.44	0.43	0.46
	Drought	0.66	0.66	0.65
Sacramento River at Mallard Island	All	0.33	0.33	0.33
	Drought	0.49	0.49	0.48
	Drought	1.34	1.35	1.27

Notes:
mg/kg = milligram per kilogram; ww = wet weight.
Results compared to Advisory Tissue Level = 2.5 mg/kg. (Office of Environmental Health Hazard Assessment 2008.) Exceedances are shaded and in italics—there are no exceedances.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of dry and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

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No comments

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Table D-18. Modeled Selenium Concentrations in Fish Fillets for Late Long-Term

Location	Period*	Period Average Concentration (mg/kg, ww)		
		Existing Conditions	EBC2_LLT	PP_LLT
Delta Interior				
Mokelumne River (SF) at Staten Island	All	0.35	0.35	0.33
	Drought	0.70	0.70	0.68
San Joaquin River at Buckley Cove	All	1.22	1.11	1.12
	Drought	1.95	1.67	1.72
Old River at Rancho del Rio	All	0.58	0.57	0.61
	Drought	0.79	0.80	0.77
Western Delta				
Sacramento River above Pt. Sacramento	All	0.44	0.44	0.43
	Drought	0.74	0.73	0.73
San Joaquin River at Antioch Ship Channel	All	0.44	0.43	0.46
	Drought	0.66	0.66	0.66
Sacramento River at Mallard Island	All	0.33	0.33	0.33
	Drought	0.49	0.49	0.48
	Drought	1.34	1.40	1.31

Notes:
mg/kg = milligram per kilogram; ww = wet weight.
Results compared to Advisory Tissue Level = 2.5 mg/kg. (Office of Environmental Health Hazard Assessment 2008.) Exceedances would be shaded and in italics—there are no exceedances.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5–consecutive year (water years 1987–1991) drought period consisting of dry and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

The elevated concentrations in fish under drought conditions of 4.68 mg/kg (EBC2_ELT) and 4.5 mg/kg (EBC2_LLT) were estimated to decrease under the preliminary proposal. Estimated concentrations of selenium decreased in whole-body fish for EBC2 and PP for both early long-term (ELT) and late long-term (LLT) are listed in Table D-19 and Table D-20. Modeled selenium concentrations under all scenarios were below the level of concern for whole-body fish (lower-end range) (Beckon et al. 2008) of 4 mg/kg, except at the San Joaquin River at Buckley Cove location.

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Table D-19. Modeled Selenium Concentrations in Whole-Body Fish for Early Long-Term

Location	Period*	Period Average Concentration (mg/kg, dw)		
		Existing Conditions	EBC2_ELT	PP_ELT
Delta Interior				
Mokelumne River (SF) at Staten Island	All	1.16	1.17	1.10
	Drought	2.06	2.06	2.00
San Joaquin River at Buckley Cove	All	3.38	3.18	3.01
	Drought	*5.21*	*4.68*	*4.30*
Old River at Rancho del Rio	All	1.76	1.74	1.84
	Drought	2.27	2.26	2.19
Western Delta				
Sacramento River above Pt. Sacramento	All	1.39	1.39	1.40
	Drought	2.16	2.14	2.13
San Joaquin River at Antioch Ship Channel	All	1.39	1.39	1.45
	Drought	1.97	1.95	1.93
Sacramento River at Mallard Island	All	1.13	1.12	1.14
	Drought	1.53	1.52	1.50
	Drought	3.68	3.70	3.49

Notes:
dw = dry weight; mg/kg = milligram per kilogram.
Results compared to Level of Concern for whole-body fish (lower end range) = 4 mg/kg. (Beckon et al. 2008.) Exceedances are shaded and in italics.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5–consecutive year (water years 1987–1991) drought period consisting of dry and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

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No comments

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Table D-20. Modeled Selenium Concentrations in Whole-Body Fish for Late Long-Term

Location	Period*	Period Average Concentration (mg/kg, dw)		
		Existing Conditions	EBC2_LLT	PP_LLT
Delta Interior				
Mokelumne River (SF) at Staten Island	All	1.16	1.18	1.12
	Drought	2.06	2.07	2.01
San Joaquin River at Buckley Cove	All	3.38	3.10	3.13
	Drought	*5.21*	*4.50*	*4.64*
Old River at Rancho del Rio	All	1.75	1.73	1.84
	Drought	2.28	2.30	2.24
Western Delta				
Sacramento River above Pt. Sacramento	All	1.39	1.39	1.39
	Drought	2.16	2.15	2.13
San Joaquin River at Antioch Ship Channel	All	1.39	1.38	1.44
	Drought	1.97	1.96	1.95
Sacramento River at Mallard Island	All	1.13	1.12	1.12
	Drought	1.53	1.53	1.50
	Drought	3.68	3.83	3.60

Notes:
dw = dry weight; mg/kg = milligram per kilogram.
Results compared to level of concern for whole-body fish (lower end range) = 4 mg/kg. (Beckon et al. 2008.) Exceedances are shaded and in italics.
* All: Water years 1975–1991 represent the 16-year period modeled using DSM2. Drought: Represents a 5-consecutive year (water years 1987–1991) drought period consisting of dry and critical water-year types (as defined by the Sacramento Valley 40-30-30 water year hydrologic classification index).
These data are preliminary and are subject to change as BDCP analyses are finalized.

Uncertainty Analysis

Modeling results are based on selenium water data for years 2010 and earlier. As previously discussed, selenium discharges from the Grassland watershed, a main contributor of selenium to the San Joaquin River and the Delta, must continue to decrease to meet relatively new criteria. The loading from the Grassland Project Area and resultant concentrations in the San Joaquin River are expected to continue to decline and will greatly diminish the source of selenium to the San Joaquin River and the Delta as a whole. The water and fish tissue modeling results does not account for this future decrease in selenium in the system and likely overestimates concentrations with the preliminary proposal water operations.

D.5.2.2.3 Changes in Proportion of San Joaquin Water in the Delta

Because the San Joaquin watershed historically has been a major source of selenium to the Delta, there is a concern that water operations, and specifically reduced flows in the Sacramento River, under the preliminary proposal could result in an increased proportion of San Joaquin water in the Delta, and with it increased selenium concentrations. DSM2 model results were used to track source water in the Delta. Results showing the difference in annual average contribution from the San

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No comments

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Joaquin River in the south Delta and Suisun Bay are presented in Table D-21. South Delta was chosen because of its proximity to the San Joaquin River. Suisun Bay was selected because elevated levels of selenium have been detected, mainly in biota, in the area. Also, Suisun Bay is near oil refineries where elevated selenium concentrations have been an issue.

Table D-21. Difference in Annual Average Proportion of San Joaquin River Contribution to Water Flow at South Delta and Suisun Bay

	South Delta—Change in San Joaquin River Contribution		Suisun Bay—Change in San Joaquin River Contribution	
	Percent Difference EBC2_ELT to PP_ELT	Percent Difference EBC2_LLT to PP_LLT	Percent Difference EBC2_ELT to PP_ELT	Percent Difference EBC2_LLT to PP_LLT
1976	-1	-2	0	0
1977	-4	-1	0	0
1978	14	15	2	2
1979	5	6	1	1
1980	6	7	1	1
1981	-3	-4	0	0
1982	17	21	4	3
1983	22	19	9	7
1984	12	14	5	5
1985	-2	-3	0	0
1986	6	6	1	1
1987	-7	-5	0	0
1988	0	3	0	0
1989	-1	8	0	0
1990	-1	-1	0	0
1991	-2	-7	0	0
Average	4	5	1	1

Results presented in Table D-21 show variation in the south Delta. The preliminary proposal actions would result in a less than 10% annual average increase in San Joaquin River water in the south Delta relative to other source waters (including the Sacramento River). For water years 1978, 1982, 1983, and 1984, the proportion of San Joaquin water is higher (12 to 22%). Preliminary proposal actions will have little to no effect on the proportion of San Joaquin water that flows to Suisun Marsh. Again, 1983 has the highest proportion of San Joaquin water present (9% for ELT and 7% for LLT).

D.5.2.3 Restoration

In addition to preliminary proposal water operations effects described above, selenium concentrations in water and covered fish tissues may be affected by mobilization of selenium in restoration areas. Because the bioavailability of selenium increases in an aquatic system, inundation of ROAs could mobilize selenium sequestered in sediments and increase exposure of covered fish species. The rate at which selenium will become mobilized as part of restoration will depend on the amount of selenium stored in the sediments, the length of inundation, and whether sufficient time

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allows the selenium to cycle through the aquatic system and into the food chain. It is likely that the highest concentrations of selenium will be mobilized during the initial flooding but will taper off with time; the length of time for the majority of selenium to flush out is not currently known and would need to be evaluated on a site-specific basis. Given that the San Joaquin River historically has delivered selenium to the Delta, the South Delta ROA has the most potential for mobilization of selenium.

In the long term, selenium inputs to the Delta should decrease as the proportion of agricultural lands decreases as a result of land use changes, including restoration to marsh habitat by the BDCP; selenium no longer would be concentrated by irrigation and leaching of these formerly farmed areas. This is especially true of the south Delta, where selenium in near-surface soils could be mobilized, but additional concentration from irrigation will cease. In contrast to the benefit of stopping application of pesticides to restored farmland, the benefit associated with selenium likely will be low, as selenium actually is leached out of the soils by agricultural use, not applied.

D.5.2.3.1 Selenium Summary

Quantitative modeling of selenium concentrations suggests that the preliminary proposal water operations would have from no effect to a positive effect on selenium in water and fish tissues. The only exceedances for fish tissues were for fish fillets and whole-body fish at Buckley Cove on the San Joaquin River during drought conditions. At Buckley Cove, benchmarks were exceeded for existing conditions (EBC2) and existing conditions early long-term (EBC2_ELT); the early long-term concentrations were lower under the preliminary proposal (PP_ELT). It is not surprising that the highest concentrations of selenium were estimated for the San Joaquin River, as this is the recognized primary source of selenium to the Delta. Future required reductions in selenium sources in the San Joaquin watershed should result in lower concentrations than those estimated by the model.

Source-water fingerprinting analysis indicates that preliminary proposed water operations will not result in a significant increased proportion of San Joaquin water at Suisun Bay. Proportions of San Joaquin water in the south Delta could increase by as much as 20%. Given the expected decrease in selenium contributions from the San Joaquin River and modeling results indicating that selenium concentrations will not exceed criteria in the south Delta, no effects on selenium concentrations as a result of preliminary proposal water operations are identified.

Selenium currently sequestered in soils could be mobilized and become more bioavailable as a result of inundation of restoration areas. The magnitude of this mobilization of selenium and resultant increases in concentrations in both water and covered species would need to be determined on a site-specific basis. The potential is highest for increased mobilization of selenium in and near the San Joaquin River and the South Delta ROAs, where selenium concentrations in soils are expected to be highest.

D.5.3 Copper

D.5.3.1 Copper—Location, Environmental Fate, and Transport

Copper (Cu) is a naturally occurring element that is present in water, air, and many soils in the environment. It is an essential trace element required by many plants and animals at low concentrations but can be toxic at elevated concentrations. In a non-aqueous environment, copper

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tends to adhere to soils and is relatively immobile. In an aqueous system, copper is considered one of the more mobile heavy metals. It partitions between sediment and particulates, and as particulates, it is taken up by low trophic levels or complexes with organics or inorganics in the water column. Typically it will occur in one of two oxidation states, cuprous ion (Cu^{1+}) and cupric ion (Cu^{2+}) (U.S. Environmental Protection Agency 2009). Toxicity is much higher for the Cu^{2+} ion, than for the Cu^{1+} ion and the copper that is organically complexed (Buck et al. 2007; Manahan and Smith 1973; Sunda and Guillard 1976).

Although copper is not listed in the 303(d) list in the Delta, it is of concern mainly because of its widespread use in pesticides. In the Delta, anthropogenic sources of copper include pesticides/herbicides, mine drainage, brake pads, and anti-foulants (such as paint used on boat bottoms) (U.S. Environmental Protection Agency 2009). Because agriculture is the dominant land use in the Delta, use of pesticides/herbicides is a dominant source of copper to the environment. Mine drainage also has been a historical source of copper to the Delta. The Iron Mountain Mines Superfund Site, a former mine that released acid mine drainage to the Sacramento River upstream of Keswick Dam, has been a significant source of copper and other metal contamination. However, the Superfund Site is undergoing remediation that has decreased discharge of copper into the rivers, and a TMDL has been implemented (Central Valley Regional Water Quality Control Board 2002). Following remediation, copper inputs from this mine should continue to decrease.

The current AWQC-Fresh Water-Chronic for copper in fresh water is derived on a site-specific basis requiring the input of 10 separate site-specific parameters to calculate the criteria—temperature, pH, DOC, calcium, magnesium, sodium, potassium, sulfate, chloride, and alkalinity. Because these parameters vary depending on location, it is not possible to calculate a general AWQC-Fresh Water-Chronic for copper.

Overall, levels of copper in the Delta ecosystem do not appear to be significantly elevated. Copper concentrations in the Sacramento River have been reported to be consistently low, with some seasonal fluctuation (Connon 2010; Domagalski 2008). Based on collection of 549 water samples collected during critically dry, normal, and wet years from 15 Delta stations, metals concentrations did not exceed AWQC and did not show toxicity (Central Valley Regional Water Quality Control Board 1998).

Bruns (1998) conducted water sampling between 1993 and 1995, compared both dissolved and total copper results against EPA AWQC and other criteria, and reported concentrations below criteria from almost all locations, including the Sacramento River. Because the criteria are dependent on sample-specific water quality measurements (including hardness), the criteria varied between sampling episodes. Significantly higher copper levels (at least an order of magnitude higher than all other results) that exceeded criteria were reported for Prospect Slough at the head of the Yolo Bypass.

In general, the copper data sets discussed above indicate low levels of copper (less than 2 µg/L) throughout the Delta waterways and elevated concentrations in agricultural drainage sloughs, and in tributaries at the head of the Yolo Bypass.

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No comments

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D.5.3.2 Copper—Effects of Preliminary Proposal Conservation Measures

D.5.3.2.1 Water Operations

Preliminary proposal water operations will result in decreased flow in the Sacramento River under certain conditions. However, because copper concentrations are consistently low throughout the Sacramento River (less than 2 µg/L) and copper concentrations in the Sacramento River watershed have been tied to flow rates, appreciable impact on copper concentrations is not expected.

D.5.3.2.2 Restoration

Restoration of agricultural lands under the preliminary proposal will have two outcomes relative to copper: copper contained in soils may become more bioavailable, and copper in pesticides that would have been applied to the agricultural land will be subtracted from the total Delta copper loads.

In general, the copper data sets discussed above indicate low levels of copper (less than 2 µg/L) throughout the Delta waterways, and elevated concentrations in agricultural drainage sloughs. Although data were not identified, it is assumed the agricultural soils will contain some level of copper given its affinity for soils in a terrestrial environment. A study of copper mobilization and bioavailability following multiple floodings of copper-enriched agricultural soils in the Everglades (Hoang et al. 2008) presents some relevant findings: (1) the amount of copper mobilized into the aquatic system depended on the concentrations in the soils, DOC, alkalinity, and soil characteristics; (2) copper concentrations in soils did not change much after multiple (four) floodings; (3) total dissolved copper in the water column did not decrease after several flooding events; and (4) the proportion of the more toxic cupric ion (Cu^{2+}) increased with the number of flooding episodes and decreased DOC.

These findings suggest that formerly agricultural ROAs, which are likely to have elevated levels of copper in soils, will result in some level of increased copper in the aquatic system over an undetermined time period. Currently, information on the concentrations of copper in soils of specific ROAs is insufficient to estimate the increase in concentrations.

Restoration of agricultural land to marshes and floodplains will result in decreased application of copper-containing pesticides and decreased copper loading to the Delta. This net benefit at least partially will counter the copper introduced to the aquatic system through mobilization during inundation.

D.5.4 Ammonia/um

D.5.4.1 Ammonia/um—Location, Environmental Fate, and Transport

Ammonia is present in water in two forms: as un-ionized ammonia (NH^{3+}), also sometimes referred to as free ammonia, and as a positively charged ammonium ion (NH^{4+}). These two forms are collectively referred to as total ammonia or ammonia plus ammonium. Generally, environmental un-ionized ammonia is more toxic to fish, and ammonium is taken up by plants and algae as a nutrient and can drive algae blooms and growth of invasive species (Jabush 2011).

The primary source of total ammonia in the Delta is effluent discharged from WWTPs, and the primary contributing treatment facility is the Sacramento Regional WWTP (Jassby 2008). The

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Sacramento plant is the source of the largest wastewater effluent discharge to the Delta (Jassby 2008), contributing an average of 141 million gallons per day (mgd) and accounting for 1 to 2% of the river water volume (Foe et al. 2010). The facility is also the largest source of total ammonia discharge to the Delta, making up 90% of the Sacramento River ammonia load (Jassby 2008). The Stockton Regional Wastewater Control Facility historically had been an important source of the ammonia load to the Delta via the San Joaquin River. This is no longer the case, as the Stockton facility has upgraded its treatment systems in recent years to include technology to remove ammonia and ammonium from effluent before discharge to the river (City of Stockton 2011).

For ammonia, there is a current EPA AWQC dated 1999, and an updated draft AWQC dated 2009 that has not yet been finalized (Table D-22). Both the current (1999) and draft (2009) AWQC for total ammonia as nitrogen are dependent on site-specific temperature and pH. The draft AWQC is also dependent on the presence or absence of unionid mussels. AWQC for ammonia (total as N) for both the current criteria and the draft criteria are listed in Table D-22. For ease of comparison, only AWQC at a temperature of 25°C and pH of 8 are listed.

Table D-22. Ambient Water Quality Criteria for Ammonia

	Draft 2009 Ammonia Criteria (at pH 8 and 25°C)	Current 1999 Ammonia Criteria (at pH 8 and 25°C)
Acute	2.9 mg N/L mussels present	5.6 mg N/L salmon present
	5.0 mg N/L mussels absent	
Chronic	0.26 mg N/L mussels present	1.2 mg N/L fish early life stages present
	1.8 mg N/L mussels absent	
Source: <http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/pollutants/ammonia/factsheet2.cfm>.		

A recent study indicated that biota can be affected at concentrations as low as 0.38 mg/L of total ammonia nitrogen, based on a study of Delta copepods by Teh and coauthors (2011).

The current NPDES permit (2010) for the Sacramento WWTP contains both new and interim standards for ammonia. The current NPDES permit also prohibits discharge to the Sacramento River when there is less than a 14:1 (river:effluent) flow ratio over a rolling 1-hour period available in the Sacramento River. In addition, to comply with new standards (Table D-23), the Sacramento plant will need to install new systems to reduce ammonia concentrations in effluent. Compliance with new effluent limits will be required as of December 1, 2020, or once the new systems are in place, whichever occurs first (Central Valley Regional Water Quality Control Board 2010). However, this permit is being appealed and may not be upheld.

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No comments

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Table D-23. Sacramento and Stockton Wastewater Treatment Facility Effluent—National Pollution Discharge Elimination System Permit Limits

	Units	Sacramento Effective 2010 (Interim) Average Daily	Sacramento Effective 2020 (New) Average Daily
Ammonia, total as N	mg/L	33	1.8
	lb	49,400	2,720
Design flow	mgd	181	181
Source: Central Valley Regional Water Quality Control Board 2010.			

The Sacramento Regional County Sanitation District (2011) reported the following ammonia concentrations in effluent from the Sacramento WWTP for the year 2010: average 24 mg/L (parts per million [ppm]); minimum 19 mg/L; and maximum 39 mg/L. Along with influent and effluent testing, the new 2010 NPDES permit requires that the Sacramento River (effluent-receiving water) be tested for ammonia, along with other parameters.

Ammonia concentrations in the Sacramento River were evaluated during a monitoring program conducted in 2009 and 2010. Water samples were collected on a monthly basis from 21 locations throughout the Delta, with a focus on tracking concentrations of ammonia downstream of the Sacramento WWTP (Foe et al. 2010). None of the ammonia data collected for 344 samples over 1 year exceeded the EPA chronic criterion for early life stages of fish present in the Delta (Foe et al. 2010). Results of this study indicated elevated ammonia levels immediately downstream of the Sacramento WWTP, with almost all the ammonia attenuated 20 miles downstream of the discharge, as follows:

- Ammonia concentrations were higher downstream (highest average 0.46 mg/L) of the Sacramento WWTP than upstream (average 0.04 mg/L).
- The highest ammonia concentrations were detected at Hood, 7 miles downstream of the WWTP.
- Downstream of Hood, total ammonia concentrations dropped continuously to an average of 0.08 mg/L at Threemile Slough, 20 miles downstream of the WWTP.

D.5.4.2 Ammonia/um—Effects of Preliminary Proposal Conservation Measures

D.5.4.2.1 Water Operations

Given the possible link established between ammonia from WWTPs and the POD (Dugdale et al. 2007; Wilkerson et al. 2006; Glibert 2010; Glibert et al. 2011), decreased dilution capacity of the Sacramento River and potential resultant increases in ammonia concentrations are of concern. Recent data (Foe et al. 2010) indicate that concentrations of ammonia downstream of the WWTP outfall do not currently exceed EPA AWQC. These conditions are maintained with a current allowed ammonia concentration in WWTP effluent of 33 mg/L (and measured maximum concentration of 39 mg/L). By 2020, effluent must be below 1.8 mg/L ammonia, an 18-fold decrease in ammonia concentrations. It would take a similar decrease in Sacramento River flows to achieve the current conditions, and few to no effects are expected from preliminary proposal actions on ammonia/um. This conclusion is supported by the following quantitative analysis.

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To evaluate resultant ammonia concentrations in the Sacramento River, the average reported concentration of ammonia in Sacramento WWTP effluent (24 mg/L) was used to calculate the Sacramento River flow required to meet AWQC. As shown in Table D-24, the minimum flow in the Sacramento River needed to dilute effluent and meet the current AWQC of 1.2 mg/L in the Sacramento River would be 5,794 cubic feet per second (cfs).

Table D-24. Sacramento River Flow Required to Dilute Sacramento Wastewater Treatment Plant Effluent

Average Effluent Ammonia Concentration	24 mg/L
Design flow	181 mgd (7,930.087 l/sec)
Ammonia load	190,322.1 mg/sec
River—Threshold not to exceed	1.2 mg/L
River—Upstream concentration	0.04 mg/L
River—Threshold not to exceed	1.16 mg/L
Threshold flow to exceed (river)	164,070.8 l/sec (5,794 cfs)

The DSM2 model output was analyzed to evaluate the percentage of time the minimum flow rate of 5,794 cfs would not be met. Results are presented in Table D-25 and Table D-26. Table D-25 presents the percentage of months the minimum flow would not be met for each scenario. Table D-26 shows the difference between EBC2_ELT and LLT and the preliminary proposal (PP_ELT and LLT) in the percent of time that Sacramento River flows at Freeport would fall below the required flow to dilute effluent. The effects of the preliminary proposal over the 82-year model run would be a 1.2% increase in the times that flows would be insufficient to meet AWQC for ammonia in August, and a 2.4% increase in October. In all other months, either no effects or a positive effect is indicated. The scenario is conservative, as concentrations in ammonia in Sacramento WWTP effluent are under order to decrease significantly.

In conclusion, changes in dilution capacity of the Sacramento River under the preliminary proposal would result from changes in upstream reservoir operations and are not expected to be significant. Diversion of water to the Yolo Bypass is not expected to affect dilution capacity, as this will occur only during high river flows. The north Delta intake is downstream of Freeport and will not affect dilution of Sacramento WWTP discharges.

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No comments

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Table D-25. Percentage of Months in CALSIM (82 Years) That Flows Are below Threshold (5,794 cfs) for Adequate Dilution of Sacramento WWTP Effluent to <1.2 mg/L Ammonia

	Percentage of Months with Inadequate Flows				
Month	EBC2	EBC2_ELT	EBC2_LLT	PP_ELT	PP_LLT
January	0.0%	0.0%	0.0%	0.0%	0.0%
February	0.0%	0.0%	0.0%	0.0%	0.0%
March	0.0%	0.0%	0.0%	0.0%	0.0%
April	0.0%	0.0%	0.0%	0.0%	0.0%
May	1.2%	1.2%	2.4%	1.2%	2.4%
June	0.0%	0.0%	0.0%	0.0%	0.0%
July	0.0%	0.0%	0.0%	0.0%	0.0%
August	0.0%	0.0%	0.0%	1.2%	0.0%
September	0.0%	1.2%	2.4%	0.0%	0.0%
October	0.0%	2.4%	0.0%	0.0%	2.4%
November	0.0%	0.0%	2.4%	0.0%	1.2%
December	0.0%	0.0%	0.0%	0.0%	0.0%

Table D-26. Percent Increase in the Number of Months That Flows Are below Threshold (5,794 cfs) for Adequate Dilution of Sacramento WWTP Effluent to <1.2 mg/L Ammonia

Month	EBC2_ELT-PP_ELT	EBC2_LLT-PP_LLT
January	0.0%	0.0%
February	0.0%	0.0%
March	0.0%	0.0%
April	0.0%	0.0%
May	0.0%	0.0%
June	0.0%	0.0%
July	0.0%	0.0%
August	-1.2%	0.0%
September	1.2%	2.4%
October	2.4%	-2.4%
November	0.0%	1.2%
December	0.0%	0.0%

D.5.4.2.2 Restoration

Restoration conservation measures are not expected to significantly affect distribution or levels of ammonia/um in the Delta. Nitrogen is associated with fertilizers, which are used heavily throughout the Delta. However, WWTPs have been identified as the primary sources of ammonia, contributing 90% of the ammonia load to the Sacramento River. Thus, restoration of agricultural lands to marsh and floodplain is not expected to significantly affect ammonia concentrations.

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No comments

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D.5.5 Pyrethroids

D.5.5.1 Pyrethroids—Location, Environmental Fate, and Transport

Pyrethroids are a group of synthetic chemicals currently used as insecticides in urban and agricultural areas. More than 1,000 synthetic pyrethroids have been developed (ASTDR 2003), but only 25 are registered for use in California (Spurlock and Lee 2008). Pyrethroids are powerful neurotoxins, have immunosuppressive effects, and can inhibit essential enzymes such as ATPases (Werner and Orem 2008). Pyrethroids can cause acute toxicity at concentrations as low as 1 µg/L in fish (Werner and Orem 2008), and at lower levels between 2 and 5 ng/L (0.002 and 0.005 µg/L) in invertebrates. When various types of pyrethroid compounds are present together in an aqueous environment, the toxicity can be additive with increased toxic effects (Weston and Lydy 2010).

Overall pyrethroid use in the Delta has nearly quadrupled from 1990 to 2006 from approximately 27,000 kilograms per year (kg/yr) to more than 101,000 kg/yr in 2006 (U.S. Department of the Interior 2008) with five pyrethroids (lambda-cyhalothrin, permethrin, esfenvalerate, cypermethrin, and cyfluthrin) among the top agricultural insecticides in California (by acres treated) (Werner and Orem 2008). Pyrethroids are found in agricultural runoff, urban stormwater runoff, and in public WWTP effluent.

Significant sources of pyrethroids coming into the Delta from agricultural land include summer irrigation return flows from treated areas, winter stormwater runoff from orchards as a result of the common practice of applying pyrethroids during the winter season, and draining of excess surface water from rice fields during cultivation (Oros and Werner 2005). In addition to agricultural sources, recent studies have shown that WWTPs and urban runoff are important sources of pyrethroids to the Delta system (Weston and Lydy 2010). Pyrethroids have been detected at concentrations lethal to amphipods in urban runoff and effluent from the Stockton, Vacaville, and Sacramento WWTPs (Weston and Lydy 2010). However, receiving waters (San Joaquin River, American River, and Sacramento River) had fewer detections of pyrethroids at sublethal concentrations. Concentrations were higher in Vacaville creeks receiving effluent.

Pyrethroids have low water solubility; they do not readily volatilize and have a tendency to bond to particulates, settle out into the sediment, and not be transported far from the source. Once pyrethroids enter the Delta, they are easily adsorbed to suspended particles, organic material, soil, and sediments (Oros and Werner 2005). Because of the low-solubility nature of pyrethroids, it is estimated that 94% of pyrethroids used in the Central Valley remain at the application site and almost 6% degrade, with half life (the average time it takes for the concentration of the chemical to be reduced by one half) ranging from days to months, leaving only 0.11% ultimately available for transport through the Delta (Werner and Orem 2008). Seventy sediment samples were collected from agricultural drainage–dominated irrigation canals that run through 10 Central Valley counties. Analysis showed pyrethroids in 75% of the samples (Weston et al. 2004). However, pyrethroids were not often detected in agricultural drainage waters, demonstrating their strong affinity to sediments (Weston 2010).

Because pyrethroids have a very strong affinity for particulates, benthic organisms may be exposed to pyrethroids in sediment, and pelagic species could be exposed to pyrethroids adsorbed to particulates in the water column. Because pyrethroids are lipophilic, they have a tendency to bioaccumulate through the food chain (Werner and Orem 2008).

No comments

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Breakdown of pyrethroids can occur through both chemical and biological processes and can take from days to months depending on a number of factors (Werner and Orem 2008). Half lives of pyrethroids are influenced by temperature and pH. At an alkaline pH, some pyrethroids can degrade through hydrolysis; however, most are stable at the relatively neutral pH of Delta waters (Werner and Oram 2008).

Many pyrethroids also are susceptible to degradation by sunlight, called photodegradation. The half life of different pyrethroids in water varies greatly with differences in their susceptibility to sunlight, from 0.67 day for cyfluthrin to 600 days for fenpropathrin (Werner and Oram 2008). High turbidity and the presence of plants can reduce ultraviolet-light penetration and increase pyrethroid half life, allowing increased residence times and the potential for greater adsorption to sediment.

D.5.5.2 Pyrethroids—Effects of Preliminary Proposal Conservation Measures

D.5.5.2.1 Water Operations

As discussed above for ammonia, preliminary proposal water operations will result in reductions in Sacramento River flow at Freeport under certain conditions, mainly due to upstream reservoir operations. This reduction in flow could limit the dilution of Sacramento WWTP effluent and urban runoff, resulting in increased pyrethroid concentrations affecting covered fish species. In their study of pyrethroids in urban runoff, WWTPs, and receiving waters, Weston and Lydy (2010) reported few to no detections or toxicity to amphipods in Sacramento River water downstream of the Sacramento WWTP.

Weston and Lydy (2010) estimated loading from the Sacramento WWTP at 9g/day in the dry season and 13 g/day in the wet season. These estimates were based on median detected levels of total pyrethroids in effluent from three dry-weather (18.2 ng/L) and three wet-weather (14.2 ng/L) sampling events. Using a 13 g/day pyrethroid load and the lowest flow rate in the Sacramento River at Freeport in an 82-year period, estimated by the DSM2 at 5,110 cfs, the resultant concentration of pyrethroids in the Sacramento River is 7.19885 E-07 ng/L. This is consistent with Weston and Lydy's (2010) results that showed little to no detection of pyrethroids in the Sacramento River (Table D-27).

Table D-27. Estimation of Resultant Pyrethroid Concentrations in Water under Preliminary Proposal Low-Flow Conditions in the Sacramento River

Pyrethroid Loading from Sacramento WWTP (Weston and Lydy 2010)	9 g/day	= 0.000104167 g/s	=0.104167 ng/s
Minimum Flow over 82 years with Preliminary Proposal	5,110 cfs	= 144,698.9497 L/sec	
Resultant Concentration	7.19885E-07 ng/L	Pyrethroids in the Sacramento River	

Based on this analysis, the preliminary proposal water operations will have no effects on pyrethroids.

No comments

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D.5.5.2.2 Restoration

As discussed above, pyrethroids have been applied widely to agricultural land across the Delta; they tend to stay sequestered in soils and therefore will be present in ROA soils. Pyrethroids have a strong affinity for particulates, and would enter the water column as suspended particulates that likely would settle out over time. The lack of pyrethroids in surface water samples where they are present in sediments (Weston et al. 2004; Weston and State Water Resources Control Board 2010) demonstrates the strong propensity for pyrethroids to remain in sediment. During inundation of restoration areas, pyrethroids could be mobilized in the food chain via uptake by benthic organisms or uptake of particulates by pelagic organisms.

Current information does not allow estimation of resultant pyrethroid mobilization due to preliminary proposal restoration. Concentrations of pyrethroids in ROA sediments and additional research on mobilization and uptake into the food chain would be required. Given their affinity for soils, pyrethroids are not expected to spread far from the source area, and any suspension into the water column should be localized.

D.5.6 Organochlorine Pesticides

D.5.6.1 Organochlorine Pesticides—Environmental Fate and Transport

Organochlorine pesticides, specifically DDT, chlordane, and dieldrin, are legacy pesticides that are no longer in use but persist in the environment (Werner et al. 2008). These pesticides came into use from the late 1930s to the late 1940s and were phased out for general use in the 1970s; however, both chlordane and dieldrin remained in use until the late 1980s for termite control (Connor et al. 2007). These pesticides are widespread throughout the Sacramento and San Joaquin River watersheds and the Delta from widespread agricultural use (Conner et al. 2007).

Organochlorine pesticides have a very low solubility in water and are very persistent in the environment. DDT will degrade to dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethene (DDE), but these toxic by-products have very long half lives. The Central Valley Water Board Agricultural Waiver Program recently reported detections of DDT and other organochlorine pesticides in Delta agricultural ditches and drainage channels (Werner et al. 2008). Because they do not dissolve in water, organochlorine pesticides enter the food chain in particulate form, mainly through uptake by benthic fauna. They are strongly lipophilic and biomagnify through the food chain, resulting in high concentrations in high trophic levels.

The current AWQC-Fresh Water-Chronic for the organochlorine pesticides of concern in the Delta—DDT, chlordane, and dieldrin—are 0.001, 0.0043, and 0.056 µg/L, respectively. It should be noted, however, that the EPA anticipates future revisions to the criteria.

The highest concentrations in sediments and the greatest loading of organochlorine pesticides are thought to come from the western tributaries of the San Joaquin River, and high concentrations have been reported in San Joaquin River sediments (Gilliom and Clifton 1990 cited in Domagalski 1998). However, total concentrations in the water column were low, consistent with the strong affinity of organochlorine pesticides for sediments. Domagalski (1998) reported low concentrations in the water column in the San Joaquin River basin, and noted that the organochlorine pesticides were highest in tributary sediments and appeared to be mobilized by storms and rainfall. A study involving collection and analysis of 70 sediment samples over 10 counties in the Central Valley showed that organochlorine pesticides continue to be present in sediments, and at high

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concentrations, especially in agricultural drainage canals (Weston et al. 2004). This study found DDT in almost all samples collected, with a median concentration of 6.9 ng/g, and a maximum concentration of 408 ng/g in a drainage canal. DDE and other organochlorine pesticides also were detected at high levels in other drainage canal sediments.

D.5.6.2 Organochlorine Pesticides—Effects of Preliminary Proposal Conservation Measures

D.5.6.2.1 Water Operations

Preliminary proposal water operations are not likely to result in mobilization of organochlorine pesticides. In the San Joaquin watershed, where concentrations are highest, these chemicals are found primarily in sediments in tributaries draining agricultural areas, and are present at low concentrations in the water column. Preliminary proposal water operations would not result in increased flows in the tributaries that would mobilize organochlorine pesticides in sediments. No changes in the load or concentrations of organochlorine pesticides transported into the Delta by the San Joaquin River are anticipated.

Upstream reservoir operations under the preliminary proposal will result in decreased flows in the Sacramento River, as discussed in previous sections. Because organochlorine pesticides adhere to soils, mobilization would have to be facilitated by erosion of contaminated soils. As significant increases in flow velocity are not expected under the preliminary proposal, organochlorine pesticides are not expected to be mobilized. Thus, no effects on organochlorine pesticide distribution are expected under the preliminary proposal water operations.

D.5.6.2.2 Restoration

Organochlorine pesticides likely will be sequestered in the formerly agricultural soils in ROAs. The highest concentrations will be in the ditches, creeks, and drains that received agricultural discharges. Because these chemicals tend to bind to particulates, concentrations are typically highest in sediment. Flooding of formerly agricultural land is expected to result in some level of accessibility to biota through uptake by benthic organisms. Significant increases in organochlorine pesticides are not expected in the water column because these chemicals strongly partition to sediments. Exposures to the foodweb will be through intake by benthic fauna and to a lesser extent, through particulates in the water column to pelagic organisms.

Also, concentrations in the water column should be relatively short-lived because these pesticides settle out of the water column in low-velocity flow. If eroded and transported from an ROA, it is likely that the pesticides would not be transported very far from the source area and would settle out and be deposited close to the ROA.

D.5.7 Organophosphate Pesticides

D.5.7.1 Organophosphate Pesticides—Environmental Fate and Transport

Organophosphate pesticides (organophosphates) are human-made chemicals that are used for pest control in both urban and agricultural environments. Sources of diazinon and chlorpyrifos in the Delta are predominantly agricultural as the sale of these compounds for most nonagricultural uses has been banned in recent years. In the Delta, diazinon is applied to crops during the dormant

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season (December–February) and irrigation or growing season (March–November) fairly equally (52% and 48%, respectively), while the majority of chlorpyrifos (97%) is applied to Delta crops during irrigation season (McClure et al. 2006).

Diazinon and chlorpyrifos have slightly different chemical properties that affect the way they behave in aquatic environments. Diazinon is fairly soluble and mobile and will bind only weakly to soil and sediment. Chlorpyrifos is less soluble than diazinon and less mobile because of its tendency to bind much more strongly to soil and sediment. Consequently, diazinon enters the Delta dissolved in runoff, while chlorpyrifos enters the Delta adsorbed to soil particles (McClure et al. 2006). Unlike organochlorine pesticides, organophosphates do not tend to bioaccumulate, as they are readily metabolized by most organisms. For example, diazinon in fish will be approximately 96% removed in just 7 days (McClure et al. 2006).

Surface water data indicate that concentrations are high for both diazinon and chlorpyrifos in back sloughs and small upland drainages, and concentrations are lower in both the main channels and main inputs to the Delta. High concentrations of chlorpyrifos also are found in Delta island drains, but concentrations of diazinon remain low in the same drains (McClure et al. 2006). In the past, elevated concentrations of diazinon and chlorpyrifos have been detected in the Sacramento and San Joaquin Rivers and in the Delta during particularly wet springs and after winter storm events (McClure et al. 2006), suggesting that increased flow with accompanying increased suspended loads will result in increased mobilization of both diazinon and chlorpyrifos.

In the 2006 Staff Report for the amendments to the Basin Plan for diazinon and chlorpyrifos, updated water quality objectives developed by California Department of Fish and Game for diazinon and chlorpyrifos were compared to a broad sample set (McClure et al. 2006). Authors summarize surface water data for diazinon from 1991 to 2005, and chlorpyrifos from 1988 to 2005, from a number of previous sampling programs and studies and compared results to the updated water quality objectives of 160 and 25 ng/L for diazinon and chlorpyrifos, respectively. For context, the current AWQC-Fresh Water-Chronic for diazinon is 170 ng/L (0.17 µg/L). There is no AWQC-Fresh Water-Chronic for chlorpyrifos.

Locations where diazinon exceeded 160 ng/L in more than 10% of samples included Mosher Slough, San Joaquin River near Stockton, Stockton Diverting Channel, and French Camp Slough. Likewise chlorpyrifos results showed more than 10% of samples collected at these locations exceeded 25 ng/L, including Ulatis Creek, Mosher Slough, Middle Roberts Island Drain, French Camp Slough, Paradise Cut, and Stockton Diverting Channel.

D.5.7.2 Organophosphate Pesticides—Preliminary Proposal Conservation Measures

D.5.7.2.1 Water Operations

Diazinon and chlorpyrifos concentrations are highest in the back sloughs and agricultural drains that receive agricultural drainage. Preliminary proposal water operations are not likely to have much effect on transport of these chemicals from the back areas; transport of the pesticides from these areas would be determined mostly by rains that would flush out the areas. When flushed during wet seasons, the Sacramento River would maintain the capacity to dilute the influx. As discussed in Section D.5.4 (*Ammonia/um*), reduced flows would occur during dry periods in the

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Sacramento River, when the back tributaries would not be flushing out. In general, preliminary proposal water operations are not expected to affect organophosphate concentrations in the Delta.

D.5.7.2.2 Restoration

Organophosphate pesticides are likely present in ROA soils that would be inundated under preliminary proposal conservation measures. Because the solubility, tendency to adhere to soils and particulates, and degradation rates for these compounds vary, it is difficult to estimate the extent to which inundation would cause the toxins to be mobilized and more bioavailable in the aquatic system. Also, because organophosphate pesticides are metabolized by fish and do not bioaccumulate, effects on covered species would be limited, depending on the life stage.

D.5.7.3 Herbicides Associated with Conservation Measure 13 Nonnative Aquatic Vegetation Control

CM13 Nonnative Aquatic Vegetation Control would involve applying existing methods used by the California Department of Boating and Waterways' (DBW's) *Egeria densa* and Water Hyacinth Control Programs. Following is a brief summary of the types of herbicides used and the known toxic effects. (Table D-28.)

DBW uses five common herbicides—Weedar 64® (2,4-D), Rodeo® (glyphosate), R-11® (NP & NPE), Sonar® (fluridone), and Reward® (diquat). Riley and Finlayson (2004) depict the detected concentrations in the environment and the lethal concentration, 50% (LC50) values (mg/L) for larval delta smelt, fathead minnow, and Sacramento splittail.

Table D-28. Summary of Toxicity Testing for Invasive Species Herbicides

Herbicides and Surfactant	Highest Detected Concentration (mg/L)	Delta Smelt LC50 (mg/L)	Fathead Minnow LC50 (mg/L)	Sacramento Splittail LC50 (mg/L)
Weedar 64® (2,4-D)	0.260	149	216	446
Rodeo® (glyphosate)	0.037	270	1,154	1,132
R-11® (NP & NPE)	0.167	0.7	1.1	3.9
Sonar® (fluridone)	0.012	6.1	5.7	4.8
Reward® (diquat)	0.110	1.1	0.43	3.7
LC50 = lethal concentration, 50%.				

Rodeo®, Weedar 64®, and Sonar® 96-h LC50 values for the three fish species are several orders of magnitude higher than detected concentrations in the environment and would not be expected to cause lethal or sublethal effects in larval fish (Riley and Finlayson 2004). However, the LC50 values for Reward®, and R-11® are lower and approach the levels found in the environment, with the highest concentrations being above the LC50 values for both fathead minnow and splittail larvae (Riley and Finlayson 2004). However, these levels were reduced to background levels within 24 hours of application (Anderson 2003). R-11® is a surfactant used with both Rodeo® and Weedar 64®. R-11 was virtually undetected in the environment and can be controlled by careful application on plant surfaces only (Riley and Finlayson 2004). In conclusion, it is unlikely that acute toxicity would occur with the application of herbicides, with the possible exception of Reward®. Exposure levels are less than acute toxic levels, and the chemicals have short lives in the environment. Sonar®

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should be examined more closely because of its longer persistence in the environment and application procedures that require repeated treatments in the same area (Riley and Finlayson 2004).

D.5.7.4 Endocrine Disruptors—Environmental Fate and Transport

EDCs can interfere with the hormonal system in fish at extremely low (ng/L) concentrations, resulting in negative effects on reproduction and development (Bennett et al. 2008; Riordan and Biales 2008; Lavado et al. 2009). Implications for Delta fish communities include changes in population distributions (e.g., changes in sex ratios that may affect population dynamics) that may be contributing to the POD (Brander and Cherr 2010).

Major sources of EDCs in the Central Valley are thought to be pyrethroid pesticides from urban runoff (Oros and Werner 2005; Weston and State Water Resources Control Board 2010), WWTPs (Routledge et al. 1998), and rangelands (Kolodziej and Sedlak 2007). EDCs also include steroid hormones (such as ethinylestradiol, 17β-estradiol, and estrone), plant constituents, plasticizers, and other industrial by-products. Pyrethroids have been documented to pass through secondary treatment systems at municipal WWTPs at concentrations that are toxic to aquatic life, and still may be present in detectable concentrations following tertiary treatment (Weston and State Water Resources Control Board 2010). Runoff from manure-treated fields and rangelands where livestock have direct access to surface waters can result in introduction of excreted endogenous steroid hormones, including estrogens, androgens, and progestins (Kolodziej and Sedlak 2007). Cultivated fields may contribute naturally occurring estrogenic compounds, such as mycotoxins, and some agricultural pesticides and wetting agents (non-ionic detergents) can be converted to estrogenic compounds in the environment or in the liver.

Estrogenic activity is a measurement of the effects of EDCs in the environment; however, this measure does not provide information on the causative substances. Documenting presence of multiple EDCs in surface waters does not necessarily indicate the constituent(s) responsible for adverse effects on fish populations. For example, Lavado with others (2010) conducted a survey of surface waters from 16 locations in California that were analyzed for EDCs using bioassays (which indicate levels of estradiol equivalents [EEQs]) and analysis for steroid hormones, detergent metabolites, agrichemicals, and other anthropogenic contaminants indicative of pharmaceuticals and personal care products. Samples from two of the 16 survey locations with estrogenic activity identified were subjected to bioassay-directed fractionation to try to identify the contaminants responsible for the estrogenic activity. Results were inconclusive.

D.5.7.5 Endocrine Disruptors—Effects of Preliminary Proposal Conservation Measures

D.5.7.5.1 Water Operations

Endocrine disruptors are a diverse group of chemicals, and it is not possible to evaluate fully the potential effects on the distribution and bioavailability of these chemicals from preliminary proposal water operations.

No comments

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D.5.7.5.2 Restoration

Given current knowledge, there is potential for endocrine disruptors associated with pesticides to be present in ROA soils and mobilized by inundation of ROAs. Because the chemical characteristics of this group are diverse, the compounds may become mobilized and more bioavailable as suspended particulates in the water column, or in the dissolved phase in the water column. The type of endocrine disruptors and the possibility of mobilization would need to be evaluated on a site-specific basis, taking into consideration the types of pesticides historically used on the property.

D.5.8 Other Urban Contaminants

Development accounts for only 8% of land area in the Delta, but urban sources, and specifically WWTPs, have been identified as important sources of some toxins (see discussion of pyrethroids and ammonia in previous sections).

The primary Delta urban centers are located in both the Sacramento River watershed (cities of Sacramento and West Sacramento) and the San Joaquin River watershed (city of Stockton). Lead, PCBs, and hydrocarbons (typically oil and grease) are common urban contaminants that are introduced to aquatic systems via nonpoint-source stormwater drainage, industrial discharges, and municipal wastewater discharges. Lead, PCBs, and oil and grease all tend to adhere to soils, although some lighter components of oil and grease can become dissolved in water. Because they adhere to particulates, they tend to settle out close to the source and likely will be found at highest concentrations adjacent to the urban areas. PCBs are very persistent, adsorb to soil and organics, and bioaccumulate in the food chain. Lead also will adhere to particulates and organics but does not bioaccumulate at the same rate as PCBs. Hydrocarbons will biodegrade over time in an aqueous environment and do not tend to bioaccumulate; thus, they are not persistent.

Lead and hydrocarbons have not been identified on the 303(d) list, and information on their presence and distribution in the Delta is very limited. Thus, they are not considered in this effects analysis. PCBs are listed on the 303(d) list and are discussed below.

D.5.8.1 Polychlorinated Biphenyls

PCBs were banned in the late 1970s, but because of their persistence in the environment, they are still found in mostly urban soils and sediments. High levels of PCBs in environmental media and fish have been studied extensively in San Francisco Bay, which historically has received large amounts of urban runoff and industrial discharge. Although the north Delta, the Natomas east main drain in Sacramento, and the Stockton Deep Water Ship Channel are listed on the 303d list of impaired waters for PCB contamination (State Water Resources Control Board 2010), few data are available concerning current concentrations or distribution of PCBs in the Delta.

However, studies have not been conducted to evaluate the concentrations or distribution of PCBs in the Delta environment. Fish studies in the Delta have indicated the presence of PCBs in the food chain, but little work has been done in characterizing PCB concentrations in surface water and sediment, and identifying the source of PCBs. Because PCBs biomagnify through the food chain, and many of the larger fish migrate through the San Francisco estuary, including the Delta, the location of the PCB source cannot be identified through fish tissue analysis.

A study of largemouth bass from the Sacramento River demonstrated significantly higher levels of PCBs in eggs from the river compared to hatchery-raised fish (Ostrach et al. 2008). Elevated

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concentrations of PCBs were reported in tissues of fish near Stockton (Lee et al. 2002; Davis et al. 2000). Studies by deVlaming (2008) and Davis with others (2000) reveal that PCB concentrations in fish tissue samples from the north Delta and the Stockton Deep Water Ship Channel exceeded thresholds for human health. deVlaming's 2005 fish tissue composite samples also found elevated PCB concentrations in the Mokelumne and Tuolumne Rivers. However, deVlaming points out that, as lipophilic legacy contaminants, PCBs are expected to be found in higher concentrations in older, fattier fish, such as those that were sampled. The Sacramento sucker consistently had the highest PCB concentrations in these studies but should not be considered an appropriate model for other species because of its high lipid content (deVlaming 2008).

Overall, deVlaming found that the results from the 2005 tissue samples indicate that while high concentrations of PCBs can be found in older, fattier fish in specific regions of the Delta (north Delta, Sacramento, and Stockton), Delta PCB concentrations are generally below Office of Environmental Health Hazard Assessment (OEHHA) screening values. In addition, deVlaming suggests that his 2005 results indicate that the north Delta may be eligible for 303d de-listing. Similarly, the 2008 TMDL for PCBs in San Francisco Bay states that PCBs in the Delta are expected to attenuate naturally, thus eliminating the need for implementing action to reduce PCBs in Delta waters. Based on the information presented here, PCBs are not expected to be affected by preliminary proposal actions.

D.6 Effects of Changes in Toxins on Covered Fish Species

D.6.1 Summary of Conclusions

The preliminary proposal involves substantial restoration that would be implemented throughout the Delta over the 50-year implementation period as well as changes in water operations that could change how some toxins move through the Delta. As discussed in previous sections of this appendix, and further below, few to no effects on toxins in the Delta are expected from preliminary proposal water operations. Restoration of land with metals and pesticides in soils that could be mobilized into the aquatic system when inundated is expected to increase the bioavailability of some toxins to covered fish species. Given the current understanding of the complex processes involved in mobilizing these toxins, it cannot be modeled or estimated with any confidence. This appendix provides a full conceptual framework to understand the relevant processes. Site-specific analyses of restoration areas will be required to estimate the magnitude of the effects. Important to this picture is that taking lands out of agricultural use will result in an overall reduction of agriculture-related toxin loading, including pesticides, copper, and in some cases, concentrated selenium in irrigation drainage.

In general, the following conclusions can be drawn.

- Preliminary proposal water operations will have few to no effects on toxins in the Delta.
- Preliminary proposal restoration will increase bioavailability of certain toxins, especially methylmercury, but the overall effects on covered fish species are expected to be localized and of low magnitude.
- Available data suggest that species exposure to toxins would be below sublethal and lethal levels.

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- The long-term benefits of restoration will reduce exposure to existing toxins in the environment and eliminate sources.

The following sections provide additional detail on the specific effects of toxic constituents on covered fish species.

D.6.2 Conclusion of Effects of Toxins on Covered Fish Species

Effects on covered fish species will depend on the species/life stage present in the area of elevated toxins and the duration of exposure. Release of toxic constituents from sediments (e.g., in restored areas) is tied to inundation, and so highest concentrations will occur during seasonal high water and to a lesser extent for short time periods on a tidal cycle in marshes. A full description of fish occurrence over the species' life cycle is included in Appendix A and is integrated into the following sections where appropriate.

D.6.2.1 Mercury

Model results presented in Section D.5.1.2.1 indicate that preliminary proposal water operations will not adversely affect covered fish species. However, BDCP restoration efforts have the potential to increase the exposure of fish to methylmercury mobilized during inundation of restored tidal wetlands and floodplains, which are used for rearing by covered fish species. The areas expected to have the highest potential for methylmercury are the Yolo Bypass and, to a lesser extent, the Mokelumne-Cosumnes River. The amounts of methylmercury mobilized and resultant effects on covered fish species are not currently quantifiable. Slotton and others (2000: 43) noted:

> Results to date suggest that wetlands restoration projects may result in localized mercury bioaccumulation at levels similar to, but not necessarily greater than, general levels within their surrounding Delta subregion. Nevertheless, high methylation potential, flooded wetland habitat may be the primary source of methyl mercury production in the overall system...Careful monitoring will be essential to assess the actual effects of new wetlands restoration projects.

Also, Slotton and others (2000) have noted that inland silversides from areas adjacent to flooded Delta tracts similar to proposed restoration sites did not exhibit elevated methylmercury.

The following discussion is based on the assumption that some level of methylmercury will be mobilized at BDCP ROAs. It also should be noted that a methylmercury mitigation conservation measure is part of the BDCP, and requires integration of design elements into restoration projects to decrease methylmercury production.

D.6.2.1.1 Eggs

The direct exposure of salmonid, sturgeon, and lamprey eggs to increased levels of methylmercury as a result of the preliminary proposal would not occur because salmonid, sturgeon, and lamprey eggs are not present anywhere that restoration is proposed. It is possible that maternal transfer could occur, i.e., prespawned eggs could be exposed to methylmercury from adult consumption of contaminated prey. Splittail, delta smelt, and longfin smelt all spawn in or near areas that would be restored under the preliminary proposal and therefore have the potential for increased exposure to methylmercury. For delta smelt and longfin smelt that spawn directly downstream of the Yolo Bypass or other ROAs in the west or north Delta, exposure of the eggs to aqueous mercury could range from 9 to 14 days (delta smelt) and up to 40 days (longfin smelt). Exposure of splittail eggs would be even less, with eggs hatching in 3–7 days. It is not known what level of mercury would be

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assimilated and transferred to the larvae. Mercury exposure in eggs can lead to egg failure and developmental effects, but the levels of mercury that would have these results are not fully understood.

D.6.2.1.2 Larvae and Juveniles

Effects of increased methylmercury are expected to be minimal for fish rearing in the Delta. Henery and others (2010) compared methylmercury in Chinook salmon confined in the Yolo Bypass with those from the Sacramento River and found that the fish that reared in the Yolo Bypass accumulated 3.2% more methylmercury than fish held in the nearby Sacramento River. However, it should be noted that the mean methylmercury concentration for fish in the floodplain was 0.0567 µg/g and only two of the 199 individuals sampled had greater than 0.20 µg/g tissue methylmercury (a whole-body threshold of potential importance for sublethal effects on fish for growth, reproduction, development, and behavior) (Beckvar et al. 2005 as cited by Henery et al. 2010: 561). In addition, the 3.2% increase observed should be considered in the context of the life stage, i.e., the fish would subsequently be leaving the Plan Area and therefore no longer would be exposed to elevated concentrations of mercury, while also growing considerably larger in the ocean and therefore diluting accumulated mercury in their increasing body mass.

Henery also found that the body mass of free-ranging Chinook salmon that reared in the floodplain grew at a rate of 3.5% per day, compared to 2.8% per day for Chinook salmon that reared in the adjacent Sacramento River. Therefore, it appears that the increased exposure to methylmercury in rearing salmonids generally would not be high enough to elicit measurable sublethal effects. This growth dilution effect would be even more pronounced in adult fish that grow to three orders of magnitude larger over their life span, making the amount of methylmercury tissue accumulation as a juvenile insignificant (Henery et al. 2010).

Unlike salmonids, juvenile and subadult green and white sturgeon spend considerable time in the Delta. Laboratory studies have shown that high concentrations of methylmercury (25–50 ppm) in sturgeon diet are required to elicit any sort of adverse effect (Kaufman pers. comm.; Lee et al. 2011). Such elevated levels of methylmercury would not be experienced in the preliminary proposal restoration areas or the Yolo Bypass. Although juvenile sturgeon spend more time than any other covered fish species in the Plan Area, they also have the fastest growth rate of any species. Accumulation of methylmercury in the body tissue thus is mediated by growth dilution from the rapidly increasing muscle mass (Kaufman pers. comm.). Total body burden of methylmercury may increase, but tissue concentration of methylmercury would be expected to remain relatively constant (Kaufman pers. comm.) Juvenile sturgeon are primarily benthivores, feeding mostly on secondary productivity in the food chain (small crustaceans, clams, etc.) and therefore would not bioaccumulate mercury as fast as a top predator.

Larvae and juvenile splittail, delta smelt, and longfin smelt feed very low on the food chain and, similar to sturgeon juveniles described above, would bioaccumulate methylmercury at low levels. Additionally, juvenile longfin smelt occur primarily in San Pablo Bay and San Francisco Bay where no restoration or effects from water operations related to the preliminary proposal would occur. Similarly, juvenile delta smelt occur primarily in the west Delta and Suisun Bay, where elevated levels of methylmercury from restoration are not likely, and in Suisun Marsh, where the potential for elevated methylmercury is also low. However, juvenile smelt remaining in the north Delta area would experience exposure from food in the Yolo Bypass and Cache Slough regions.

No comments

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D.6.2.1.3 Adults

Central Valley adult salmonids do not feed during their time in the Delta (Sasaki 1966) and potentially would be exposed to the elevated methylmercury produced in this portion of the Delta through absorption from water through their gills. Additionally, they tend to stay in the main channels through the Delta, rather than the shallow, slow-moving waters of wetlands and floodplains. As a result of their limited time in the estuary and the tendency to migrate in the main channels, adult salmonids are not likely to be exposed to a significantly different quantity of methylmercury under the preliminary proposal than under current conditions. Elevated mercury levels in the East Delta subregion could be encountered at the confluence of the Mokelumne and Cosumnes Rivers, although the number of spawning occurrences in this area by covered fish species is relatively small.

Adult sturgeon would be using the preliminary proposal regions primarily as a pathway for spawning migration, although they do forage in the lowest preliminary proposal regions. Adult sturgeon would not accumulate high tissue loads of methylmercury for the same reason as the juveniles, coupled with the fact that they spend little time in areas that are projected to have increased methylmercury production. Analyses of white sturgeon from San Francisco Bay (albeit downstream of the Plan Area) found median mercury concentration in muscle below the screening level for human consumption concern of 0.3 µg/g wet weight (Greenfield et al. 2000).

Although adult life stages of splittail, delta smelt, and longfin smelt feed and spawn in areas with potential for elevated methylmercury levels, they feed primarily on lower trophic level food sources and therefore do not accumulate methylmercury at rates as high as if they preyed on fish. Additionally, they are not expected to spend excessive amounts of time in these areas, so the uptake through their gills and food is expected to be minimal. Nevertheless, delta smelt have been shown to accumulate appreciable quantities of mercury: Bennett and coauthors (2001) found average levels of 0.18 µg/g, which is just under the 0.20 µg/g general threshold for effects on fish suggested by Beckvar and coauthors (2005 as cited by Henery et al. 2010: 561). There is no evidence for acute toxicity of mercury being related to recent declines of pelagic fish such as delta smelt and longfin smelt, although mercury, selenium, and copper may have had a chronic effect on these species (Brooks et al. 2011).

D.6.2.2 Selenium

As discussed in Section D.5.2, elevated selenium is recognized as a threat to fish in the Delta. However, few to no effects on selenium from preliminary proposal actions have been identified. Historically, the San Joaquin River has been a major source of selenium to the Delta; however, the selenium source is being addressed and selenium concentrations are decreasing. Further, modeling results indicate that preliminary proposal water operations would have few to no effects on selenium concentrations in water or fish tissue. Suisun Marsh has high levels of selenium in filter-feeding clams that bioaccumulate selenium and form the base of the food chain, which results in biomagnification to covered fish species. However, no mechanisms for the preliminary proposal actions to increase selenium in Suisun Marsh have been identified.

As a conservative approach, the following discussion of the possible effects of preliminary proposal actions on selenium in covered fish species assumes that some increase in selenium will occur under the preliminary proposal actions. Any increases are expected to be localized and associated with

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inundation of ROAs, mainly in the south Delta, which receives input from the San Joaquin River, a historical source of selenium.

The bioaccumulation and effects of selenium on fish have much to do with their feeding behavior. The overbite clam, *C. amurensis*, accumulates selenium and is key to mobilizing it into the food chain. It is abundant in Suisun Bay, but the preliminary proposal is not expected to increase the contribution of selenium to this area given the distance from the San Joaquin River source (modeling results corroborate). Smelt, steelhead, and Chinook salmon would be expected to have low exposure to selenium as they are feeding on pelagic organisms that are able to excrete selenium at more than 10 times the rate of the benthic clam, *C. amurensis*. This is in contrast to sturgeon and splittail that are at risk for teratogenesis because of their diet preference for *C. amurenis*, and high concentrations of selenium bioaccumulated in their tissues, especially reproductive organs, liver, and kidneys. Deformities occur in developing embryos when selenium replaces sulfur in sulfur-rich hard tissues (Diplock 1976). For example, recent field surveys identified Sacramento splittail from Suisun Bay (where selenium concentrations are highest) that have deformities typical of selenium exposure (Stewart 2004). Both green and white sturgeon feed on *C. amurensis* in the three lower subregions (Suisun Bay, Suisun Marsh, and West Delta) but are not likely to be affected by the preliminary proposal–related changes in selenium because of the distance from the source area (Grassland in San Joaquin River basin). Modeling results corroborate this conclusion. Little is known about lampreys, but based on lamprey ammocoete occurrence in the Delta (mostly in the Sacramento River area), it is expected that their exposure to selenium-laden sediments and water would be minimal.

D.6.2.3 Copper

Copper will be present in agricultural soils and could be mobilized by inundation of the ROAs, as it is fairly immobile in soils, but is very mobile in an aquatic system. Preliminary proposal water operations are not expected to have much effect on copper concentrations, although there is a slight chance of mobilization of copper from increased flow at the weir at the upstream end of the Yolo Bypass, where copper concentrations may be elevated.

Mobilized copper could have a temporary adverse effect on juvenile fish, namely salmonids, splittail, and smelt that rear in the Yolo Bypass. Additionally, splittail adults, eggs, and larvae may be exposed while in the bypass. Likewise, rearing juvenile and adult salmonids and sturgeon may be exposed in other ROAs previously used for agriculture.

It is difficult to establish precise concentrations at which copper is acutely toxic to fish, as a large number of water chemistry parameters (including temperature, pH, DOC, and ions) can affect the bioavailability of copper to the fish population (U.S. Environmental Protection Agency 2007). As discussed in Section D.5.3, copper is present in the Sacramento River at low concentrations (2 µg/L). Connon with others (2010) demonstrated that the median lethal concentration of dissolved copper at which 10% of delta smelt juveniles died after 7 days of exposure under experimental conditions (LC10) was 9.0 µg/L; 50% of juveniles died (LC50) when exposed to a median concentration of 17.8 µg/L. Although 96-hour larval delta smelt mortality suggested higher concentrations than juveniles (median LC10 = 9.3 µg/L; median LC50 = 80.4 µg/L), these results were complicated by differences in exposure duration and experimental conditions (particularly for factors such as temperature and conductivity that may affect copper toxicity) (Connon et al. 2010).

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Carreau and Pyle (2005) demonstrated that copper exposure during embryonic development of fathead minnows could result in permanent impairment of chemosensory functions but that the same exposure caused only temporary impairment in adults once copper is removed, suggesting that the specific life stage at the time of exposure also plays a role in the toxicity of copper to fish. Baldwin and coauthors (2003) reported inhibition of olfactory physiology in salmonids at concentrations of 6 µg/L (background plus spiked concentration), indicating that low levels of copper over a short period of exposure could affect migratory ability in salmonids. Sandahl (2007) reported impairment of sensory functions and avoidance behavior in juvenile coho at copper concentrations of 2µg/L. There is some evidence that larval delta smelt swimming velocity decreases as dissolved copper concentration increases, although experimental testing did not find statistical differences between test subjects and controls (Connon et al. 2010). Various delta smelt genes have been to shown to have altered expression in copper-exposed larvae (Connon et al. 2010).

Localized, short-term increases in copper concentrations are possible near ROA areas, but the length of time and the concentrations cannot be determined with available data. Overall, because copper concentrations are generally low in Delta waters, preliminary proposal actions are not expected to result in increased effects of copper on covered fish species. In fact, halting agricultural use and application of pesticides on restoration areas will result in decreased loading of copper to the Delta system and will provide a long-term net benefit to the ecosystem.

D.6.2.4 Ammonia

Based on the analysis presented in Section D.5.4, preliminary proposal actions are not expected to result in substantial increases in ammonia concentrations in the aquatic system that could affect covered fish species. Analysis of the ability of the Sacramento River to dilute ammonia discharges from the Sacramento WWTP indicates that resultant concentrations would be within ecologically acceptable limits under the preliminary proposal. Further, no addition or mobilization of ammonia to the aquatic system would result from restoration activities.

D.6.2.5 Pyrethroids, Organophosphate Pesticides, and Organochlorine Pesticides

Based on the analyses in Sections D.5.5, D.5.6, and D.5.7, changes in concentrations of pyrethroids, organophosphate pesticides, and organochlorine pesticides resulting from the preliminary proposal are expected in the vicinity of agricultural land restored to marshes and floodplains. These chemicals either have a strong affinity for sediment and will settle out of the water column, or readily degrade in an aquatic system. Thus, it is expected that increases in concentrations due to preliminary proposal actions will be of relatively short duration and localized near ROAs. Specific areas of these elevated toxins have not been identified, but they can be expected in any of the ROAs. Preliminary proposal restoration will take these agricultural areas out of production, therefore eliminating the source and reducing these chemicals in the Delta system, providing a long-term ecological benefit.

Pyrethroids have been shown to be lethal as low as 1 µg/L, although there are many different chemicals in this group with varying toxicities for fish. Likewise, little is known on the effects of organophosphates on fish, but elevated concentrations of organophosphates are more likely to affect the lower trophic levels that the covered fish species prey on than the fish directly (Turner 2002). As these pesticides are neurotoxins, behavioral effects are of primary concern; however, Scholz (2000) points out that the effects are not well understood. Scholz (2000) found that diazinon

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concentrations as low as 1 µg/L resulted in significant impairment of predator-alarm responses, and slightly higher concentrations of 10 µg/L caused the impairment of homing behavior in Chinook salmon. Organochlorine pesticides are neurotoxic, are likely carcinogenic, and have been implicated as endocrine disruptors because of their estrogenic nature and effects on reproductive development (Leatherbarrow et al. 2006). These pesticides are highly persistent and lipophilic, and as such, they strongly bioaccumulate (Werner et al. 2008). Because of their persistence in the environment and biomagnifications through the foodweb, the main concern with organochlorines is bioaccumulation in the higher trophic levels and implications for human consumption. However, organochlorine pesticides and degradation products can directly affect fish through toxicity to lower-level invertebrates on the food chain, and toxicity to small and early life stage fish, but there is little information specific to effects on individual species. Sublethal effects may include reproductive failure and behavioral changes. Ostrach's (2009) report suggests that largemouth bass have been experiencing reproductive failure due to organochlorine compounds in San Francisco Bay, which is likely due to concentrations accumulated through biomagnifications. Because they tend to adhere to soils and particulates, organochlorine compounds may take longer to flush out than some of the more environmentally mobile constituents discussed above (e.g., copper).

In the Delta, fish in higher trophic levels are particularly vulnerable to these pesticides, as the chemicals will biomagnify and bioaccumulate in their tissues. These fish include white and green sturgeon, salmonids, and lampreys. As smaller fish at lower trophic levels, smelt and splittail can be expected to have less biomagnification of these pesticides.

More detailed analysis of pyrethroid, organophosphate pesticide, and organochlorine pesticide effects would require site-specific information, but overall the preliminary proposal is not expected to substantially increase the potential exposure of fish because elevated bioavailability likely would be localized near ROAs and over a relatively short time period. Additionally, restoration of agricultural land will result in an overall reduction in these chemicals in the Delta system, with an overall net ecological benefit.

D.6.3 Uncertainties and Information Needs

As discussed throughout this appendix, the amount of toxins that will be mobilized and made more bioavailable to covered fish species due to inundation of ROAs is uncertain. This uncertainty is most critical for methylmercury, and to a lesser extent for pesticides and other metals. For each of the toxins, the chemical-specific and site-specific factors that will determine resultant effects vary. Conservation CM12 is included in the BDCP to support site specific evaluation and monitoring of methylmercury production in restored areas. Data from this monitoring will assist in evaluating the effects of restoration actions and reduce the uncertainty associated with the potential exposure of covered fish to methylmercury mobilized by these actions.

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No comments

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No comments

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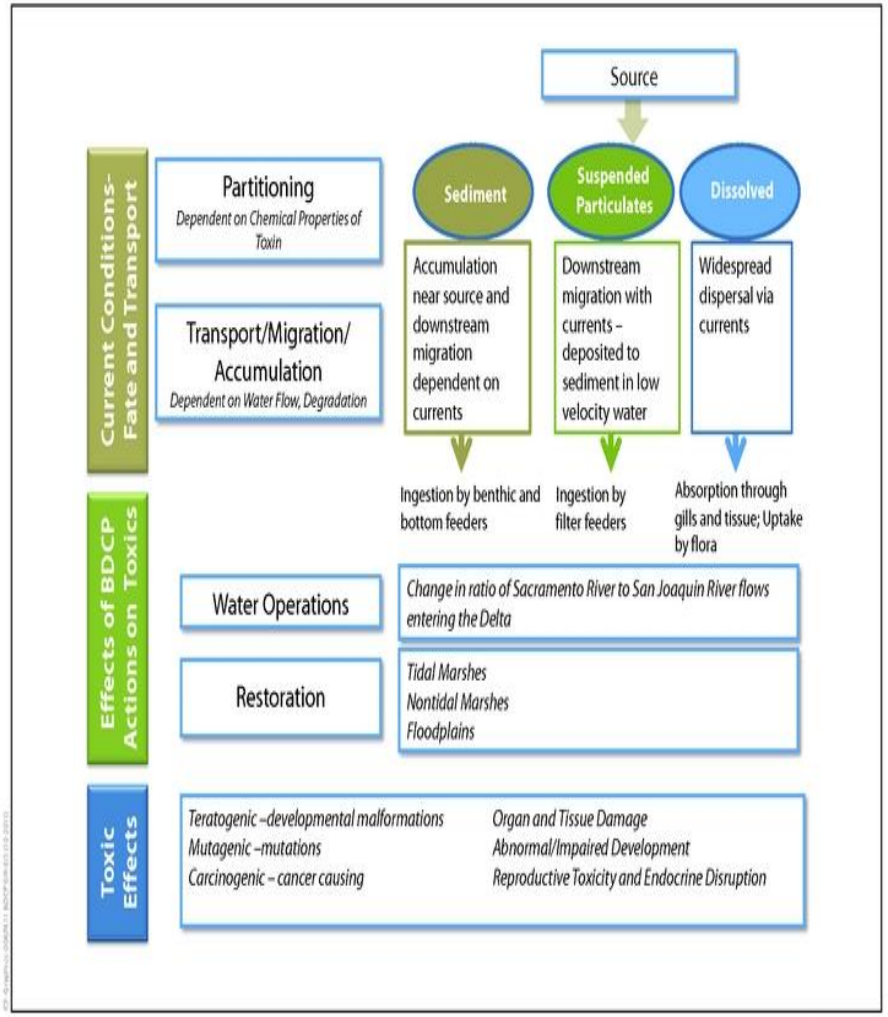

Figure D-1
Generic Conceptual Model to Evaluate BDCP Toxins Effects

No comments

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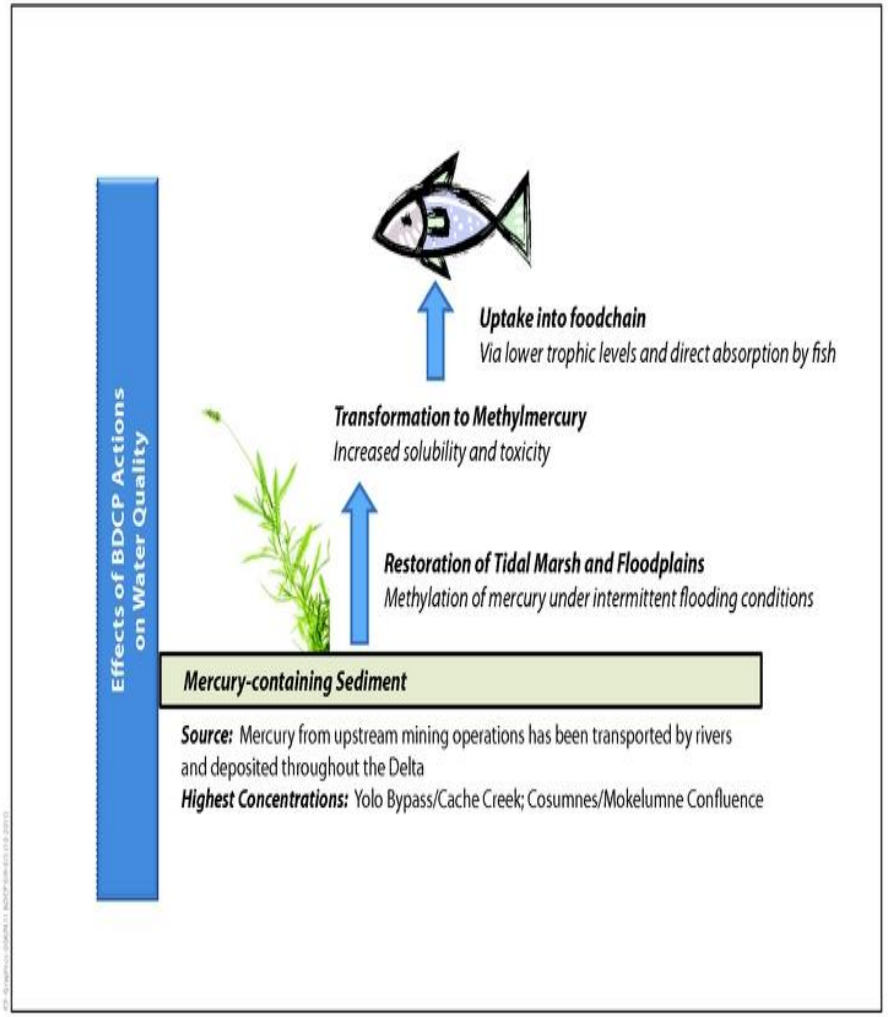

Figure D-2
Methylmercury Cycling in an Aqueous System

No comments

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Attachment 4.A

Bioaccumulation Model Development for Mercury Concentrations in Fish

4.A.1 Introduction

Areas of enhanced bioavailability and toxicity of mercury (created through the mercury methylation process) exist in the Sacramento–San Joaquin River Delta (Delta), and elevated mercury concentrations in fish tissue produce estimates of exposure and risk to humans and wildlife. Consequently, the beneficial uses most directly affected by mercury are shellfish harvesting and commercial and sport fishing activities that pose a human health concern, and wildlife habitat and rare, threatened, and endangered species resources that can be exposed to bioaccumulation of mercury. Because of these concerns, mercury was the first total maximum daily load (TMDL) approved for San Francisco Bay in 2007 (San Francisco Bay Regional Water Quality Control Board 2006), and a methylmercury TMDL is in progress for the Delta (Central Valley Regional Water Quality Control Board 2008). The Delta and Suisun Marsh both are listed as impaired water bodies on the Clean Water Act Section 303(d) lists for mercury in fish tissue (State Water Resources Control Board 2007).

The conceptual model of mercury transport, fate, and risk for the Delta as used in this study shows important linkages among waterborne loading, waterborne concentrations, and water, sediment, and biotic processing of mercury and methylmercury. Mercury is strongly particle-associated and tends to settle and accumulate in sediment deposition areas that facilitate mercury methylation by sulfur-reducing bacteria. From that point in the cycle, diet (rather than waterborne concentration) is the primary route for methylmercury exposure to fish, wildlife, and humans.

Mercury in largemouth bass was chosen as the representative measure of fish bioaccumulation for this study because bass tissue concentrations have been described recently over a wide area of the Delta. Consequently, the fish tissue concentrations of mercury could be linked in time and space with estimated waterborne concentrations of mercury and methylmercury to examine possible causal linkages. In addition, the California Regional Water Quality Control Board, Central Valley Region (Central Valley Water Board) already successfully used this general approach to link waterborne and largemouth bass mercury concentrations for broad areas of the Delta. However, for the preliminary proposal, it was desirable to examine fish tissue–water mercury linkages at defined locations rather than general Delta conditions over broad areas.

4.A.2 Mercury Concentrations in Water and Fish

The DSM2 output locations where whole-body largemouth bass data for mercury were available are shown on Table D.A-1 (tables are at the end of this attachment). The geometric mean mercury and methylmercury concentrations in water were estimated for selected DSM2 output locations and then used to estimate mercury concentrations in fish tissue (fillets).

The quarterly and annual average waterborne mercury and methylmercury concentrations for the DSM2 output locations are shown in Table D.A-1 (for Year 2000). Note that the first quarter DSM2

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model results were discarded because the model "ramps up" for a new year, and the average values from those first months were distinctly lower than for the other quarters. Therefore, the annual average for the year was computed from the last three quarters.

Largemouth bass were chosen for modeling because they are popular sport fish, top predators, live for several years, and tend to stay in the same area (that is, they exhibit high site-fidelity). Consequently, they are excellent indicators of long-term average mercury exposure, risk, and spatial pattern for both ecological and human health. Fish tissue concentrations were available from 1999 and 2000 at modeled locations; DSM2 estimated waterborne concentrations from those locations were modeled on the year 2000 hydrology. The Sacramento River inflows and Cosumnes River were the areas of highest fish tissue bioaccumulation of mercury. Bass had uniformly lower tissue concentrations in the central Delta. The Central Valley Water Board TMDL tissue concentration goal for normalized 350-mm total length largemouth bass tissue is 0.24 mg/kg wet weight (ww) mercury for the Delta (Central Valley Regional Water Quality Control Board 2008).

4.A.3 Bioaccumulation Model Predicting Mercury in Fish

The largemouth bass tissue mercury concentrations were presented as edible fillet concentrations for fish normalized to 350 mm in total length as supplied directly by San Francisco Estuary Institute (SFEI) (2010). It is important to standardize concentrations to the same size fish at each location because of the well-established positive relationship between fish size and age and tissue mercury concentrations (Alpers et al. 2008).

Co-located fish fillet mercury concentrations were graphed against their corresponding values of waterborne mercury or methylmercury in standard, linear regression analyses using annual average and quarterly water values calculated using the SAS Institute's Statview 5 analytic software (SAS Institute 1998). The data were log-transformed to improve normality. The positive relationships with mercury were not as strong as with methylmercury. The best choice for a predictive model was the linear regression showing a statistically significant relationship between annual average waterborne methylmercury concentrations in water from the third quarter of the year and largemouth bass tissue mercury concentrations:

Fish mercury (mg/kg ww) = 10^(4.217+ (Log methylmercury in water, µg/L × 1.164)) **[Eq.1]**

The results of this regression model in can be compared to those using the alternative from the Central Valley Water Board TMDL model, which also predicts 350-mm normalized largemouth bass fillets from methylmercury in water. This comparison is shown in Table D.A-2. The Central Valley Water Board developed a model based on largemouth bass as grouped in major areas of the Delta compared to average methylmercury concentrations in water for those areas (Central Valley Regional Water Quality Control Board 2008):

Fish mercury (mg/kg ww) = 20.365 × ((methylmercury in water, ng/L)^1.6374) **[Eq. 2]**

For the DSM2-estimated water concentrations for 2000, the Central Valley Water Board model consistently overpredicted the fish concentrations as compared to the regression model (mean of 0.719 mg/kg compared to 0.411 mg/kg) relative to the measured value of 0.446 mg/kg (Table D.A-2). For this reason, the regression model was used to predict bass fillet concentrations for this study. The Central Valley Water Board TMDL model was not established to predict fish tissue

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concentrations but to provide the linkage between the 0.24 mg/kg tissue mercury TMDL target and the waterborne goal of 0.066 ng methylmercury/L.

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No comments

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2 **Table D.A-1. Mercury and Methylmercury Concentration Estimates in Water at Selected Locations in the Delta**

	Concentration (µg/L)							
	Second Quarter*		Third Quarter		Fourth Quarter		Annual Average	
DSM2 Output Location	Hg	MeHg	Hg	MeHg	Hg	MeHg	Hg	MeHg
Sacramento River RM 44	0.00410	0.00010	0.00410	0.00010	0.00410	0.00010	0.00410	0.00010
Mokelumne River downstream of Cosumnes	0.00856	0.00022	0.00845	0.00022	0.00855	0.00022	0.00852	0.00022
Cosumnes River	0.00860	0.00022	0.00860	0.00022	0.00860	0.00022	0.00860	0.00022
Cache Slough	0.00411	0.00010	0.00413	0.00010	0.00412	0.00010	0.00412	0.00010
Sacramento River at Isleton	0.00410	0.00010	0.00411	0.00010	0.00411	0.00010	0.00411	0.00010
San Joaquin River Potato Slough	0.00532	0.00013	0.00420	0.00010	0.00424	0.00010	0.00459	0.00011
Sherman Island	0.00479	0.00011	0.00450	0.00010	0.00475	0.00009	0.00468	0.00010
White Slough downstream of Disappointment Slough	0.00686	0.00016	0.00466	0.00012	0.00490	0.00013	0.00547	0.00014
Franks Tract	0.00546	0.00013	0.00426	0.00011	0.00429	0.00010	0.00467	0.00011
Big Break	0.00493	0.00012	0.00436	0.00010	0.00448	0.00010	0.00459	0.00011
Mildred Island	0.00699	0.00015	0.00461	0.00012	0.00509	0.00012	0.00556	0.00013
San Joaquin River Naval Station	0.00762	0.00016	0.00763	0.00016	0.00761	0.00015	0.00762	0.00016

Notes:
*First quarter DSM2 modeled water concentrations were not used because of model "ramp up" artifacts.
MeHg = methylmercury.
Hg = mercury.
RM = river mile.

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Table D.A-2. Modeled and Measured Bass Fillet Mercury Concentrations

Site	Bass Tissue Concentration (mg/kg ww)		
	Measured Fish	Regression Model	Central Valley Water Board TMDL Model
Sacramento River RM 44	0.869	0.364	0.470
Mokelumne River downstream of Cosumnes	1.091	0.930	1.758
Cosumnes River	0.895	0.926	1.745
Cache Slough	0.559	0.372	0.484
Sacramento River at Isleton	0.628	0.366	0.473
San Joaquin River Potato Slough	0.365	0.413	0.560
Sherman Island	0.323	0.371	0.482
White Slough downstream of Disappointment Slough	0.226	0.525	0.785
Franks Tract	0.265	0.420	0.574
Big Break	0.226	0.390	0.518
Mildred Island	0.226	0.498	0.729
San Joaquin River Naval Station	0.352	0.621	0.996
San Joaquin River Vernalis	0.739	0.583	0.912
Geometric mean	**0.446**	**0.493**	**0.719**
Maximum	**1.091**	**0.930**	**1.758**
Minimum	**0.226**	**0.364**	**0.470**
mg/kg ww = milligram per kilogram wet weight.			

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No comments

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Attachment 4.B

Selenium Modeling Methods

4.B.1 Bioaccumulation Model Development for Selenium Concentrations in Whole-Body Fish, Bird Eggs, and Fish Fillets

Plan-related changes in waterborne concentrations of selenium in the Sacramento–San Joaquin River Delta (Delta) may result in increased selenium bioaccumulation and/or toxicity to aquatic and semi-aquatic receptors using the Delta. Historical fish tissue data and measured (at Vernalis) or DSM2-modeled (other locations) waterborne selenium concentrations for selected locations in 2000, 2005, and 2007 were used to model water-to-tissue relationships, generally following procedures described by Presser and Luoma (2010).

The output from the DSM2 model (expressed as percent inflow from different sources) was used in combination with the available measured waterborne selenium concentrations to model concentrations of selenium at locations throughout the Delta. These modeled waterborne selenium concentrations were used in the relationship model to estimate bioaccumulation of selenium in whole-body fish and bird eggs. Selenium concentrations in fish fillets then were estimated from those in whole-body fish.

The data and processes used to develop the final models to estimate this selenium bioaccumulation are described in the following sections.

4.B.2 Selenium Concentrations in Water

Dissolved selenium data were available for six inflow locations to the Delta. Whole-body largemouth bass data for selenium were available from the following DSM2 output locations.

- Big Break
- Cache Slough at Ryer Island
- Franks Tract
- Knights Landing
- Middle River Bullfrog
- Old River Near Paradise Cut
- Sacramento River Mile (RM) 44
- San Joaquin River Potato Slough
- Vernalis

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The geometric mean selenium concentrations from the inflow locations were combined with the modeled quarterly average percent inflow for each DSM2 output location to estimate waterborne selenium concentrations at selected DSM2 output locations.

The quarterly average mix of water from the six inflow sources was calculated from daily percent inflows provided by the DSM2 model output for the nine DSM2 output locations for which fish data were available. DSM2 data were not available at or near Vietnam Veterans Memorial Bridge on the Sacramento River or Vernalis on the San Joaquin River. Historical data of selenium concentrations in water collected near these locations were used to represent quarterly averages. The geometric mean of total selenium concentrations in water collected from years 2003, 2004, 2007, and 2008 (California Department of Water Resources 2009) at Knights Landing were used to represent quarterly averages of selenium concentrations in water for all years. The geometric means of selenium concentrations (*total* or *dissolved* was not specified) in water collected from years 1999–2007 (Central Valley Regional Water Quality Control Board 2009) were used to represent quarterly averages for all years of selenium concentrations in water at Vernalis.

The quarterly waterborne selenium concentrations at DSM2 locations were calculated using the following equation:

$$C_{water\ quarterly} = \frac{(I_1 \bullet C_1) + (I_2 \bullet C_2) + (I_3 \bullet C_3) + (I_4 \bullet C_4) + (I_5 \bullet C_5) + (I_6 \bullet C_6)}{100} \quad \textbf{[Eq.1]}$$

Where:

$C_{water\ quarterly}$ = quarterly average selenium concentration in water (µg/L) at a DSM2 output location

$I_{1\text{-}6}$ = modeled quarterly inflow from each of the six sources of water to the Delta for each DSM2 output location (percentage)

$C_{1\text{-}6}$ = selenium concentration in water (µg/L) from each of the six inflow sources to the Delta (1-6)

Example Calculation: Modeled Selenium Concentration at Franks Tract Year 2000, First Quarter:

(43.94 [% inflow from Sacramento River water source at Franks Tract] × 0.32 µg/L [Selenium concentration at Sacramento River at Freeport]) + (11.56 [% inflow from East Delta Tributaries water source at Franks Tract] × 0.10 µg/L [Selenium concentration at Mokelumne, Calaveras, and Cosumnes Rivers]) + (15.79 [% inflow from San Joaquin River water source at Franks Tract] × 0.84 µg/L [Selenium concentration at San Joaquin River at Vernalis]) + (0.02 [% inflow from Martinez/Suisun Bay water source at Franks Tract] × 0.09 µg/L [Selenium concentration at San Joaquin River near Mildred Island]) + (0.32 [% inflow from Yolo Bypass water source at Franks Tract] × 0.45 µg/L [Selenium concentration at Sacramento River at Knights Landing]) + (5.06 [% inflow from Delta Agriculture water source at Franks Tract] × 0.11 µg/L [Selenium concentration at Mildred Island, Center])/100 = 0.29 µg/L

The quarterly and average annual waterborne selenium concentrations for the DSM2 output locations were calculated for Year 2000, Year 2005, and Year 2007.

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4.B.3 Bioaccumulation of Selenium into Whole-Body Fish and Bird Eggs

Selenium concentrations in whole-body fish and bird eggs were calculated using ecosystem-scale models developed by Presser and Luoma (2010). The models were developed using biogeochemical and physiological factors from laboratory and field studies; information on loading, speciation, and transformation to particulate material; bioavailability; bioaccumulation in invertebrates; and trophic transfer to predators. Important components of the methods included (1) empirically determined environmental partitioning factors between water and particulate material that quantify the effects of dissolved speciation and phase transformation; (2) concentrations of selenium in living and nonliving particulates at the base of the foodweb that determine selenium bioavailability to invertebrates; and (3) selenium biodynamic foodweb transfer factors that quantify the physiological potential for bioaccumulation from particulate matter to consumer organisms and prey to their predators.

4.B.3.1 Selenium Concentration in Particulates

Phase transformation reactions from dissolved to particulate selenium are the primary form by which selenium enters the foodweb. Presser and Luoma (2010) used field observations to quantify the relationship between particulate material and dissolved selenium as shown below.

$$C_{particulate} = K_d \bullet C_{water\ column} \quad \textbf{[Eq. 2]}$$

Where:

$C_{particulate}$ = selenium concentration in particulate material (micrograms/kilogram, dry weight [µg/kg dw])

$C_{water\ column}$ = selenium concentration in water column (µg/L)

K_d = particulate/water ratio

The K_d describes the particulate/water ratio at the moment the sample was taken and should not be interpreted as an equilibrium constant (as it sometimes is). It can vary widely among hydrologic environments and potentially among seasons (Presser and Luoma 2010). In addition, other factors such as speciation, residence time, and particle type affect K_d. Residence time of selenium is usually the most influential factor on the conditions in the receiving water environment. Short water-residence times (e.g., streams, rivers) limit partitioning of selenium into particulate material. Conversely, longer residence times (e.g., sloughs, lakes, estuaries) allow greater uptake by plants, algae, and microorganisms. Furthermore, environments in downstream portions of a watershed can receive cumulative contributions of upstream recycling in a hydrologic system. Because of its high variability, K_d is a large source of uncertainty in the model, especially if translation of selenium concentration in the water column is necessary.

4.B.3.2 Selenium Concentrations in Invertebrates

Species-specific trophic transfer factors (TTFs) for transfer of selenium from particulates to prey and to predators were developed using data from laboratory experiments and field studies (Presser and Luoma 2010). TTFs are species-specific, but the range of TTFs for freshwater invertebrates was found to be similar to TTFs for marine invertebrates determined in laboratory experiments.

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TTFs for estimating selenium concentrations in invertebrates were calculated using the following equation:

$$TTF_{invertebrate} = \frac{C_{invertebrate}}{C_{particulate}}$$

[Eq. 3]

Where:

$TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrate

$C_{invertebrate}$ = concentration of selenium in invertebrate (µg/g dry weight [dw])

$C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)

A mean aquatic insect TTF was calculated from TTFs for aquatic insect species with similar bioaccumulative potential, including mayfly (Baetidae, Heptageniidae, Ephemerellidae), caddisfly (Rhyacophilidae, Hydropsychidae), crane fly (Tipulidae), stonefly (Perlodidae/Perlidae, Chloroperlidae), damselfly (Coenagrionidae), corixid (*Cenocorixa* spp.), and chironomid (*Chironomus* spp.) aquatic life stages. Species-specific TTFs ranged from 2.14 to 3.2 with a mean TTF of 2.8.

4.B.3.3 Selenium Concentrations in Whole-Body Fish

The mechanistic equation for modeling selenium bioaccumulation in fish tissue is similar to that of invertebrates if whole-body concentrations are the endpoint (Presser and Luoma 2010), as follows:

$$TTF_{fish} = \frac{C_{fish}}{C_{invertebrate}}$$

Where:

$$C_{invertebrate} = C_{particulate} \bullet TTF_{invertebrate} \quad \textbf{[Eq. 4]}$$

Therefore:

$$C_{fish} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{fish}$$

Where:

C_{fish} = concentration of selenium in fish (µg/g dw)

$C_{invertebrate}$ = concentration of selenium in invertebrate (µg/g dw)

$C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)

$TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrate

TTF_{fish} = trophic transfer factor from invertebrate to fish

Modeling of bioaccumulation into a particular fish species includes physiology of the organism and its preferred foods. Therefore, variability in fish tissue concentrations of selenium is driven more by

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dietary choices and their respective levels of bioaccumulation (i.e., $TTF_{invertebrate}$) than by differences in the dietary transfer to the fish (TTF_{fish}). A diet of mixed prey (including invertebrates or other fish) can be modeled as follows:

$$C_{fish} = TTF_{fish} \bullet \left[\left(C_1 \bullet F_1\right) + \left(C_2 \bullet F_2\right) + \left(C_3 \bullet F_3\right)\right] \quad \textbf{[Eq. 5]}$$

Where:

C_{fish} = concentration of selenium in fish (µg/g dw)

TTF_{fish} = trophic transfer factor for fish species

C_{1-3} = concentration of selenium in invertebrate or fish prey items 1, 2, and 3 (µg/g dw)

F_{1-3} = fraction of diet composed of prey items 1, 2, and 3

Modeling of selenium concentrations in longer foodwebs with higher trophic levels (e.g., forage fish being consumed by predator fish) can be completed by incorporating additional TTFs; for example:

$$C_{predator\ fish} = TTF_{invertebrate} \bullet C_{particulate} \bullet TTF_{forage\ fish} \bullet TTF_{predator\ fish} \quad \textbf{[Eq. 6]}$$

Where:

$C_{predator\ fish}$ = concentration of selenium in fish (µg/g dw)

$TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrate

$C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)

$TTF_{forage\ fish}$ = trophic transfer factor for invertebrates to foraging fish species

$TTF_{predator\ fish}$ = trophic transfer factor for forage fish to predator species

The fish TTFs reported in Presser and Luoma (2010) ranged from 0.5 to 1.6, so the average fish TTF of 1.1 was used for all trophic levels of fish.

Modeled selenium concentrations in whole-body fish were used to estimate selenium concentrations in fish fillets, as described below.

4.B.3.4 Selenium Concentrations in Bird Eggs

Selenium concentrations in bird tissues can be estimated, but the transfer of selenium into bird eggs is more meaningful for evaluating reproductive endpoints (Presser and Luoma 2010). Examples of models for selenium transfer to bird eggs are as follows:

$$C_{bird\ egg} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{bird\ egg} \quad \textbf{[Eq. 7]}$$

Or:

$$C_{bird\ egg} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{fish} \bullet TTF_{bird\ egg} \quad \textbf{[Eq. 8]}$$

Where:

$C_{bird\ egg}$ = concentration of selenium in bird egg (µg/g dw)

$C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)

$TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrate

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No comments

- n/a -

TTF_{fish} = trophic transfer factor from invertebrate to fish

$TTF_{bird\ egg}$ = trophic transfer factor from invertebrate or fish (depending on diet) to bird egg

The only bird TTF presented in Presser and Luoma (2010) was for the mallard ($TTF_{bird\ egg}$ = 1.8). Mallards are considered a species sensitive to selenium based on reproductive endpoints.

4.B.4 Refinement of Selenium Bioaccumulation Models for the Delta

Several models were evaluated and refined to estimate selenium uptake in fish and in bird eggs from waters in the Delta. Input parameters to the model (K_ds and TTFs) were varied among the models as refinements were made. Rationale for each refinement is presented below with the discussion of each model. In addition, largemouth bass collected in the Delta from areas near DSM2 output locations were used to calculate the geometric mean selenium concentration in whole-body fish (Foe 2010a). The ratio of the estimated selenium concentration in fish to measured selenium in whole-body bass was used to evaluate each fish model and to focus refinements to the model. The models evaluated are presented in the following subsections.

4.B.4.1 Bioaccumulation in Whole-Body Fish

Seven models were evaluated for estimating whole-body selenium concentrations in fish. The basic models were refined by dietary fraction and input parameters to provide a model that would most closely represent conditions in the Delta. Each model is described in this section.

Model 1 was a basic representative of uptake by a forage fish, and Models 2 and 3 calculated sequential bioaccumulation in longer foodwebs representative of predatory fish of increasing complexity as shown below:

- Model 1: Trophic level 3 (TL-3) fish eating invertebrates

$$C_{fish} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{fish} \quad \textbf{[Eq. 9]}$$

- Model 2: Trophic level 4 (TL-4) fish eating TL-3 fish

$$C_{fish} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{fish} \bullet TTF_{fish} \quad \textbf{[Eq. 10]}$$

- Model 3: TL-4 fish eating TL-3 fish eating TL-3 and TL-2 invertebrates

$$C_{fish} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{invertebrate} \bullet TTF_{fish} \bullet TTF_{fish} \quad \textbf{[Eq. 11]}$$

Where:

C_{fish} = concentration of selenium in fish (µg/g dw)

$C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)

$TTF_{invertebrate}$ = Trophic transfer factor from particulate material to invertebrate

TTF_{fish} = Trophic transfer factor from invertebrate or fish to fish

In each model, the particulate selenium concentration was estimated using Equation 2 and a default K_d of 1,000. The average TTFs for invertebrates (2.8) and fish (1.1) were used in each model. The

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No comments

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outputs of estimated selenium concentrations and the ratios of estimated fish selenium concentration to measured bass selenium concentration for Models 1, 2, and 3 were calculated.

Model 1 tended to underestimate the whole-body selenium concentrations in fish compared to bass data reported in Foe (2010a). This was most likely because Model 1 was estimating a forage fish (TL-3), whereas bass are a predatory fish with expected higher dietary exposure. Consequently, Model 1 was not developed further as the selenium bioaccumulation model to represent fish in the Delta.

Models 2 and 3 are both representative of predatory fish, but Model 2 was very similar to Model 1 in distribution of data and in underestimating bass data. Conversely, Model 3 had a larger distribution and greater variation in the data and significantly overestimated the bass data. These models were used as the basis for Models 4 and 5.

Models 4 and 5 were developed to represent a mixed diet using prey fractions to characterize the diet of fish in the Delta, as follows:

- Model 4: 50% of Model 2 and 50% of Model 3

$$C_{fish\ Model\ 4} = (0.5 \bullet C_{fish\ Model\ 2}) + (0.5 \bullet C_{fish\ Model\ 3}) \quad \textbf{[Eq. 12]}$$

- Model 5: 75% of Model 2 and 25% of Model 3

$$C_{fish\ Model\ 5} = (0.75 \bullet C_{fish\ Model\ 2}) + (0.25 \bullet C_{fish\ Model\ 3}) \quad \textbf{[Eq. 13]}$$

Models 4 and 5 used the default K_d (1,000), average invertebrate TTF (2.8), and average fish TTF (1.1). The outputs of estimated selenium concentrations and ratios of the estimated selenium concentration in fish to measured selenium concentration in bass data for Models 4 and 5 were calculated. Data distribution and variation were comparatively large in Model 4. Model 5 was relatively predictive of bass data but was not considered representative of the general population of predatory fish in the Delta. Consequently, it was determined that Model 2 was the most representative of the prey base used by fish in the Delta (i.e., number of trophic levels in the model); therefore, further evaluation and refinement of the selenium bioaccumulation model was limited to Model 2.

In addition, review of Models 1 through 5 indicated that the default value of 1,000 for K_d was not representative of the Delta's potentially high variability and uncertainty with regard to residence time. The Delta tends to have a long water-residence time and receives upstream contributions of selenium, and greater recycling and higher concentrations of selenium entering the foodweb are expected. Model 6 was developed using an extrapolated K_d value of 1,400 with Model 2 (Equation 10). The average invertebrate and fish TTFs were used. Model 6 was generally predictive of bass data (ratio median 1.04). The outputs of estimated selenium concentrations and ratios of the estimated selenium concentration in fish to measured selenium concentration in bass data for Model 6 were calculated.

Model 7 was a further refinement whereby site-specific data for dissolved selenium in water and selenium in particulate samples collected in the Delta (Lucas and Stewart 2007) were used to calculate a site-specific K_d of 1,760 (geometric mean). Model 7 used the more representative site-specific K_d (1,760) with Model 2 (Equation 10) and the average invertebrate and fish TTFs (2.8 and 1.1, respectively). The outputs from Model 7 slightly overestimated selenium concentrations in fish compared to selenium concentrations in bass (ratio median 1.30).

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No comments

- n/a -

Model 8 used the site-specific K_d (1,760) and the average fish TTF (1.1). The invertebrate TTF was revised so that mayflies and stoneflies were not included in the average, because these species would not be readily available in the Delta to contribute to fish or bird diets. The revised invertebrate TTF of 2.1 was used in Model 8.

As expected in a large, complex, and diverse ecological habitat such as the Delta, variations in the data distribution and in the outputs of all models including Model 8 (minimum ratio 0.45, maximum ratio 2.21, and median ratio 0.98) were observed. The variation in the models' outputs is influenced primarily by (1) the selenium concentration in water, used to estimate the selenium concentration in fish tissue, and (2) the measured selenium concentration in bass. Variation in selenium concentrations in water among the years was small, so the variation in selenium concentrations in bass was the primary factor determining the temporal variation among the models. One prominent outlier was observed in all models, seasons, and years as shown by the overestimation of selenium concentration in fish to measured selenium in bass collected at Vernalis. The overestimation is likely the result of high selenium concentrations in water calculated during different years (1999–2007) from those when bass were collected (2000, 2005, and 2007).

Data from Year 2000 were the most predictive in estimating selenium concentrations in fish tissue compared to measured selenium concentrations in bass with Model 8 (minimum ratio = 0.53, maximum ratio = 2.21, and median ratio = 0.98). Foe (2010a) reported the water-year type for 2000 as "above normal" for both the Sacramento River and San Joaquin River watersheds. It came after wet water years and was followed by dry water years. Year 2005 selenium concentrations in bass were comparatively lower than those estimated for Year 2000. Year 2005 was wetter than Year 2000 (reported as above normal for the Sacramento River watershed and wet for the San Joaquin River watershed) and occurred between periods of wetter water years than reported for Year 2000. As expected in a wet water year, the water-residence time is shorter, resulting in less selenium recycling and lower concentrations of selenium entering the foodweb. Under these influences, Model 8 tended to overestimate selenium concentrations in fish for Year 2005 (minimum ratio = 0.79, maximum ratio = 2.12, and median ratio = 1.21). For Year 2007, the model generally underestimated the comparatively higher measured selenium concentration in bass (minimum ratio = 0.45, maximum ratio = 1.57, and median ratio = 0.62). Water Year 2007 was reported as dry (Sacramento River watershed) and critically dry (San Joaquin River watershed). It came after wet water years and was followed by critically dry water years. This dry water year resulted in a longer water-residence time, greater selenium recycling, and higher concentrations of selenium entering the foodweb. Because the influences of a dry water year were not captured in the selenium concentrations in water and were reflected only in bass, Model 8 underestimated selenium concentrations in bass for Year 2007. Therefore, these results illustrate how Model 8 best predicts selenium concentration in fish during normal to wet water years but not dry water years. However, as shown above, Model 8 also can represent selenium bioaccumulation when all water-year types are combined (represented by 2000, 2005, and 2007).

Further evaluation of water-year effects on selenium concentration in bass concluded that a more representative model was needed for dry water years. Therefore, Model 9 used an extrapolated K_d of 2,840, the revised invertebrate TTF of 2.1, and the average fish TTF of 1.1 with Model 2 to provide a better fit for the bass data in dry water years. The outputs of estimated selenium concentrations and ratios of the estimated selenium concentration in fish to measured selenium concentration in bass data for Model 9 were calculated.

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No comments

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Model 8 is relatively predictive of selenium concentration in whole-body bass during normal to wet water years (ratio median 1.04) for all water years (ratio median 0.98) and Model 9 is considered predictive for dry water years (ratio median 1.00) These models were selected as the selenium bioaccumulative models to estimate selenium concentration in whole-body fish in the Delta and are summarized below for ease of reference.

Model 8: Trophic level 4 (TL-4) fish eating TL-3 fish

$$C_{fish} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{fish} \bullet TTF_{fish}$$

Where: **[Eq. 14]**

$$C_{particulate} = K_d \bullet C_{water}$$

- Model 9: Trophic level 4 (TL-4) fish eating TL-3 fish

$$C_{fish} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{fish} \bullet TTF_{fish}$$

Where: **[Eq. 15]**

$$C_{particulate} = K_d \bullet C_{water}$$

Where:

$C_{particulate}$ = Concentration of selenium in particulate material (µg/g dw)

C_{water} = selenium concentration in water column (µg/L)

K_d = equilibrium constant

$TTF_{invertebrate}$ = Trophic transfer factor from particulate material to invertebrate

TTF_{fish} = Trophic transfer factor from invertebrate to fish

Because all models greatly overestimated selenium bioaccumulation in fish at Vernalis in all seasons and years, Models 8 and 9 were modified by adjusting the K_d downward to reflect the lower rate of bioaccumulation at that location. The adjusted models used K_d values of 850 for Model 8a and 1,130 for Model 9a. With these adjustments, Model 8a produced a ratio of 1.01 for the comparison of modeled fish to the bass data, and Model 9a produced a ratio of 1.00.

4.B.4.2 Bioaccumulation in Bird Eggs

The K_d, invertebrate TTF, and fish TTFs developed for use in fish bioaccumulation Models 8 and 9 also were used to estimate selenium uptake into bird eggs using the following two bird egg models:

- Bird Egg: Uptake from invertebrates

$$C_{bird\ egg} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{bird\ egg}$$

Where: **[Eq. 16]**

$$C_{particulate} = K_d \bullet C_{water}$$

- Bird Egg: Uptake from fish

$$C_{bird\ egg} = C_{particulate} \bullet TTF_{invertebrate} \bullet TTF_{fish} \bullet TTF_{bird\ egg}$$

Where: **[Eq. 17]**

$$C_{particulate} = K_d \bullet C_{water}$$

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No comments

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Where:

$C_{bird\ egg}$ = concentration of selenium in bird egg (µg/g dw)

$C_{particulate}$ = concentration of selenium in particulate material (µg/g dw)

C_{water} = selenium concentration in water column (µg/L)

K_d = equilibrium constant

$TTF_{invertebrate}$ = trophic transfer factor from particulate material to invertebrate

TTF_{fish} = trophic transfer factor from invertebrate to fish

$TTF_{bird\ egg}$ = trophic transfer factor from invertebrate or fish (depending on diet) to bird egg

For normal to wet years, the site-specific K_d value (1,760), revised invertebrate TTF (2.1), average fish TTF (1.1), and mallard bird egg TTF (1.8) were used. For dry years, the revised K_d (2,840), revised invertebrate TTF (2.1), average fish TTF (1.1), and mallard bird egg TTF (1.8) were used..

4.B.5 Bioaccumulation in Fish Fillets

Selenium concentrations in whole-body fish were converted to selenium concentrations in skinless fish fillets. The regression equation provided by Saiki and coauthors (1991) for largemouth bass from the San Joaquin River system was considered to be the most representative of fish in the Delta and was used for the conversion of these selenium concentrations as follows:

$$SF = -0.388 + 1.322\,WB \quad \textbf{[Eq. 18]}$$

Where:

SF = selenium concentration in skinless fish fillet (µg/g dw)

WB = selenium concentration in whole-body fish (µg/g dw)

Fish fillet data will be compared to the advisory tissue level (2.5 µg/g) in wet weight (Office of Environmental Health Hazard Assessment 2008); therefore, wet-weight concentrations were estimated from dry-weight concentrations using the equation provided by Saiki and coauthors (1991) as follows:

$$WW = DW \bullet (100 - Moist)/100 \quad \textbf{[Eq. 19]}$$

Where:

WW = selenium concentration in wet weight (µg/g ww)

DW = selenium concentration in dry weight (µg/g dw)

$Moist$ = mean moisture content of the species

Because moisture content in fish varies among species, sample handling, and locations, the mean moisture content of 70% as used by Foe (2010b) was used as an assumed approximation for fish in the Delta. The final equation used to estimate selenium concentration in skinless fish fillets (wet weight) from selenium concentration in whole-body fish (dry weight) is as follows:

$$SF = (-0.388 + 1.322\,WB) \bullet 0.3 \quad \textbf{[Eq. 20]}$$

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No comments

- n/a -

Where:

SF = selenium concentrations in skinless fish fillet (µg/g ww)

WB = selenium concentration in whole-body fish (µg/g dw)

4.B.6 References

4.B.6.1 Printed References

Central Valley Regional Water Quality Control Board. *Surface Water Ambient Monitoring Program*. 2009. Available: <http://www.swrcb.ca.gov/centralvalley/water_issues/swamp/index.shtml>. Accessed: March 6, 2009.

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Saiki, M. K., M. R. Jennings, and S. J. Hamilton. 1991. Preliminary Assessment of the Effects of Selenium in Agricultural Drainage on Fish in the San Joaquin Valley. In A. Dinar and D. Zilberman (eds.), *The Economics and Management of Water and Drainage in Agriculture*. Boston, MA: Kluwer Academic.

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U.S. Geological Survey). 2010. *USGS Water–Quality Daily Data for California*. Available: <http://waterdata.usgs.gov/ca/nwis/dv/?referred_module=qw>. Accessed: April 14, 2010.

4.B.6.2 Personal Communications

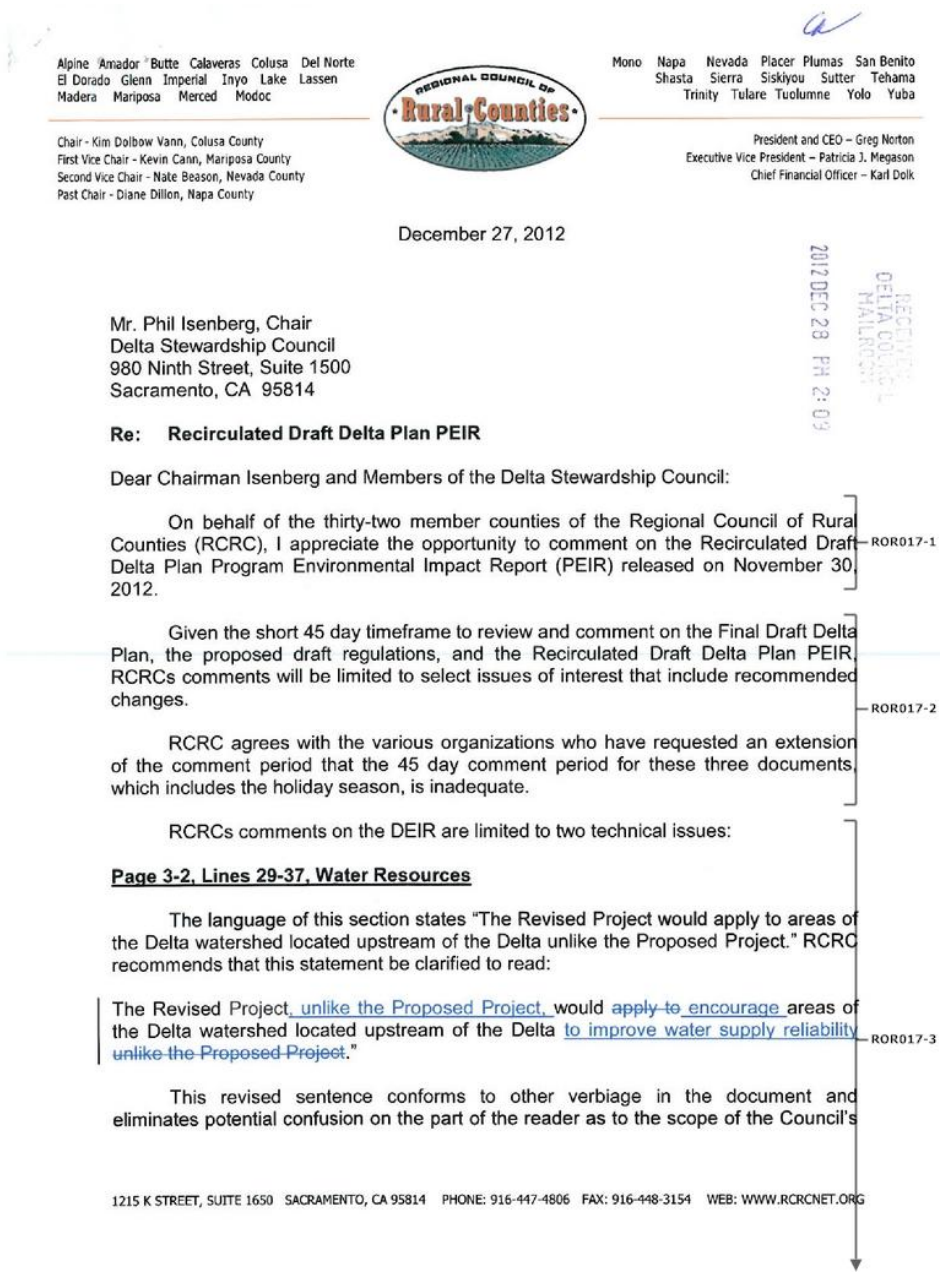
Foe, Chris. Staff Environmental Scientist. California Regional Water Quality Control Board, Central Valley Region, Rancho Cordova, CA. April 23, 2010—e-mail to Harry Ohlendorf, Technology Fellow, CH2M HILL, Sacramento, CA.

Working Draft

No comments

- n/a -

ROR017 RCRC



Alpine Amador Butte Calaveras Colusa Del Norte
El Dorado Glenn Imperial Inyo Lake Lassen
Madera Mariposa Merced Modoc

Mono Napa Nevada Placer Plumas San Benito
Shasta Sierra Siskiyou Sutter Tehama
Trinity Tulare Tuolumne Yolo Yuba

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December 27, 2012

2012 DEC 28 PM 2:09

Mr. Phil Isenberg, Chair
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: Recirculated Draft Delta Plan PEIR

Dear Chairman Isenberg and Members of the Delta Stewardship Council:

On behalf of the thirty-two member counties of the Regional Council of Rural Counties (RCRC), I appreciate the opportunity to comment on the Recirculated Draft Delta Plan Program Environmental Impact Report (PEIR) released on November 30, 2012. ROR017-1

Given the short 45 day timeframe to review and comment on the Final Draft Delta Plan, the proposed draft regulations, and the Recirculated Draft Delta Plan PEIR, RCRCs comments will be limited to select issues of interest that include recommended changes. ROR017-2

RCRC agrees with the various organizations who have requested an extension of the comment period that the 45 day comment period for these three documents, which includes the holiday season, is inadequate.

RCRCs comments on the DEIR are limited to two technical issues:

Page 3-2, Lines 29-37, Water Resources

The language of this section states "The Revised Project would apply to areas of the Delta watershed located upstream of the Delta unlike the Proposed Project." RCRC recommends that this statement be clarified to read:

The Revised Project, unlike the Proposed Project, would ~~apply to~~ encourage areas of the Delta watershed located upstream of the Delta to improve water supply reliability ~~unlike the Proposed Project~~." ROR017-3

This revised sentence conforms to other verbiage in the document and eliminates potential confusion on the part of the reader as to the scope of the Council's

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Response to comment ROR017-1

Comment noted.

Response to comment ROR017-2

The review period for the Recirculated Draft PEIR began on November 30, 2012, and ended on January 14, 2013. CEQA guidelines, Section 15105 requires that review periods for draft EIRs should not be less than 30 days, and no longer than 60 days. The 45-day comment period is sufficient under CEQA.

Response to comment ROR017-3

Regarding the Delta Plan's application to areas upstream of the Delta, and the relationship between Policy WR P1 and existing water planning requirements, please refer to Master Response 5. Regarding the terms "apply" and "encourage," please see the discussion of the Delta Plan's policies and recommendations in Master Response 1.

authority. As you know, only projects determined to qualify as a "covered action" come under the regulatory purview of the Council.

The use of the term "apply" would seem to imply regulation v. recommendation. The DEIR is comparing the Revised Project and the Proposed Project and asserting that they are different because the Revised Project is "recommending" that areas upstream of the Delta undertake projects to improve water supply reliability and that the Proposed Project did not. ROR017-3

As noted in RCRCs comments on the Final Draft Delta Plan, water suppliers are required to comply with a variety of existing laws relating to water (water conservation, water use efficiency, etc.). Confirming that these various requirements are being met is not within the purview of the Council - unless an action is determined to be a covered action.

Page 3-7 and 3-8, Lines 27-4, Water Resources

As the Council knows, the State Water Resources Control Board (State Water Board) has commenced work on updating the Bay-Delta Plan. The State Water Board recently held three workshops to hear from scientific and technical experts to help inform their eventual decision. RCRC recommends that the statements contained in lines 27 through 4 as to the assumed outcome of the State Water Board's decision be deleted from the document. These statements include the following:

".....would likely result in a more natural flow regime in the Delta and Delta tributaries."
".....would likely emphasize Delta ecosystem habitat beneficial uses by providing increased Delta outflows in the winter, spring, and fall months, and increased Delta inflows from the Sacramento and San Joaquin rivers in the winter and spring months."
".....these water quality changes would benefit native species that evolved with the natural flow regime that the objectives would seek to emulate." ROR017-4

Or, alternatively, the terms "if" and "could" could be inserted where appropriate. Use of these terms would conform to language found in other sections of the DEIR.

RCRC understands that a document the size of the DEIR has multiple authors. The use of the term "apply" (please see previous comments) can be found in various sections in the document, while in others greater clarity is provided with the use of "encourage".

RCRC recommends that the Council opt for greater clarity and consistency within the DEIR. The use of this term throughout the various sections (Biological Resources, Delta Flood Risk, Land Use and Planning, Agricultural and Forestry Resources, etc.) appears to be largely associated with the discussion of reliable water supply.

Response to comment ROR017-4

The Delta Plan encourages the SWRCB to complete the updated Bay-Delta Water Quality Control Plan flow objectives. However, only the SWRCB has authority to set those objectives. The Delta Plan and the EIR therefore cannot project what those objectives will be. The Delta Plan and the sources it cites (including especially the SWRCB's 2010 Flow Criteria Report) explains that the flow objectives that best advance the coequal goals will be those that bring about more natural functional flows within and out of the Delta. *See* Delta Plan, pp. 136 to 142, 155, and sources cited therein. The EIR thus assumes, consistent with CEQA, that the SWRCB will adopt updated objectives that will advance such a flow regime. The general assumption of a more natural flow regime is sufficient for the EIR's programmatic approach. The impacts of the flow objectives are analyzed in greater, quantitative detail, in the SWRCB's Draft Substitute Environmental Document in Support of Potential Changes to the Water Quality Control Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary: San Joaquin River Flows and Southern Delta Water Quality (December 2012). See Master Response 5 for further discussion. Regarding the terms "apply" and "encourage," please see the discussion of the Delta Plan's policies and recommendations in Master Response 1.

Page 4-11, Line 2, Biological Resources

Please see previous comments relating to the Council's assumption as to the end result of the State Water Board's updating of the Bay-Delta Plan. At a minimum RCRC recommends that "would" be replaced with "could". ROR017-5

In conclusion, please feel free to contact me if you have any questions at (916) 447-4806 or kmannion@rcrcnet.org.

Sincerely,

Kathy Mannion
Legislative Advocate

cc: Members, Delta Stewardship Council
Mr. Chris Knopp, Executive Officer

Response to comment ROR017-5

Please see the response to comment ROR017-4.

ROR018 SJTA

O'Laughlin & Paris LLP

Attorneys at Law

SENT VIA EMAIL

January 14, 2013

Delta Stewardship Council
980 9th Street, Suite 1500
Sacramento, California 95814
recirculateddpeircomments@deltacouncil.ca.gov

Re: Recirculated Draft EIR

Dear Council Members:

The San Joaquin Tributaries Authority and its members[1] ("SJTA") have completed review of the Delta Stewardship Council's ("DSC") recirculated Draft Programmatic Environmental Impact Report ("R-DPEIR"). The SJTA finds that several analytical and descriptive deficiencies remain from the Draft Programmatic Environmental Impact Statement ("DPEIR") and therefore incorporate and attach the written comments provided from the San Joaquin River Group Authority on February 2, 2012. For the reasons set forth below, the SJTA recommends that the DSC **not** certify the DPEIR or the R-DPEIR until the deficiencies which render it unable to survive judicial review are remedied. ROR018-1

A. *The "Delta Plan" is the project.*

The DSC released the Fifth Staff Draft of the Delta Plan in August 2011. This became the "Proposed Project" for purposes of the DPEIR. Since the DPEIR was released and the comment period closed, several significant revisions to the Proposed Project occurred, culminating in the Final Draft Delta Plan, released in November 2012 ("Revised Project"). The R-DPEIR characterizes itself as an additional "volume" and treats the Revised Project as a separate alternative to the Proposed Project.

The Revised Project is not an alternative to the Proposed Project, it is the Proposed Project. Characterizing the Final Delta Plan as an "alternative" is incorrect. The Delta Plan has been a single ROR018-2

[1] Members of the San Joaquin Tributaries Authority include the City and County of San Francisco, Merced Irrigation District, Modesto Irrigation District, Oakdale Irrigation District, South San Joaquin Irrigation District, and Turlock Irrigation District.

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Response to comment ROR018-1

Comment noted.

Response to comment ROR018-2

The Revised Project is the 2012 Final Draft Delta Plan, which is analyzed in the RDPEIR (see, e.g., RDPEIR, p. ES-1). The revised project description is Section 2, Description of Revised Project, of the RDPEIR. The Fifth Staff Draft Delta Plan, which was the "Proposed Project" analyzed in the DPEIR, is now referred to as the Proposed Project Alternative for purposes of clarity, and is analyzed in the RDPEIR as an alternative (see, e.g., RDPEIR Section 25.3). Please see Master Response 1. The RDPEIR also modifies and/or expands upon analyses presented in the DPEIR. For example, performance measures to assist in implementation of the policies and recommendations were added.

project developed over several months and no other draft form of the Delta Plan is considered as an Alternative. This is clearly an attempt to side-step the proper process to revise the DPEIR and indicates a lack of disclosure and public transparency.

The R-DPEIR states that it was recirculated pursuant to California Code of Regulations, Title 14, section 15088.5, which requires recirculation when there is "significant new information." It goes on to state that only the revised chapters or portions of an environmental impact report ("EIR") (in this case, DPEIR) need to be recirculated. Nowhere in the regulations or statutory code authorizes the same project to be presented as an alternative. Indeed, "recirculate" by definition would suggest that something is being re-released. In this case, this is an entirely new "volume" which does not revise any chapters or portions of the DPEIR. The DSC is obligated to conduct environmental review of its project in a thorough manner to allow the public to understand potential impacts; the hasty manner in which the R-DPEIR was completed does not remedy deficiencies or revise the DPEIR. The SJTA therefore requests that the DSC forego adopting the R-DPEIR and insist that a proper recirculated DPEIR is prepared and released, accurately analyzing impacts resulting from the Revised Project and proposed mitigation measures. ROR018-2

B. Project analyses remain inadequate, precluding meaningful public review.

The statutory goal of an EIR is to provide the public with information and meaningful analysis of alternatives about a proposed project that will enable it to understand evaluate and respond. (Laurel *Heights Improvement Ass'n v. Regents of Univ. of California* (1988) 47 Cal.3d 376, 403 – 404.) Recirculation is required when a draft EIR is so inadequate and conclusory in nature that meaningful public review and comment were precluded. (Cal. Code Regs., tit. 14 § 15088.5(a)(4).) Such should have been the case here. ROR018-3

For instance, the R-DPEIR's use of "natural flow" remains undefined, while the Revised Project appears to shift toward using "functional flow." At minimum, this change should have been addressed in the R-DPEIR and substituted in the DPEIR. Until meaningful analysis allowing for informed public participation occurs, the DPEIR and R-DPEIR fall short of legal accuracy.

a. Water Supply Reliability

The R-DPEIR states that the "Revised Project would apply to areas of the Delta watershed located upstream of the Delta unlike the Proposed Project." (R-DPEIR, at 3-2.) Several problems stem from this statement. First, the DSC has no authority to regulate outside of the Delta. (Water Code, § 85302(b).) Therefore, the Revised Project cannot apply to areas located upstream.

Next, the R-DPEIR states in conclusory fashion that many impacts related to reliable water supply projects under the Revised Project would be greater than under the Proposed Project because of the newly-covered upstream area. Like the DPEIR, these statements entirely lack analyses. The R-DPEIR does not identify where the impacts are expected to occur other than the overly broad "upstream" description, how long those impacts will last, what types of impacts are expected to occur, or any other descriptive analysis. This falls significantly short of the CEQA standard which requires an EIR to provide the public with information and meaningful analysis of alternatives. ROR018-4

Response to comment ROR018-3

Please refer to Master Response 2 regarding the level of detail provided in the EIR's analysis. Please refer to Master Response 5 regarding the referenced flow objectives.

Response to comment ROR018-4

Because Central Valley Project and State Water Project water flows through the Delta, many changes to the management or delivery of such water would "occur, in whole or in part, within the boundaries of the Delta," and therefore could be a "covered action" under Water Code section 85057.5, a key legal and analytical distinction for the Delta Plan and the EIR. The San Joaquin and Sacramento rivers flow into the Delta and therefore are reasonably considered "tributaries." Please see Master Response 1.

The EIR uses three study areas: the Delta (including the Suisun Marsh), the Delta watershed, and areas outside of the Delta that use Delta water (DEIR, p. 1-14; see also Water Code § 85059). Because different impacts are likely to occur in different locations, each section of the EIR specifies the study area for the impact analyzed. See Master Response 2. The study area for Section 3 of the EIR (Water Resources) encompasses all three study areas listed above. DEIR, p. 3-1 to 3-3. The RDPEIR explains the increased geographic extent of the revised project (Final Draft Delta Plan) relative to the Fifth Staff Draft Delta Plan, and the types of impacts likely to occur in the newly covered areas (see RDEIR, p. 3-2).

b. Ecosystem Restoration Policy 1

One purpose of recirculating EIR's is to inform the public of significant new information. The Final Draft Delta Plan Ecosystem Restoration Policy 1 mandates the State Water Board to develop, implement and enforce new and updated flow objectives for the Delta and high priority tributaries. Accordingly, the State Water Board has been undertaking the development of updated flow objectives for the past several months and has identified a phased approach to the revision of flow objectives, beginning with the San Joaquin River watershed. Related to these efforts, the State Water Board released its substitute environmental document ("SED") identifying environmental and economic impacts in accordance with its duties pursuant to CEQA. The impacts identified in the State Water Board's SED are environmental impacts that are directly related to a policy in the Delta Plan and should therefore be included in the R-DPEIR. The impacts and analysis found in the State Water Board's SED constitute "significant new information" which influences impact analysis for the Revised Project because the Delta Plan sets a regulatory policy requiring that flow objectives be revised. The public must be informed of this significant new information. ROR018-5

C. Economic and social impacts should be included.

The R-DPEIR repeatedly reminds the reader that impacts will be greater in the Revised Project because it applies to upstream areas of the Delta unlike the Proposed Project. The application of the Revised Project upstream of the Delta, albeit without authority of the DSC to so act, is a reduction of water used from the Delta watershed. This will likely cause an impact on communities that rely on that water, and have no other source from which to obtain water. ROR018-6

"Economic or social effects of a project may be used to determine the significance of physical changes caused by the project." (Cal. Code Regs, tit. 14, § 15131(b).) The DSC should therefore revise the DPEIR to include an analysis of economic and social effects which would result from a net reduction in the percentage of water used from the Delta watershed.

D. The R-DPEIR improperly defers analysis to a later DEIR or negative declaration.

Similar to the DPEIR, the R-DPEIR defers much, if not all, analysis to later environmental documents and analysis, or negative declarations. To justify this, the R-DPEIR several times echoes the DPEIR by stating that it is a "programmatic" document. However, tiering cannot be used for the purpose of deferring environmental analyses to later projects to avoid adequate analyses of environmental impacts of the broader project. (Cal. Code Regs., tit. 14, § 15152(b), (c).) Like the DPEIR, the R-DPEIR improperly defers nearly all impact analyses to other agencies; there is simply no foundational environmental impact analyses from which an agency could later tier from. ROR018-7

Even if the DPEIR and R-DPEIR were acceptable programmatic documents, "CEQA's demand for meaningful information 'is not satisfied by simply stating information will be provided in the future.'" (Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova (2007) 40 Cal.4th 412, 431, citing *Santa Clarita Org. for Planning the Env't v. Cty. of Los Angeles* (2003) 106 Cal.App. 4th 715, 723.) CEQA requires informative impact analysis from which the public can meaningfully comment.

The R-DPEIR is seriously deficient in much the same way as the DPEIR. Until these deficiencies and those addressed in earlier comments, attached hereto, are addressed, remedied and recirculated, neither ROR018-8

Response to comment ROR018-5

The referenced Draft Substitute Environmental Document In Support of Potential Changes To The Water Quality Control Plan For The San Francisco Bay-Sacramento/San Joaquin Delta Estuary: San Joaquin River Flows And Southern Delta Water Quality (SED), issued by the SWRCB in December 2012, concludes that the analyzed flow objectives could cause reductions in water supplies (SED, p. ES-39 to ES-42) (SWRCB 2012). It also concludes that diverters may be able to reduce their reliance on surface water diversions, thereby reducing the significance of the referenced impacts on water supplies (see SED, pp. 5-90, 5-91). Thus, this analysis is consistent with the Delta Plan EIR and does not alter this EIR's conclusions regarding the significance of the Delta Plan's impacts on the environment, particularly on water supplies. RDEIR, pp. 3-5, 3-9, 3-11, 3-14, 3-16. As a result, the referenced SED does not constitute significant new information that would require further recirculation pursuant to CEQA Guidelines section 15088.5.

Response to comment ROR018-6

The EIR concludes that water users—including those located upstream of the Delta and/or in the Delta watershed—will have alternative water supplies and/or demand reduction measures available to them. These options may include projects to recycle wastewater and stormwater, in addition to local groundwater (RDEIR p. 3-2). See also Master Response 5. In addition, social and economic impacts are not effects on the environment under CEQA, and are not analyzed in the EIR (CEQA Guidelines §§ 15064(e) and 15131; see also Master Response 2).

Response to comment ROR018-7

Please see Master Response 2. As described in subsection 1.4 of the Draft Program EIR, Overview of the Delta Plan Environmental Impact Report, the Delta Plan Program EIR is a program-level EIR due to the broad, program level of the Delta Plan. Future environmental documents would be completed by other agencies when they propose to implement projects that are subject to consistency reviews by the Council, or projects which are encouraged or otherwise influenced by the Delta Plan. Hence, this program EIR is not intended to provide project-level clearance for any specific project.

Response to comment ROR018-8

Comment noted.

the DPEIR or the R-DPEIR satisfy CEQA requirements. As such, the SJTA requests that the DSC revise the DPEIR and R-DPEIR, and recirculate a single document detailing the impacts and mitigation analysis resulting from the Final Draft Delta Plan.

ROR018-8

Very truly yours,

O'LAUGHLIN & PARIS LLP

TIM O'LAUGHLIN

TO/tb
Enclosure
cc: San Joaquin Tributaries Authority

No comments

- n/a -

O'Laughlin & Paris LLP Attorneys at Law

SENT VIA E-MAIL

February 2, 2012

Delta Stewardship Council
980 Ninth Street, Suite 1500
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Attn: Terry Macaulay
eircomments@deltacouncil.ca.gov

RE: Comments of the San Joaquin River Group Authority on the Delta Plan Draft Environmental Impact Report

Dear Councilmembers:

Thank you for the opportunity to comment on the Delta Plan Draft Environmental Impact Report ("DEIR"). The following comments on the Delta Plan ("Plan") DEIR are submitted on behalf of the San Joaquin River Group Authority ("SJRGA") and each of its individual members[1] for your consideration. After review and consideration of the DEIR, the SJRGA and its members urge the Council to reject it because it does not comply with the California Environmental Quality Act ("CEQA") for several reasons.

A. The DEIR Project and Alternative descriptions and analyses are inadequate and contain improper conclusory statements, precluding meaningful public review.

"An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences." (Cal. Code Regs., tit. 14 § 15151; Pub. Res. Code § 21061.) Conversely, the DEIR does not define several key definitions, it makes conclusory statements, and analysis of potential impacts from encouraged actions and alternatives is absent in many sections.

CEQA requires that an EIR provide accurate and sufficient information to allow the public to understand and meaningfully consider environmental issues raised by a proposed project such as the

[1] Modesto Irrigation District, Turlock Irrigation District, Merced Irrigation District, South San Joaquin Irrigation District, Oakdale Irrigation District, Friant Water Authority, San Joaquin River Exchange Contractors, and the City and County of San Francisco.

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No comments

- n/a -

Plan. (*Laurel Heights Improvement Ass'n v. Regents of University of California* (1988) 47 Cal.3d 376, 405 ["An EIR must include detail sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project."]; San Joaquin Raptor Rescue Center v. County of Merced (2007) 149 Cal.App.4th 645, 655 ["An accurate, stable and finite project description is the sine qua non of an informative and legally sufficient EIR. [citation omitted] … Only through an accurate view of the project may the public and interested parties and public agencies balance the proposed project's benefits against its environmental cost, consider appropriate mitigation measures, assess the advantages of terminating the proposal and properly weigh other alternatives."].)

Several crucial terms and phrases are left undefined in this DEIR, leaving true environmental implications resulting from the proposed Plan undeterminable. For instance, the DEIR provides the statutory definition of "covered actions" in Section 2A (pp. 2A-2 – 4), but follows with a qualification that underlying agency actions, otherwise statutorily exempt, are in fact "covered actions" without further description. This simply confuses the otherwise plain statutory language and casts uncertainty as to the reach of covered actions beyond the Delta, and which actions would be considered "mandatory policy" or merely a "recommendation." (DEIR, p. 2A-5.)

Additionally, "natural flow regime" is not defined in the Project Description or elsewhere throughout the DEIR and yet it is a foundational element of the Plan, especially with respect to the "Delta Ecosystem Restoration" element. (See, e.g., pp. 3-85, 4-68, 6-50.) It is uncertain how much water would be necessary to "make up" for reductions in water as a result of a more "natural flow regime." (See, e.g., pp. 3-84, 85.) Without knowing what is considered "natural flow" it is impossible to analyze any impacts resulting from restoration of "natural flow" and understand why establishment of a "natural flow regime" is preferable to any alternative.

Also, "Delta water" is used throughout the entire DEIR but is undefined as to whether it refers to water upstream of the Delta, water exported from the Delta, water used within the Delta, some combination thereof, or other definition altogether. It is thus also ambiguous who "water users that use Delta water" (or similar) might be. "Delta water" and "water users that use Delta water" as undefined is particularly troublesome because parties and entities cannot know what, if any, responsibility might be derived. In short, the scope of impacts to undefined water users cannot be known and analyzed by the public and interested parties.

This is principally important because the DEIR places the responsibility of investigating, researching and conducting environmental analysis on "local and regional" water suppliers to "make up for [the] reduction in water" the DEIR anticipates. (See, e.g., DEIR, p. 3-85.) One of the specific "Thresholds of Significance" states that the DEIR considers an impact significant if it "[s]ubstantially change[s] water supply availability to water users located outside of the Delta that use Delta water." (DEIR, p. 3-77.) Are the public and interested parties supposed to understand "Delta water" to mean water prior to entering the Delta, while it is within the geographic perimeter of the Delta, or after it flows through and out of the Delta? Clarifying such vagueness is essential to truly understand environmental impacts of the Plan.

Meaningful comprehension and analysis is practically impossible with such vague terms and phrases at work. For example, Impact 3-3a reads in its entirety:

No comments

- n/a -

> "The Proposed Project encourages a variety of actions to improve local and regional water reliability while reducing the use of Delta water, including actions to increase the use of recycled wastewater and stormwater, groundwater and surface water facilities, surface water and wellhead treatment facilities, water use efficiency and conservation actions, water transfers, and ocean desalination plants. Such water supply reliability projects would provide a benefit to water supply availability to water users that use Delta Water." (DEIR, p. 3-82.)

The DEIR does not analyze potential impacts of the suggested "variety of actions" and in conclusory fashion determines the variety of projects would provide a benefit. The DEIR does not explain how reducing the use of Delta water will increase reliability, and it does not quantify how much water it will take for suggested actions to make up for the Delta water reduction because no metric is given. Indeed, no metrics are provided in this section or elsewhere in the DEIR.[2] Such a conclusory nature of the DEIR renders it inadequate. (Preservation Action Council v. City of San Jose (2006) 141 Cal.App.4th 1336 [Court held FEIR inadequate because of ambiguous alternative analysis.]; Santiago Cty. Water Dist. v. Cty. of Orange (1981) 118 Cal.App.3d 818, 831 ["The EIR must contain facts and analysis, not just the bare conclusions of a public agency."].)

The DEIR also states that the Plan's primary objective is to achieve the coequal goals in a manner that, among other things, is accomplished as rapidly as realistically possible. (See, e.g., DEIR, p. ES-3 (emphasis added).) The DEIR does not state how "accomplishment" is measured and does not discuss the realistic nature of the Plan and the Alternatives.

For example, the Plan sets deadlines of years 2014 and 2018 for the State Water Resources Control Board ("SWRCB") to complete flow objectives and criteria, notwithstanding the lack of authority to enforce SWRCB action. These deadlines have been seriously questioned as unrealistic at several DSC meetings, yet the DEIR assumes these are realistic measures and misrepresents the feasibility of their achievement.

The DEIR, though, uses the non-accomplishment of flow objectives and criteria in an expedient manner as the basis to declare Alternatives 1a and 1b environmentally inferior because those Alternatives "would be less aggressive in moving toward minimum standards for water flow in the Delta necessary for a healthy fishery and ecosystem." (DEIR, p. 25-11.) Furthermore, despite such reliance on flow criteria and objectives, the DEIR does not describe or analyze why the standards are necessary and, more importantly, how realistic they are and what impacts will result should they not be accomplished.

"To sum up, the omission of required information constitutes a failure to proceed in the manner required by law where it precludes informed decision-making by the agency or informed participation by the public." (California Native Plant Society v. City of Santa Cruz, supra, 177 Cal.App.4th at p. 987.) The public and interested parties must better understand what impact, if any, will be felt as a result of the Plan; the DEIR does not provide the required information or analysis, and without both, the public and interested parties cannot reasonably be expected to understand and meaningfully consider issues raised by the Plan. (California Native Plant Society v. City of Santa Cruz (2009) 177

[2] For instance, the DEIR project description states that the DEIR "assumes the Delta Plan will be successful and lead to other agencies taking physical actions." (DEIR, p. ES-2, fn. 3.) The DEIR, though, neither defines what constitutes success nor provides a metric to measure success.

No comments

- n/a -

Cal.App. 4th 957; Bakersfield Citizens for Local Control v. City of Bakersfield (2004) 124 Cal.App. 4th 1184.)

B. Mitigation measures could result in unconsidered impacts.

The DEIR found that mitigation measures for Change in Water Supply Availability to Water Users that Use Delta Water (Impact 3-3) are not necessary because it assumes that water users will undertake projects to "make up" for water reduction resulting from the SWRCB's flow objectives. (See, e.g., DEIR, p. 3-84 – 85.) What the DEIR does not at all discuss is the environmental impacts of the "water user" projects needed to make up water.

"If a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed." (Cal. Code Regs., tit. 14, § 15126.4(a)(1)(D); see also Stevens v. City of Glendale (1981) 125 Cal.App.3d 986 [The appellate court affirmed the EIR did not properly analyze impacts of a mitigation measure which would extend an existing street.].)

The DEIR analysis for Reliable Water Supply found that the Plan proposes to reduce the use of Delta water, but the reduction will be offset by the variety of actions the Plan proposes. The DEIR did not make an explicit finding of impact (significant, less than significant, or otherwise). It can be inferred, though, that the "variety of actions" proposed to offset and "provide a benefit to water supply availability" are themselves mitigation measures because the actions are used to reach the conclusion that water supply availability will benefit from implementing these projects. (DEIR, p. 3-82.) The DEIR did not analyze impacts from these actions individually or in the aggregate as a mitigation measure. In effect the Plan and Project Description are incomplete in the sense that it would appear that the speculated mitigations are integral to the Plan's success.

As to Ecosystem Restoration, the DEIR recognized that water supply availability would be reduced for agricultural, municipal, and industrial water uses because the assumed flow objectives seek to return to a "natural flow regime." The DEIR, though, concludes this impact is less than significant because "water users would undertake the projects and actions encouraged by the [Plan] to improve water supply reliability, as discussed in Section 2A, Proposed Project and Alternatives, and summarized in Section 3.4.3.1." (DEIR, p. 3-85) In other words, the DEIR assumes that water users will conceive solutions (such as the "variety of projects") to mitigate the reduced water supply availability. The DEIR does not analyze impacts that would arise from these mitigation measures.

C. The DEIR lacks analysis and reasoning for dependence on projects unrelated to the Delta Plan as examples of potential environmental effects.

While CEQA discourages duplicative analysis, this DEIR goes too far by entirely avoiding analysis. The DEIR relies on multiple EIRs for wholly unrelated projects. This DEIR assumes that similar impacts would occur if or when "similar" projects are completed as encouraged by the Plan. The DEIR concludes that mitigation measures would be the same to reduce impacts to less than significant in most cases.

No comments

- n/a -

For example, the DEIR frequently relied on the Davis-Woodland Water Supply Project EIR to identify potential impacts and related mitigation measures to reduce impacts to less than significant. The DEIR does not explain its reasoning, does not identify similarities of the Davis-Woodland project to the Plan, and/or how environmental impacts and mitigation measures could be—or would be—similar. Ironically, this particular project (that the DEIR heavily relies on) is meeting significant resistance and its fruition is threatened because of the substantial burden placed on ratepayers.[3]

The core purpose of CEQA is to "inform governmental decision makers and the public about the potential, significant environmental effects of proposed activities." (Cal. Code Regs., tit. 14, § 15002(a)(1).) Relying on projects in different geographic locations for different objectives creates suspicion that the DEIR does not analyze the true impacts from the Plan. It is as though the Plan DEIR is tiering off of unrelated project EIRs.

While a lead agency can use an EIR from an earlier project, the earlier EIR must have been prepared "in connection with an earlier project to apply to a later project, if the circumstances of the projects are essentially the same." (Cal. Code Regs., tit. 14, § 15153(a).) The projects and EIRs this DEIR relies upon are entirely unrelated and the DEIR does not identify similar circumstances, geographic conditions or otherwise to make the projects "essentially the same." Tiering from other and unrelated project EIRs is therefore improper.

D. The DEIR improperly defers analysis to a later DEIR or negative declaration.

This DEIR is a program-level EIR and it anticipates that agencies will prepare separate environmental documents as they propose specific projects encouraged by the Plan, however EIRs cannot simply defer all analysis to a later environmental document.

Tiering is a method CEQA allows to analyze general matters in a broader EIR to eliminate repetitive environmental analyses. (Cal. Code Regs., tit. 14, § 15152.) Tiering, though, cannot be used for the purpose of deferring environmental analyses to later more specific projects and avoid adequate analyses of environmental impacts of the broader project. (Cal. Code Regs., tit. 14, § 15152(b), (c).) Here, the DEIR defers virtually all environmental impact analyses to other agencies encouraged to implement projects suggested in the Plan. No environmental analysis is available in this DEIR that an agency can later tier from. In fact, this DEIR is essentially seeking to improperly tier from other wholly unrelated EIRs. This DEIR is seeking to approve a Plan, but defer any analysis whatsoever of environmental impacts to later DEIRs; in essence, this DEIR is "putting the cart before the horse." (*Stanislaus Nat'l Heritage Proje*ct v. County of Stanislaus (1996) 48 Cal.App.4th 182, 200.)

E. The DEIR is encyclopedic rather than analytic and excessively long.

CEQA requires that EIRs, among other things, (i.) are prepared in a clear and plain language format, (ii.) are analytical rather than encyclopedic, (iii.) are meaningful to the public, and (iv.) emphasize alternatives and feasible mitigation measures rather than unnecessary project description. (Cal. Code Regs., tit. 14 §§ 15000 et seq., Pub. Res. Code § 21003.) The DEIR fails to accomplish any of these.

[3] See, e.g., http://www.sacbee.com/2012/01/30/v-print/4224312/water-systems-need-fixes-badly.html

No comments

- n/a -

The DEIR is approximately 2200 pages, far exceeding the recommended number of pages: 150 pages, 300 in unusual circumstances.[4] (Cal. Code Regs., tit. 14, § 15141.) This creates a considerable burden for interested parties and the general public in sorting through the DEIR to find worthwhile analyses to comment on, frustrating the very purpose of EIR review.[5]

CONCLUSION

Commenting on the DEIR is a daunting task because it does not analyze an actual project and the sheer volume made it nearly impossible to cite each inadequacy. The above analyses and citations are examples and not intended as exhaustive of each inadequacy. The public and interested parties require much more analysis of environmental impacts before this DEIR can be meaningfully reviewed and deemed sufficient.

Very truly yours,
O'LAUGHLIN & PARIS LLP

VALERIE C. KINCAID

VCK/tlb
cc: San Joaquin River Group Authority

[4] Additionally, the Executive Summary "should not normally exceed 15 pages," yet the Executive Summary to the DEIR is 57 pages. (Cal. Code Regs., tit. 14, § 15123(c).)
[5] "The purposes of review of EIRs … include: (a) Sharing expertise, (b) Disclosing agency analyses, (c) Checking for accuracy, (d) Detecting omissions, (e) Discovering public concerns, and (f) Soliciting counter proposals." (Cal. Code Regs., tit. 14, § 15200.)

No comments

- n/a -

ROR19 FOTR

From: Bob Wright
To: comment. rulemakingprocess@DeltaCouncil
Cc: Katy Cotter; Corey Gibson; John Carlson
Subject: Rulemaking Package Comment letter attached
Date: Thursday, January 24, 2013 2:20:22 PM
Attachments: 1 24 13 DP regs comment ltr.pdf

Cindy Messer, Delta Stewardship Council and Council Members:

Attached please find a copy of my four page comment letter dated January 24, 2013 on the Regulations and rulemaking Package for the Record. So as to not confuse anyone, this is an identical copy of the comment letter that I referred to in my oral comments at the Public Hearing this morning and then supplied for the Record in hard copy to Angela of the Council Staff. — ROR19-1

As I say in the letter, you are welcome to call me with any questions you may have.

Bob Wright
Senior Counsel
Friends of the River
Sacramento, CA
(916) 442-3155 x207

Response to comment ROR19-1

Comment noted.

To protect and restore California Rivers by influencing public policy and inspiring citizen action.

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January 24, 2013

Cindy Messer
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: Comments on Proposed Delta Plan Rulemaking Package (Regulations) ***Including Proposed Amendments***

Dear Ms. Messer and Council Members:

This organization, Friends of the River, objects to approval of the Delta Plan (DP), RDPEIR, and Regulations. We adopt and incorporate by this reference our prior comment letters of January 11 and 14, 2013, and the Environmental Water Caucus comment letter of January 14, 2013. We do propose the following amendments to your Proposed Regulations that we believe would resolve our objections to your actions and would also allow your actions to comply with CEQA: ROR19-2

Proposed Amendments

§5007. Update Delta Flow Objectives.

[Retain subsections (a) and (b) from 11/16/12 Draft]

[Delete Subsections (c) and (d) in 11/16/12 draft, and replace with new subsections (c) and (d) as shown below].

[New subsection (c)]

(c) In the absence of development of new and updated flow objectives for the Delta and high-priority tributaries including public trust doctrine analysis by the State Water Resources Control Board (Board), in the absence of the "comprehensive review and analysis" including "a reasonable range of flow criteria, rates of diversion, and other operational criteria. . . and other operational requirements and flows necessary for recovering the Delta ecosystem and restoring ROR19-3

Response to comment ROR19-2

Please refer to commenter's letters on the RDPEIR, ROR10, and RI014, and the Environmental Water Caucus letter, ROR077.

Response to comment ROR19-3

This is a comment on the project, not on the EIR.

fisheries under a reasonable range of hydrologic conditions, which will identify the remaining water available for export and other beneficial uses", "a reasonable range of Delta conveyance alternatives, including through-Delta", "the potential effects of climate change, possible sea level rise up to 55 inches,", "the potential effects on migratory fish and aquatic resources", and the "potential effects of each Delta conveyance alternative on Delta water quality" (Draft EIR 23-3, 4) supposedly to be provided in the future by the BDCP CEQA process; and in the absence of water supply availability analysis, quantification, and analysis of the environmental impacts of supplying specific quantities of water required by CEQA as determined by the California Supreme Court's decision in *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412; it is not possible at this time for the Council to lawfully call for, plan for, encourage, recommend, or require development of new conveyance upstream from the Delta for the exporters. Sufficient analysis including CEQA and public trust doctrine analysis has not been performed to be able to lawfully select an alternative at this time calling for development of new upstream conveyance as opposed to continuing through-Delta conveyance and/or reducing exports.

[New subsection (d)]

(d) These Regulations and the Delta Plan do not call for, plan for, encourage, recommend, or require development of new conveyance, intakes, tunnels, canals and/or diversions upstream from the Delta for the exporters, improved Delta conveyance and operations, or optimizing diversions in wet years when more water is available. Nothing in these Regulations and the Delta Plan, or the draft EIR or RPDEIR establishes support for any future decision including but not limited to the BDCP process to favor selection of an alternative of development of new conveyance and diversions upstream from the Delta for the exporters as opposed to the alternatives of maintaining through-Delta conveyance and/or reducing exports. This provision is imperative to ensure that the Delta Plan and these Regulations do not violate CEQA and/or lead to development of or creation of momentum for a project or projects that will or may further degrade Delta water quality prior to comprehensive CEQA analysis, and prior to development of new and updated flow objectives for the Delta and high-priority tributaries including public trust doctrine analysis by the Board. This subsection and subsection (c) of this Section control over any provision or provisions in these Regulations, Delta Plan, Draft EIR and/or RPDEIR in actual or arguable conflict with this subsection and/or subsection (c) of this Section.

ROR19-3

No comments

- n/a -

§5001. General Definitions.

(e)(1)(A)

Delete "expand storage, and improve Delta conveyance and operations."

(e)(1)(C)

Delete entire subsection including but not limited to the calls for "improving conveyance" and "to optimize diversions in wet years."

ROR19-3

Support for Proposed Amendments

Our previous comment letters and the Environmental Water Caucus comment letter referenced at the beginning of this comment letter establish the numerous violations of CEQA that will take place if the Council proceeds to adopt the Delta Plan and Regulations including calls for improved, meaning new, upstream conveyance. Our Proposed Amendments to Section 5007 are intended to allow you to comply with, as opposed to violate, CEQA if you proceed to adopt the Regulations and Delta Plan at this time. The Council's own Initial Statement of Reasons (SOR) furnishes additional support for the need to either not adopt the Regulations and Delta Plan at this time, or include our Proposed Amendments if the Regulations and Delta Plan are adopted. The SOR includes statements that "The best available science suggests that the currently required flow objectives within and out of the Delta are insufficient to protect the Delta ecosystem. Additionally, uncertainty regarding future flow objectives for the Delta impairs the reliability of water supplies that depend on the Delta or its watershed. The predictability of water exports cannot be improved and the Bay Delta Conservation Plan cannot be implemented without timely State Water Resources Control Board (SWRCB) action to update flow objectives. Section 5007 is intended to achieve the legislative intent for the SWRCB to establish an accelerated process to determine instream flow needs of the Delta for the purposes of facilitating the planning decisions that are required to achieve the objectives of the Delta Plan (Water Code section 85086)." (SOR pp. 5-6).

ROR19-4

Those statements appear to be both clear and indisputable. That being the case, it would be directly contrary to those statements to proceed now to make planning decisions calling for or facilitating new, upstream conveyance for the exporters. No such planning decisions can be considered rationally, let alone made, until ***after*** the Board makes the determinations which the Council's own Statement of Reasons declares are essential to the making of such planning decisions. To do otherwise "would put the cart before the horse."

Our Proposed Amendments to the definitions in Section 5001, are intended to remove planning decisions calling for improved, meaning new, conveyance made in the guise of definitions. The most important and fundamental planning decision made in the history of the Delta will be whether or not to develop massive, new upstream conveyance from the Delta, for

Response to comment ROR19-4

This is a comment on the project, not on the EIR.

the benefit of the exporters and to the detriment of the Delta. That is a planning decision that can only be considered rationally, let alone made, after comprehensive CEQA analysis and public trust doctrine analysis have been performed, and not made at the outset in the guise of being called "definitions". ROR19-4

Please call if you have any questions about our comments.

Sincerely,

/s/ E. Robert Wright
E. Robert Wright
Senior Counsel

No comments

- n/a -

ROR21 PGE

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January 14, 2013

VIA E-MAIL
DELTAPLANCOMMENT@DELTACOUNCIL.CA.GOV

Mr. Philip Isenberg, Chair
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA, 95814

Re: Delta Plan: Comments of Pacific Gas and Electric Company on November 2012 Final Draft Delta Plan

Dear Chair Isenberg and Council Members:

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to comment on the Delta Stewardship Council's (Council) November 2012 Final Draft Delta Plan (Plan). PG&E generally supports the significant efforts of the Council and the many stakeholders involved to help craft a Delta Plan that meets the coequal goals of improved water reliability for California and the protection, restoration, and enhancement of the Delta ecosystem. As the owner and operator of gas and electric transmission and distribution facilities within the Delta, as well as many hydroelectric facilities in the upstream tributaries, PG&E has a significant interest in what occurs in the Delta.

Impacts of the Delta Plan on Electric and Gas Operations

Routine Operations and Maintenance of PG&E Facilities

PG&E believes that its routine operations and maintenance for facilities within the geographic boundaries covered by the Delta Plan generally should not be affected. Representatives from PG&E's State Agency Relations and Land & Environmental Management teams met with Council staff in September 2012 to confirm that only major new projects proposed by PG&E may be subject to the new provisions of the Delta Plan. Council Staff agreed that the majority of PG&E activities in the Delta would not be considered a "covered action" under the proposed screening criteria, as PG&E work on existing facilities is covered under existing the California Public Utilities Commission (CPUC) approval or exemption process, and would not be considered to have a significant impact on the Plan's coequal goals. The draft Plan should be clear in stating that these types of activities are not covered actions.

ROR21-1

Prioritization of State Investments in Delta Levees

While PG&E anticipates that the majority of its activities in the Delta would not be considered "covered actions," it is worth noting that one of the proposed policies (RR P1)—Prioritization of

Response to comment ROR21-1

This is a comment on the project, not on the EIR.

State Investments in Delta Levees and Risk Reduction—states that "prioritization shall identify guiding principles, constraints, and strategic considerations to guide Delta flood risk reduction investments…. This analysis shall consider, but not be limited to values related to protecting: … critical local, State, federal, and private infrastructure including electricity transmission lines..." As the owner and operator of gas and electric transmission and distribution facilities within the Delta and hydroelectric facilities in the upstream tributaries, we appreciate the Delta Plan's emphasis on the importance of these facilities for consideration of Delta flood risk reduction investments. It is important that electric and natural gas infrastructure, defined broadly, should be protected under this prioritization, as safety and reliability of the electric and gas infrastructure[1] is a critical priority. Such protections should apply to relocation of existing infrastructure to accommodate any new Delta improvements, such as the water conveyance facilities, which will involve significant planning, engineering, land rights, and cost.

Promote Early Coordination for Specific Proposed Projects and Minimize Permitting Redundancy

While the Plan and its associated EIR largely do not address actions at the project level, it is important to note that upgrading, relocating or protecting utility infrastructure can be a complex, time-consuming, and costly undertaking. Upon adoption of the Plan, we strongly urge future project proponents to work closely with PG&E during the earliest planning phases of projects within the Delta. To the extent feasible, maps and prioritization schedules should be adopted for levee and flood control facility changes. Early consultation can help to evaluate and plan for impacts and identify the best options for addressing any affected facilities that maximize achievement of the coequal goals and minimize or avoid both environmental impacts and service disruptions to electric or gas customers. ROR21-1

In addition, to avoid redundant permit requirements and unnecessary permit approval delays, any newly introduced permitting requirements for covered projects should be closely coordinated with existing permit requirements such as CWA 401, 404, and existing habitat conservation plans.

Council has also begun the work of establishing an Interagency Implementation Committee. The purpose of this committee will be to formally coordinate the multiple agencies with management responsibility and jurisdiction for permitting activities within the Delta, in order to achieve the co-equal goals of the Delta Plan. State and local agencies will be formal members of the committee, and relevant federal agencies will be invited and encouraged to participate. PG&E plans to continue to monitor the development of this group and may seek to coordinate with the committee, if needed, to address conflicting agency direction on our activities within the Delta.

Allow Mitigation Flexibility for Major New Electric, Gas, or Generation Projects

Major new projects (such as new electric transmission facilities) proposed within the Delta, would require any state or local government entity needing to grant discretionary approval for

[1] For example, PG&E's MacDonald Island gas storage facility is a critical facility requiring protection.

No comments

- n/a -

the project to also follow the new Certification of Consistency process proposed in the Delta Plan. This process, outlined in Policy GP 1 of the Final Draft Delta Plan "Detailed Findings to Establish Consistency with the Delta Plan," essentially requires the approving agency to make findings showing the project is consistent with the provisions of the Delta Plan. The screening criteria are listed on Page 55 of the Final Draft Delta Plan (FDDP), along with a decision tree for state and local agencies on possible covered actions (Figure 2-3). ROR21-1

Lead agencies should be allowed flexibility in determining how to mitigate impacts of new infrastructure to be consistent with the Delta Plan, including for visual impacts from transmission towers. In a specific example, in the draft PEIR Section 8 Visual Resources (8.4.3.6.1 Mitigation Measure 8-1), the following mitigation measure was recommended, "Use single-pole electrical transmission towers instead of lattice-form towers for proposed large electrical transmission lines, and put transmission lines underground along areas with high visibility and high public use." We strongly urge that this Mitigation Measure be amended or removed. The safety and reliability of the electric grid should be the paramount concern when designing and engineering support structures for electrical transmission lines. Any proposed Mitigation Measure must allow lead agencies flexibility to assess specific project proposals and cannot be a "one size fits all" approach to the design and, engineering of transmission towers and lines. ROR21-2

PG&E's Upstream Hydropower Facilities

New proposed regulations updating the Delta Flow Objectives will require the State Water Resources Control Board (SWRCB) to update its flow objectives for the Bay-Delta Water Quality Control Plan ("Bay-Delta Plan") by specific dates. Flow objectives for major upstream tributaries to the Delta would need to be adopted by the SWRCB by 2018. This process is already underway at the SWRCB, and PG&E is engaged in that process. The flow objectives within the Delta itself, to be completed by June 2013, have the potential to negatively impact the amount of hydropower produced at the State Water Project (SWP) and Central Valley Project (CVP). Any changes to the flow objectives for the Delta's upstream tributaries could affect upcoming FERC relicensing and existing licenses of PG&E hydroelectric facilities located upstream of the Delta through imposition of minimum in-stream flow requirements and other conditions as part of Section 401 water quality certifications issued by the SWRCB. Any change to minimum in-stream flows requires significant coordination and negotiation between many agencies and stakeholders. ROR21-3

Conclusion

We appreciate your consideration of our remarks and look forward to continued participation in this important planning process. Please feel free to contact me if you have any questions.

Respectfully submitted,

/s/

Valerie Winn

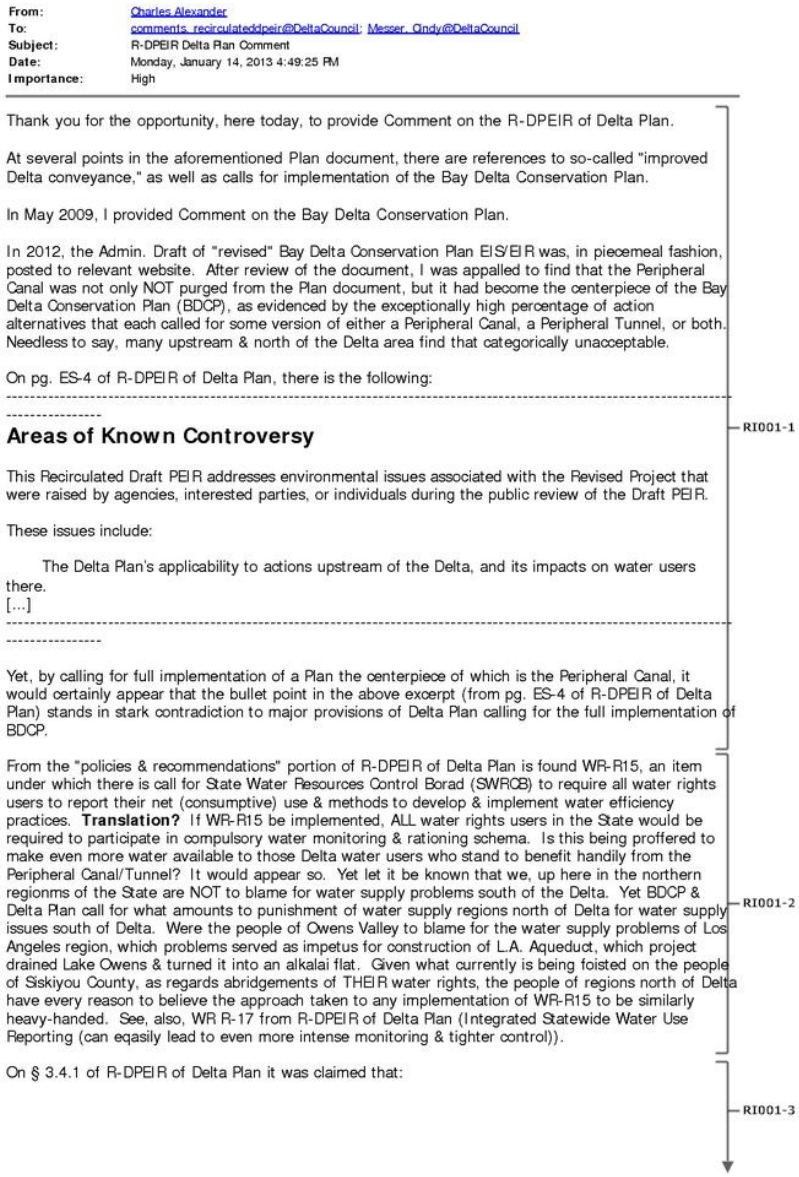
Response to comment ROR21-2

In response to this comment, please see text change(s) in Section 5 of the FEIR.

Response to comment ROR21-3

This is a comment on the project, not on the EIR.

RI001 Alexander



From: Charles Alexander
To: comments_recirculateddpeir@DeltaCouncil; Messer, Cindy@DeltaCouncil
Subject: R-DPEIR Delta Plan Comment
Date: Monday, January 14, 2013 4:49:25 PM
Importance: High

Thank you for the opportunity, here today, to provide Comment on the R-DPEIR of Delta Plan.

At several points in the aforementioned Plan document, there are references to so-called "improved Delta conveyance," as well as calls for implementation of the Bay Delta Conservation Plan.

In May 2009, I provided Comment on the Bay Delta Conservation Plan.

In 2012, the Admin. Draft of "revised" Bay Delta Conservation Plan EIS/EIR was, in piecemeal fashion, posted to relevant website. After review of the document, I was appalled to find that the Peripheral Canal was not only NOT purged from the Plan document, but it had become the centerpiece of the Bay Delta Conservation Plan (BDCP), as evidenced by the exceptionally high percentage of action alternatives that each called for some version of either a Peripheral Canal, a Peripheral Tunnel, or both. Needless to say, many upstream & north of the Delta area find that categorically unacceptable.

On pg. ES-4 of R-DPEIR of Delta Plan, there is the following:

Areas of Known Controversy

This Recirculated Draft PEIR addresses environmental issues associated with the Revised Project that were raised by agencies, interested parties, or individuals during the public review of the Draft PEIR.

These issues include:

The Delta Plan's applicability to actions upstream of the Delta, and its impacts on water users there.
[...]

Yet, by calling for full implementation of a Plan the centerpiece of which is the Peripheral Canal, it would certainly appear that the bullet point in the above excerpt (from pg. ES-4 of R-DPEIR of Delta Plan) stands in stark contradiction to major provisions of Delta Plan calling for the full implementation of BDCP.

From the "policies & recommendations" portion of R-DPEIR of Delta Plan is found WR-R15, an item under which there is call for State Water Resources Control Borad (SWRCB) to require all water rights users to report their net (consumptive) use & methods to develop & implement water efficiency practices. **Translation?** If WR-R15 be implemented, ALL water rights users in the State would be required to participate in compulsory water monitoring & rationing schema. Is this being proffered to make even more water available to those Delta water users who stand to benefit handily from the Peripheral Canal/Tunnel? It would appear so. Yet let it be known that we, up here in the northern regionms of the State are NOT to blame for water supply problems south of the Delta. Yet BDCP & Delta Plan call for what amounts to punishment of water supply regions north of Delta for water supply issues south of Delta. Were the people of Owens Valley to blame for the water supply problems of Los Angeles region, which problems served as impetus for construction of L.A. Aqueduct, which project drained Lake Owens & turned it into an alkalai flat. Given what currently is being foisted on the people of Siskiyou County, as regards abridgements of THEIR water rights, the people of regions north of Delta have every reason to believe the approach taken to any implementation of WR-R15 to be similarly heavy-handed. See, also, WR R-17 from R-DPEIR of Delta Plan (Integrated Statewide Water Use Reporting (can eqasily lead to even more intense monitoring & tighter control)).

On § 3.4.1 of R-DPEIR of Delta Plan it was claimed that:

RI001-1

RI001-2

RI001-3

Response to comment RI001-1

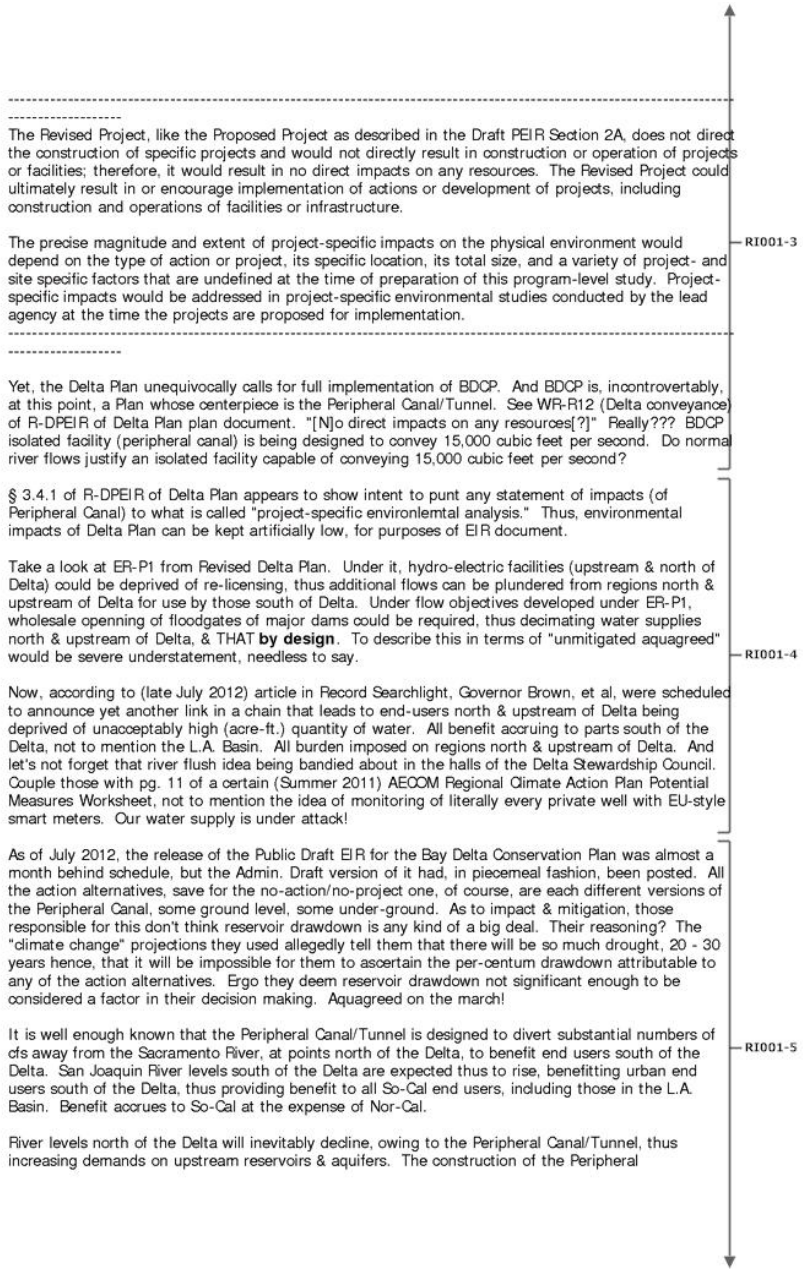
The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1.

Response to comment RI001-2

This is a comment on the project, not on the EIR. Delta Plan recommendation WR R15 recommends that DWR and the SWRCB work with stakeholders to identify and recommend measures to reduce procedural and administrative impediments to water transfers and protect water rights and environmental resources (RDEIR, Appendix C, Table C-12, p. C-14; Final Draft Delta Plan, p. 112). Delta Plan Recommendation WR R17 recommends that DWR, in coordination with multiple state agencies and stakeholder, develop a coordinated statewide system for water use reporting that would include data needed to better manage California's water resources (RDEIR, Appendix C, Table C-12, p. C-15; Final Draft Delta Plan, p. 113). As stated in Chapter 3 of the Delta Plan, the rationale for the recommendation is to address the lack of accurate, timely, consistent, and transparent information on the management of California water supplies and beneficial uses, which is a significant impediment to the achievement of the coequal goals.

Response to comment RI001-3

Please see response to I001-1.



The Revised Project, like the Proposed Project as described in the Draft PEIR Section 2A, does not direct the construction of specific projects and would not directly result in construction or operation of projects or facilities; therefore, it would result in no direct impacts on any resources. The Revised Project could ultimately result in or encourage implementation of actions or development of projects, including construction and operations of facilities or infrastructure.

The precise magnitude and extent of project-specific impacts on the physical environment would depend on the type of action or project, its specific location, its total size, and a variety of project- and site specific factors that are undefined at the time of preparation of this program-level study. Project-specific impacts would be addressed in project-specific environmental studies conducted by the lead agency at the time the projects are proposed for implementation.

RI001-3

Yet, the Delta Plan unequivocally calls for full implementation of BDCP. And BDCP is, incontrovertably, at this point, a Plan whose centerpiece is the Peripheral Canal/Tunnel. See WR-R12 (Delta conveyance) of R-DPEIR of Delta Plan plan document. "[N]o direct impacts on any resources[?]" Really??? BDCP isolated facility (peripheral canal) is being designed to convey 15,000 cubic feet per second. Do normal river flows justify an isolated facility capable of conveying 15,000 cubic feet per second?

§ 3.4.1 of R-DPEIR of Delta Plan appears to show intent to punt any statement of impacts (of Peripheral Canal) to what is called "project-specific environlemtal analysis." Thus, environmental impacts of Delta Plan can be kept artificially low, for purposes of EIR document.

Take a look at ER-P1 from Revised Delta Plan. Under it, hydro-electric facilities (upstream & north of Delta) could be deprived of re-licensing, thus additional flows can be plundered from regions north & upstream of Delta for use by those south of Delta. Under flow objectives developed under ER-P1, wholesale openning of floodgates of major dams could be required, thus decimating water supplies north & upstream of Delta, & THAT **by design**. To describe this in terms of "unmitigated aquagreed" would be severe understatement, needless to say.

RI001-4

Now, according to (late July 2012) article in Record Searchlight, Governor Brown, et al, were scheduled to announce yet another link in a chain that leads to end-users north & upstream of Delta being deprived of unacceptably high (acre-ft.) quantity of water. All benefit accruing to parts south of the Delta, not to mention the L.A. Basin. All burden imposed on regions north & upstream of Delta. And let's not forget that river flush idea being bandied about in the halls of the Delta Stewardship Council. Couple those with pg. 11 of a certain (Summer 2011) AECOM Regional Climate Action Plan Potential Measures Worksheet, not to mention the idea of monitoring of literally every private well with EU-style smart meters. Our water supply is under attack!

As of July 2012, the release of the Public Draft EIR for the Bay Delta Conservation Plan was almost a month behind schedule, but the Admin. Draft version of it had, in piecemeal fashion, been posted. All the action alternatives, save for the no-action/no-project one, of course, are each different versions of the Peripheral Canal, some ground level, some under-ground. As to impact & mitigation, those responsible for this don't think reservoir drawdown is any kind of a big deal. Their reasoning? The "climate change" projections they used allegedly tell them that there will be so much drought, 20 - 30 years hence, that it will be impossible for them to ascertain the per-centum drawdown attributable to any of the action alternatives. Ergo they deem reservoir drawdown not significant enough to be considered a factor in their decision making. Aquagreed on the march!

It is well enough known that the Peripheral Canal/Tunnel is designed to divert substantial numbers of cfs away from the Sacramento River, at points north of the Delta, to benefit end users south of the Delta. San Joaquin River levels south of the Delta are expected thus to rise, benefitting urban end users south of the Delta, thus providing benefit to all So-Cal end users, including those in the L.A. Basin. Benefit accrues to So-Cal at the expense of Nor-Cal.

RI001-5

River levels north of the Delta will inevitably decline, owing to the Peripheral Canal/Tunnel, thus increasing demands on upstream reservoirs & aquifers. The construction of the Peripheral

Response to comment RI001-4

Please see response to comment I001-1 and Master Response 5. As described on page 2A-39, Lines 38 through 40, of the Draft Program EIR and Master Response 5, it is anticipated that implementation of updated water quality and flow objectives by the State Water Resources Control Board (SWRCB) could increase Delta outflow, reduce current reverse flow conditions in the south Delta, increase flows in restored Delta floodplains, and result in a more "natural flow regime" in the Delta. Neither the Delta Plan nor the SWRCB's flow objectives will affect water rights. Following the adoption of its flow objectives, the SWRCB will engage in a further public proceeding, including complete environmental review, concerning implementation of the objectives, which may include altering water rights. Please see Master Response 5 for further discussion of the EIR's analysis of the updated flow objectives and the protections for exiting water uses and users. The hydroelectric power generation at the SWP and CVP reservoirs is primarily used to convey SWP and CVP water. Even if future flow objectives result in changing the timing of reservoir operations, water releases from the SWP and CVP reservoirs would continue to generate electricity, although in a different time of the year, which could be used to meet a portion of California's energy supply. If less water is conveyed through the Delta by SWP and CVP, there would be less demand for energy for conveyance of this water.

Response to comment RI001-5

Please see response to comment I001-04. The BDCP is separate project, for which the Department of Water Resources is the lead agency. It is not a part of the Delta Plan and was therefore not analyzed in the EIR, as further explained in Master Response 1.

Canal/Tunnel, under any circumstances, is harmful to the North State, but during a drought such as we currently suffer is categorically insane.

Some fields (north & upstream of Delta) may have to go fallow. Industries of all types will be further curtailed beyond that which otherwise would be the case. Residential end users will face some form of rationing, such as that which those in Jones Valley, Castella, & other places, narrowly avoided (a few years back). They are by no means out of the proverbial woods, yet. And what of hydro-power?

Electricity from hydro-generators depends on turbine speed. RPMs, there, result from hydraulic force brought to bear on turbine blades. Force is the product of pressure multiplied by area. And pressure, here, is a function of depth. So when depth at the dam is reduced, hydroelectric capacity is thus reduced, thereby increasing grid-dependence on the very non-renewable fuels the Air Resources Board is currently disincentivising for such use. RI001-5

We would do well to remember the history of Lake Owens.

Unless & until implementation of BDCP (&/or of similar) is purged from Delta Plan, it will be inextricably linked to plans for Peripheral Canal/Tunnel!
Take a look at the following excerpt from May 2009 Comment on BDCP.:

Indeed there is a plan intended, ultimately, to plunder Northern California of her water to indeed quite an alarming extent, as I will show in the remainder of this Comment. But before I go on here, I must herenow pose the following question, "Cannot any threatened species listed for protection under the Federal ESA & / or under the California ESA by properly protected without bringing about the likely wholesale decimation of agriculture & ecosystems north & upstream of the Delta AND without imposing great hardship on agricultural & non-agricultural end-users north & upstream of the Delta?" Of course! But that is manifestly not the purpose of the BDCP, as this Comment clearly shows. Another question, "Cannot the Delta & Estuary ecosystems be properly protected without bringing about the decimation of ecosystems north & upstream of the Delta AND without imposing great hardship on agricultural & non-agricultural end-users north & upstream of the Delta?" Of course! But that is manifestly not the purpose of the BDCP, as this Comment clearly shows.

Now, looking at the Delta Vision website, et al, I found the phrase "Peripheral Canal" to have mysteriously disappeared somehow from any official discussion. Instead, what is found is a cavalcade of glowing rhetoric extolling the alleged virtues of the so-called Delta Vision, rhetoric that is almost quasi-messianic in tone. Much effort at review of the documents collected was required before the first mention of any kind of peripheral canal was found, at all. Of course, the exact phrase "Peripheral Canal" appears nowhere in the official discussion. Rather, terms such as "conveyance," "dual conveyance," & "Delta Fix" are used. Only such descriptions as are light on detail are to be found anywhere inside the avalanche of propaganda favorable to the promoters of the idea of a Peripheral Canal, there at the Delta Vision website. And that was not the only such propaganda-laden webpage. RI001-6

Eventually, I came across the U.S.F.W.S. announcement of a certain comment submission deadline in re the BDCP. It came in the form of pg.s 7257 - 7260 of the Federal Register / Vol. 74, No. 29 / Friday February 13, 2009 / Notices.

The language thereof, though significantly more sober, in tone, than any portion of the Delta Vision webpage, nevertheless is more favorable to the Peripheral Canal than not. It is manifestly designed to lead the reader of it to deduce that in order to preserve the environment in one part of the State, one must

Response to comment RI001-6

Comment noted. Please see response to comment I001-1.

agree to the likely ecological decimation of parts north & upstream of the area in question. Remember Lake Owens!

Thereafter I came upon the BDCP webpage. It was at this point that I hoped to finally get to the proverbial heart of the matter. I was rather disappointed upon the finding of there only being a small percentage of the chapters of the actual BDCP Draft Scoping Plan posted to the website. Most of the rest
of what was there consisted largely of what can only, ultimately, be described as so much propaganda. So I examined what I could, to the end that I might have a more accurate picture of the situation. Some
of what I found in portions of Ch. 3 of the Draft Scoping Plan certainly gave rise to quite some concern.

For instance, there is that which is identified as the "Major Plan Element." It calls for, inter alia, "[...] new water diversion facilities [to] be designed, constructed, & operated[.]" Further on therein 'tis said, "An isolated canal facility [...] to convey water from the new diversion facilities to the South Delta[.]" At twenty-seven lines of text thence, "Various isolated canal facility routes are under consideration including routes on the east & west sides of the Delta." And at three lines thence, "The isolated canal facility would include above & below ground portions and would connect to the existing South Delta SWP
& CVP facilities[.]"

On pg. 3-10, ln.s 13-15, "Completion of North Delta diversion facilities, the isolated canal facility, and associated project components would mark the beginning of the long-term implementation period of the BDCP." Behold the Peripheral Canal. Yikes! And according to the above citation, without the Peripheral
Canal, there is essentially no BDCP. God forbid! Indeed, 'tis quite telling. Isn't it? Essentially what is being admitted to is that the BDCP is really nothing more than an elaborate smoke screen designed to obscure the real purpose & intent of the whole bloody enterprise. — RI001-6

And it's now being done in the name of protecting those species listed as endangered & / or threatened under both the Federal ESA & the California ESA. But is there substance to all the messianic promises being made in this attempt to set parts of Northern California well on their way to each potentially becoming another Lake Owens, for all practical intents & purposes? Well, there are certainly a great deal of promises & propaganda, but that certainly doesn't prove much. Couple that with the following admission of anticipated inefficacy of the proposed Peripheral Canal from pg. 3-8, "[T]he population level response of covered species to this parameter is uncertain[.]" Now, non-flow factors are there cited as reasons, but, be that as it may, 'tis apparent that the authors of the Draft Scoping Plan simply can't bring themselves to admit that the stated purpose of the Peripheral Canal may never be thereby fulfilled. Let's list a few factors: food limitation, invasive species, discharges of contaminants, temperature trends, etc. Again from pg. 3-8, "Even if construction & operation of North Delta facilities completely eliminates negative effects to covered species [...], other stressors may ultimately result in failure of these species to recover." Even if? What's this "even if" business? Is it not an admission, at least of sorts, that the Peripheral Canal likely cannot deliver on its promises? Also, from pg. 3-11, "There are also uncertainties related to how covered species will respond to various
operational aspects of a North Delta facility[.]"

Going back to pg. 3-8, "Because significant infrastructure would be constructed, this 'conservation' measure is not easily reversible." Essentially, any Peripheral Canal that is constructed is permanent (& that by design).

Now, as to rationale behind the Peripheral Canal, here is something from pg. 3-4, "[W]ater has been diverted directly from the South Delta through SWP & CVP facilities to meet agricultural & urban water demands south of the Delta." What's this? Drying up Lake Owens & turning it into an alkali salt flat does
not suffice for So-Cal? "Rob from Nor-Cal to give to So-Cal" seems to be the order of the day, as

No comments

- n/a -

regards
this issue. Indeed, waters conveyed via the Peripheral Canal to parts farther south would certainly reduce demand on Southern California water sources by Southern California end users. And that is the true purpose of the Peripheral Canal! Not any of this other business which is now being cited as reasons
& rationale. No. The real reason is that Southern California covets Northern California water. The So-Cal mentality can be best summed up in the words of the late William Mullholland where he said, at a
ceremony marking the completion of the L.A. Aqueduct in Nov. 1913 (speaking of Lake Owens water) "There it is! Take it!" And, indeed, that is the purpose of the Peripheral Canal, in re Northern California water. RI001-6

And from pg. 3-10, "The operation of new facilities may require modifications of the operations of upstream reservoirs. This would require modification of the various agreements & licenses governing the
operation of these reservoirs. This may require changes in minimum instream flow requirements, minimum drawdown levels, flood control operations, temperature standards, & riparian & geomorphic flow requirements. Such modifications may require modification of Clean Water Act § 404 permits for these projects, as well. Additionally, hydroelectric facilities may need modification to their FERC licenses." Translation, greater demands will inevitably be imposed on upstream water supplies north of the Delta, thus jeopardizing end users north of the Delta as well as hydroelectric generation capacities severely, not to mention jeopardizing upstream ecosystems, all in the event of the construction & operation of the Peripheral Canal. Thus the purpose & intent of the Peripheral Canal is further revealed.

Now, in the course of this Comment several references have herein been made to Lake Owens. And in
the following three paragraphs is a brief history of Lake Owens & of Mono Lake, using information taken
from http://en.wikipedia.org/wiki/Owens_Lake and from
http://en.wikipedia.org/wiki/California_Water_Wars. Similar information can be found at many other places & websites, and the following is a partial listing thereof:
http://www.gbuapcd.org/owenslake/index.htm,
http://www.kevinroderick.com/dust.html, http://www.desertusa.com/mag98/april/owens/owenslake.html,
http://www.pbs.org/weta/thewest/people/d_h/eaton.htm,
http://www.pbs.org/weta/thewest/people/i_r/mulholland.htm, etc.

What was it like before the L.A. Aqueduct dried up Lake Owens (a progress of 11 years from completion of the aqueduct in 1913 until 1924 when the lake had finally dried up)? It was an area supporting numerous & diverse waterfowl. According to a 1917 report by Joseph Grinell of the Museum of Vertebrate Zoology in Berkeley, "Great numbers of birds are in sight along the lake shore -- avocets, phalaropes, ducks. Large flocks of shorebirds in flight over the water in the distance, wheeling about show in mass, now silvery now dark, against the grey-blue of the water. There must be literally thousands of birds within sight of this one spot." The area was one that included several farms & ranches RI001-7
& even the occasional example of heavy industry. Before that, the Paiute (a tribe of North American indians) inhabited the area, making use of the natural resources, including that done vis à vis their techniques of irrigation. However, by 1901 the irrigation systems then in use were reportedly so poorly designed that several areas of land in the north of Owens Valley became over-saturated to the point of nearly becoming unsuitable for many agricultural purposes. The south of Owens Valley, by contrast, was
more arid & less irrigated than the north, a situation that lent itself to the kind of ranching that indeed was
characteristic of south valley agriculture, then. The U.S. Bureau of Reclamation reportedly started formulating plans for an irrigation system designed for better water efficiency than the then extant systems. But then came Frederick Eaton of Los Angeles, along with William Mullholland of LADWP. Mr.

Response to comment RI001-7

Comment noted.

Eaton lobbied then President Theodore Roosevelt urging him to stop all such plans, so that the planned diversion of Lake Owens water toward the greater L.A. area via the then yet to be constructed L.A. Aqueduct could take place. Mr. Eaton got what he wanted. And the rest, they say, was history.

But that was not enough to satisfy L.A.'s aquagreed. In 1970, LADWP completed a second aqueduct.
Two years thence, they were diverting yet more surface water & were pumping groundwater at the rate of
several hundred thousand acre-ft. / yr. Owens Valley springs & seeps dried up. Groundwater – dependent vegetation started dying off. And that isn't all. Not too many years after Lake Owens first dried up back in 1924, LADWP went about looking for additional water sources.

RI001-7

So they acquired water rights in Mono Valley. They did this during the Depression, when they knew many parties to be in dire monetary need. By 1941, the aqueduct extensions were complete. Water bodies that once fed Mono Lake were then feeding L.A.'s ever insatiable aquagreed. Mono Lake once served as an important ecosystem link, where gulls & migratory birds would nest. But the lake level began to fall beyond the extent that tufa formations were being exposed. Lake water salinity & alkalinity
increased, threatening native brine shrimp. And the birds nesting on Negit & Paoha Islands came under
increasing threat. For not only were alkalinity & salinity levels rising as lake levels declined, but a land bridge was beginning to form between the lake shore & Negit Island, much to the relish of local predators.
1979 saw the beginning of litigation against LADWP in re the situation at Mono Lake. And the rest, they
say, is history.

In the preceding three paragraphs was presented a brief history of Lake Owens & of Mono Lake. Now, that is not the sum - total of So-Cal aquagreed, for entire volumes of work would need to be written
to give a more full account.

In 1982, an initiative was put on the ballot, which initiative provided for the construction & operation of
the Peripheral Canal. Fortunately, it was rejected by the voters.

And today, we have before us yet another Peripheral Canal proposal. So how, exactly, will the Peripheral Canal do its work? It will draw water away from the Sacramento River at points north of the Delta. The water thus diverted will then be conveyed to points south of the Delta, freeing up San Joaquin
River water sources for use in supplementing So-Cal water supplies for So-Cal's exclusive benefit.

By the way, how is it that "Public Trust" gets trampled under foot by So-Cal aquagreed, all whilst being
oppositely described by its proponents, in the name of conservation? Take a good, hard look at Ch. 3 of
the BDCP Draft Scoping Plan, as well as at the Delta Vision!

RI001-8

Getting back to how the Peripheral Canal does its work, not one drop of benefit accrues to the North.
Because major flows & flow rates are diverted away from the Delta thus, increased demands are imposed
on upstream reservoirs to increase discharge rates, lest river levels be suffered to wane. Some upstream
reservoirs were recently fitted with river temperature control devices designed to automatically increase discharge rates whenever river water temperatures start to exceed a preset number of degrees Centigrade. This was done to promote salmon spawning. But because of the mandated use of these

Response to comment RI001-8

Please see response to comment I001-01. Compliance with the public trust doctrine is required by the Delta Reform Act, as recognized in Water Code sections 85022(c)(3) and 85032(h). The Final Staff Draft Delta Plan discusses the public trust doctrine throughout, particularly at pages 81 through 83. The EIR analyzes the Delta Plan's impacts on all relevant public trust resources, including water resources (Section 3), fisheries (Section 4), recreation (Section 18), and navigation (Section 24).

devices, whenever major flows are diverted away from the Delta (thus reducing river levels by the rate of diversion, less any increase in upstream reservoir discharge rates), reservoir levels drop even faster than would otherwise be the case. Thus less water is available for end-users upstream of the diversion points.

Drought or not, the Peripheral Canal is an abominably bad idea. But in the midst of such a drought as we now suffer, the Peripheral Canal is not only an abominably bad idea, it is also categorically insane! And as water is diverted upstream of the North Delta, Delta salinity naturally increases, thus placing Delta & Estuary ecosystems at increased risk. To counter this, bypass flows must needs be suffered to increase. And indeed the BDCP calls for exactly that. However, bypass flow rates cannot, ultimately, be made to increase, except that upstream reservoir discharge rates likewise be made to increase. And this is because even if diversion rates are ever reduced below the upper limit of diversion capacity, under no diversion plan now being contemplated will rates ever be brought down to zero.

After all, who builds a canal who does not also intend for it to be used at all?

And the South Delta (along with reservoirs upstream of it) will continue to be exempted from any additional burdens. For this is wholly consistent with the whole idea of a Peripheral Canal. Needless to say, with the construction & operation of the Peripheral Canal, discharge rates for reservoirs upstream of the North Delta will inevitably increase, which during a drought is at the height of folly. And with higher reservoir discharge rates comes reservoir levels lower than otherwise would be the case. — RI001-8

On the heels of that comes reduced hydroelectric generation capacity. It's only natural for that to be. For the rotational speed of hydroelectric turbines is entirely dependent on the force exerted on each turbine blade by the water. Force, incidentally, is the product of pressure multiplied by volume, and pressure is a function of depth. Where depth is reduced, pressure is reduced. Where pressure is reduced, force (relative to volume) is reduced. Where force is reduced, the rotational speed of each hydroelectric turbine is reduced, and where that is reduced, the electrical output of a given hydroelectric generator is thus reduced. Lo, another facet of the manifest purpose of the Peripheral Canal!

And of all the several means by which electricity is generated for a given population of rate payers, which means are contemplated to be suffered to proliferate, solar, water, and wind result in lower levels of emissions of so-called greenhouse gases (GHGs) than any other such means by which such electricity is to be generated. And of these, water is in the greatest jeopardy, in the event of the construction & operation of the Peripheral Canal, & that by design. Where hydroelectric generation capacity is reduced, an electricity deficit is thus created. That deficit must be made up somehow, or else the risk of area–wide utility service failure, of one form or another, escalates considerably. Additional sources of electricity are time consuming to bring on-line, needless to say. It is so for additional sources of low carbon electricity sources as it is for additional higher carbon electricity sources. When hydroelectrical capacity is reduced, the only two ways to make up the resulting deficit, at least in the shorter term anyhow, are to: (a) allow reservoirs levels to sufficiently increase (a thing that will likely never be allowed to happen, in the event of the construction & operation of the Peripheral Canal); (b) generate more electricity from higher carbon sources; and / or (c) institute rolling blackouts. And given the policy goals

No comments

- n/a -

of the California Global Warming Solutions Act of 2006 (commonly identified as AB32), the Western Climate Initiative (WCI), etc., and given the emerging such policy goals of Congress & of the White House, the idea of the Peripheral Canal is especially repugnant. The Peripheral Canal is manifestly designed to increase statewide GHG emission rates, and may therefore (at least in theory, anyway) be classifiable as an indirect gross polluter. To paraphrase a popularly known anti-drug slogan "Just say no to the Peripheral Canal!" RI001-8

No comments

- n/a -

RI003 Dillard

From: Joyce Dillard [mailto:dillardjoyce@yahoo.com]
Sent: Monday, January 14, 2013 4:21 PM
To: Messer, Cindy@DeltaCouncil
Subject: Comments to Delta Stewardship Council Title 23 Proposed Regulation due 1.14.2013

The Final Draft Delta Conservation Plan and Recirculated PEIR Volume 3 have a concurrent due dates for public review yet you proceed with regulatory actions.

"Drafts" are referred to in this document, yet no plans have been approved. This could mean any form of the drafts. RI003-1

"Best Available Science" is a judgment term. Best Available Science to the area in question, or the general subject matter.

"Adaptive Management" is based on generalities or a designated database with facts and scenarios.

Will monitoring be open and available on a publically accessed website?

Is habitat restoration based on historical models, or migratory models? How are weather patterns including extreme weather patterns applied? Is the State viewed entirely, or just this region. RI003-2

How do these regulations affect other regions dependent on the Delta? RI003-3

Joyce Dillard
P.O. Box 31377
Los Angeles, CA 90031

Response to comment RI003-1

This is a comment on the project, not on the EIR. The Delta Plan and its associated state regulations (which will make the Delta Plan's policies legally enforceable) and the EIR are in "draft" form until the Delta Stewardship Council adopts the final documents following consideration of comments received during the public review periods. The public review periods on the Recirculated Draft PEIR and the draft rulemaking package were run concurrently to better inform the Council's ultimate decision regarding certification of the EIR and adoption of the Delta Plan and its associated state regulations. After being adopted by the Council, the Delta Plan's associated state regulations will take effect after the rulemaking process is completed in compliance with the State Administrative Procedures Act (which includes approval by the state Office of Administrative Law).The term "best available science" is contained in the Delta Reform Act, Water Code section 85302(g) regarding implementation of the Delta Plan to further the restoration of the Delta ecosystem and a reliable water supply, and is discussed in the Final Draft Delta Plan on pages 42 to 45 and pages 61 to 62 (recommendation G R1). The term "adaptive management" is defined in the Delta Reform Act, Water Code section 85052, and Adaptive Management and the Delta Plan is described in detail in Appendix A of the Delta Plan. See also Final Draft Delta Plan, p. 43.

Response to comment RI003-2

This is a comment on the project, not on the EIR. As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. Availability of monitoring data will be project-specific, and will depend on the lead agency for the project. Please see Chapter 4 of the Delta Plan for a summary of the goals, principles of, and considerations for ecosystem restoration in the Delta. Please see Chapter 3 of the Delta Plan for a summary of the State's water resources, including historical, existing, and projected hydrology. As described in Section 1 of the Draft Program EIR and Section 3 of the Recirculated Draft EIR, the study area includes "areas outside of the Delta that use Delta water," such as the service area of the State Water Project and Central Valley Project

that divert Delta water from intakes in the Delta. The hydrologic areas presented in Section 3 of the Draft Program EIR are based on the hydrologic basins used by the Department of Water Resources in 2009 Water Plan Update. Please see Master Response 2.

Response to comment RI003-3

This is a comment on the project, not on the EIR. As described in Section 1 of the Draft Program EIR and Section 3 of the Recirculated Draft EIR, the study area includes "areas outside of the Delta that use Delta water," such as the service area of the State Water Project and Central Valley Project that divert Delta water from intakes in the Delta. The regulations are applicable to covered actions as defined in the Delta Plan. Please see Master Response 1 regarding covered actions.

RI004 Morat

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2012 DEC 28 PM 2:02

December 27, 2012

"Recirculated Draft PEIR Comments"
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Council:

I am really unhappy that you opted to restrict comments on this enormous, lengthy and complex environmental review of the Program EIR. As noted on Page ES-11 of the Recirculated Draft, lines 4 through 7: "Under CEQA Guidelines Section 15088.5, when a portion of an EIR is recirculated the lead agency may request that the reviewers limit their comments to the recirculated portion, and to refrain from commenting on the unrevised portions. This Recirculated Draft PEIR is solely adding the analysis of the Revised Project as the new alternative. It does not revise the Draft PEIR's analysis of the Proposed Projector any of the other alternatives. Accordingly, the Council requests that comments be limited to the analysis of this Recirculated DPEIR."

Considering the duration and rigor of your process and the desire for public involvement, what is to be lost by not allowing any comment to be made now? You could have advised reviewers to comment as they wish, please do not duplicate earlier comments that they had submitted, and warned them that only comments relevant to the Recirculated Draft PEIR or new and process-essential information would be acknowledged and/or addressed. I am reviewing the document for personal reasons; I am a stakeholder of one. I do not have the resources of the stakeholders who have benefitted so tangibly and enormously, subsidized if you will, from decades of Central Valley Rivers and Delta water supplies. RI004-1

I will pursue my concerns on process with my State legislators as to how an unattached stakeholder who had an interest was ever expected to catch and hang on to this runaway train for three years. I feel like I am a stakeholder who has not benefited but rather have been hurt by Sacramento-San Joaquin River and Delta water exploitation – fisherman, hunters, non-consumptive users of wildlife, boaters, farmers, and the many health-impacted drinkers of Delta water.

I did make a comment at a public scoping session once, and that will be the basis for my one comment herein.

The geographic scope of the Delta Plan makes a huge and fatal mistake in not including the San Francisco Bays. Those parts of this estuary downstream of Suisun - San Pablo Bay, Central Bay, and South Bay - are integral parts of the estuary and undeniably affected by changes in hydrology (flow magnitudes and timing) and water qualities (including sediments). Did CEQA drive this document or the Delta Restoration Act of 2009? RI004-2

Response to comment RI004-1

Please refer to Master Response 2. The Draft EIR (Volumes 1 and 2), which analyzes the Fifth Staff Draft Delta Plan, was circulated for public review and comment for 90 days beginning on November 4, 2011 and ending on February 2, 2012. In November 2012, the Recirculated Draft Programmatic EIR (Volume 3 of the Draft EIR), which analyzes the Final Staff Draft Delta Plan (the "Revised Project"), was circulated for review and comment for 45 days beginning on November 30, 2012 and ending on January 14, 2013. When an EIR is submitted to the State Clearinghouse, the review period shall not be less than 45 days unless a shorter period is approved by the State Clearinghouse (CEQA Guidelines § 15105(a)). The Council will consider any comments it received during the public review periods and prepare a written response to any comments on significant environmental issues as required by Public Resources Code section 21091(d).

Response to comment RI004-2

As described in Section 1 of the Draft Program EIR and Section 3 of the Recirculated Draft EIR, the study area includes "the Delta and Suisun Marsh, the Delta Watershed that contributes water to the Delta, and areas outside of the Delta that use Delta water." As described in Section 3, Page 3-1 Lines 31 through 33 of the DEIR, the Delta watershed is "represented by the drainage of the Central Valley except for the Tulare Lake area. Areas outside of the Delta that use Delta water include Tulare Lake, San Francisco Bay, Central Coast, and Southern California." The hydrologic areas presented in Section 3 of the Draft Program EIR are based on the hydrologic basins used by the Department of Water Resources in 2009 Water Plan Update.

My anger is directed at institutional and collective behaviors that have been occurring for many decades, not individual members of the Delta Stewardship Council. RI004-3

Firmly,

Richard Morat
2821 Berkshire Way
Sacramento, CA 95864

Response to comment RI004-3

Comment noted.

RI005 Sarah Pierce

From: Friends of the River on behalf of Sarah Pierce
To: comments, EIR@DeltaCouncil
Subject: Please adopt Alternative 2 to restore the Delta and reduce Delta water diversions
Date: Tuesday, March 13, 2012 10:01:08 AM

Mar 13, 2012

Mr. Joe Grindstaff
980 9th Street, Suite 1500
Sacramento, CA 95814

Dear Mr. Grindstaff,

I urge the Delta Stewardship Council to adopt Alternative 2 and to specifically limit Delta water diversions to no more than 3,000 cubic feet per second, to implement the Delta Plan. RI005-1

Unfortunately, none of the alternatives currently in the EIR meet the legal mandates of restoring the Delta ecosystem, water quality, and fisheries. Therefore, I urge that the draft EIR be recirculated with at least one alternative that fully achieves these important goals. RI005-2

A valid Delta Plan must enforce water quality standards and meet the minimum flow recommendations of the California Department of Fish and Game and Water Resources Board. RI005-3

The Plan should focus on cost-effective water use efficiency, recycling, and conservation measures, instead of costly and destructive dams and canals, to achieve its water supply reliability goal.

I oppose any alternative that would require the construction of a Peripheral Canal or tunnel to divert more water from the Delta. I also oppose any plan that assumes the taxpayer will cover the costs for Delta projects that primarily benefit those who receive Delta water exports. Those who receive Delta water need to mitigate the damage they have caused to the Delta ecosystem. RI005-4

The Delta is a nationally significant public trust resource critical to the economic and environmental health of California. Please adopt a Delta Plan that ensures full protection and restoration of this important estuary. RI005-5

Thank you.

Mrs. Sarah Pierce
9778 Hillside Dr
Forestville, CA 95436-8907

Response to comment RI005-1

This is a comment on the project, not on the EIR.

Response to comment RI005-2

Regarding the range of alternatives analyzed in the EIR and the consideration of alternatives' ability to meet the coequal goals, please see Master Response 3.

Response to comment RI005-3

This is a comment on the project, not on the EIR.

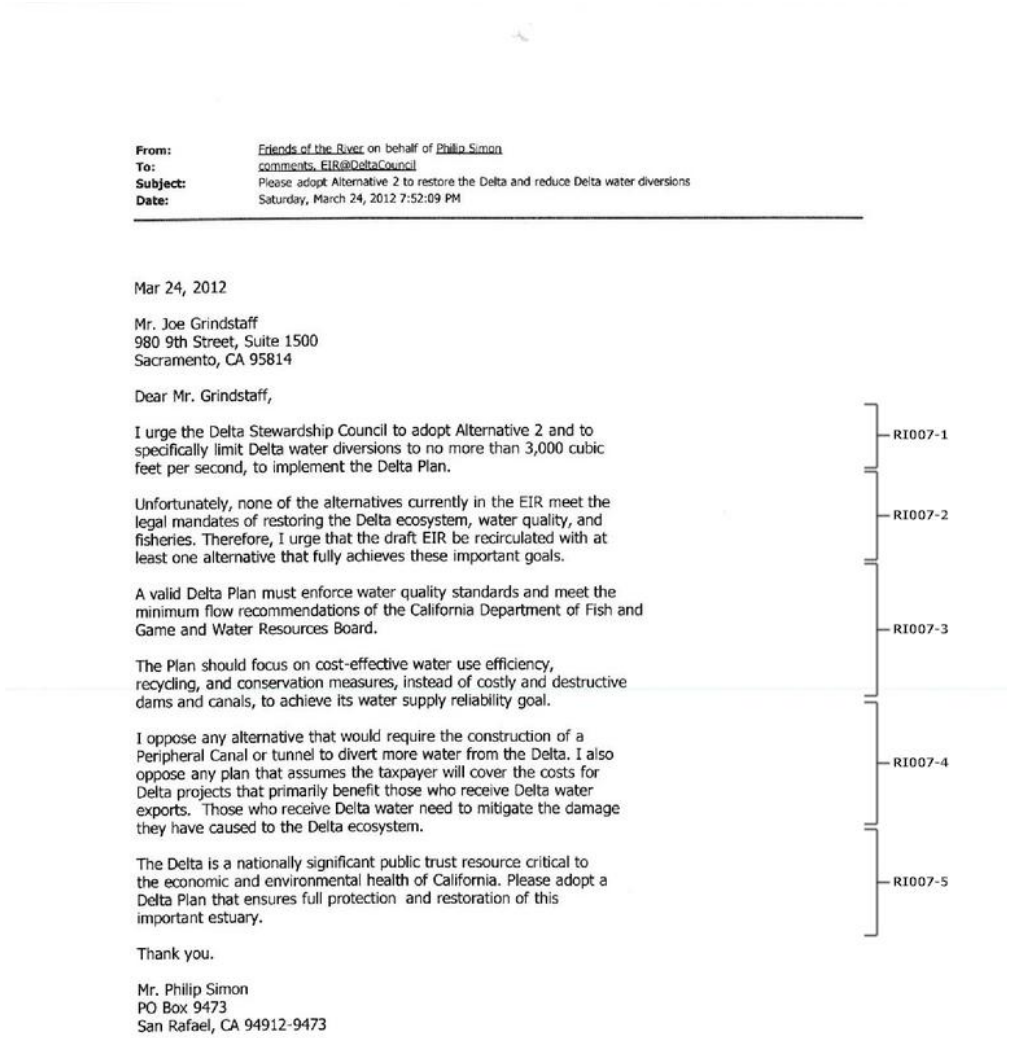
Response to comment RI005-4

This is a comment on the project, not on the EIR. None of the alternatives considered in the EIR, including the Final Draft Delta Plan (which is analyzed as the Revised Project in the Recirculated Draft PEIR) include a Peripheral Canal or a tunnel to convey water diverted from the Delta. Regarding the relationship between the Delta Plan and the Bay Delta Conservation Plan, which may include a conveyance facility, please see Master Response 1.

Response to comment RI005-5

This is a comment on the project, not on the EIR.

RI007 Philip Simon



From: Friends of the River on behalf of Philip Simon
To: comments, EIR@DeltaCouncil
Subject: Please adopt Alternative 2 to restore the Delta and reduce Delta water diversions
Date: Saturday, March 24, 2012 7:52:09 PM

Mar 24, 2012

Mr. Joe Grindstaff
980 9th Street, Suite 1500
Sacramento, CA 95814

Dear Mr. Grindstaff,

I urge the Delta Stewardship Council to adopt Alternative 2 and to specifically limit Delta water diversions to no more than 3,000 cubic feet per second, to implement the Delta Plan. RI007-1

Unfortunately, none of the alternatives currently in the EIR meet the legal mandates of restoring the Delta ecosystem, water quality, and fisheries. Therefore, I urge that the draft EIR be recirculated with at least one alternative that fully achieves these important goals. RI007-2

A valid Delta Plan must enforce water quality standards and meet the minimum flow recommendations of the California Department of Fish and Game and Water Resources Board. RI007-3

The Plan should focus on cost-effective water use efficiency, recycling, and conservation measures, instead of costly and destructive dams and canals, to achieve its water supply reliability goal.

I oppose any alternative that would require the construction of a Peripheral Canal or tunnel to divert more water from the Delta. I also oppose any plan that assumes the taxpayer will cover the costs for Delta projects that primarily benefit those who receive Delta water exports. Those who receive Delta water need to mitigate the damage they have caused to the Delta ecosystem. RI007-4

The Delta is a nationally significant public trust resource critical to the economic and environmental health of California. Please adopt a Delta Plan that ensures full protection and restoration of this important estuary. RI007-5

Thank you.

Mr. Philip Simon
PO Box 9473
San Rafael, CA 94912-9473

Response to comment RI007-1

This is a comment on the project, not on the EIR.

Response to comment RI007-2

Regarding the range of alternatives analyzed in the EIR and the consideration of alternatives' ability to meet the coequal goals, please see Master Response 3.

Response to comment RI007-3

This is a comment on the project, not on the EIR.

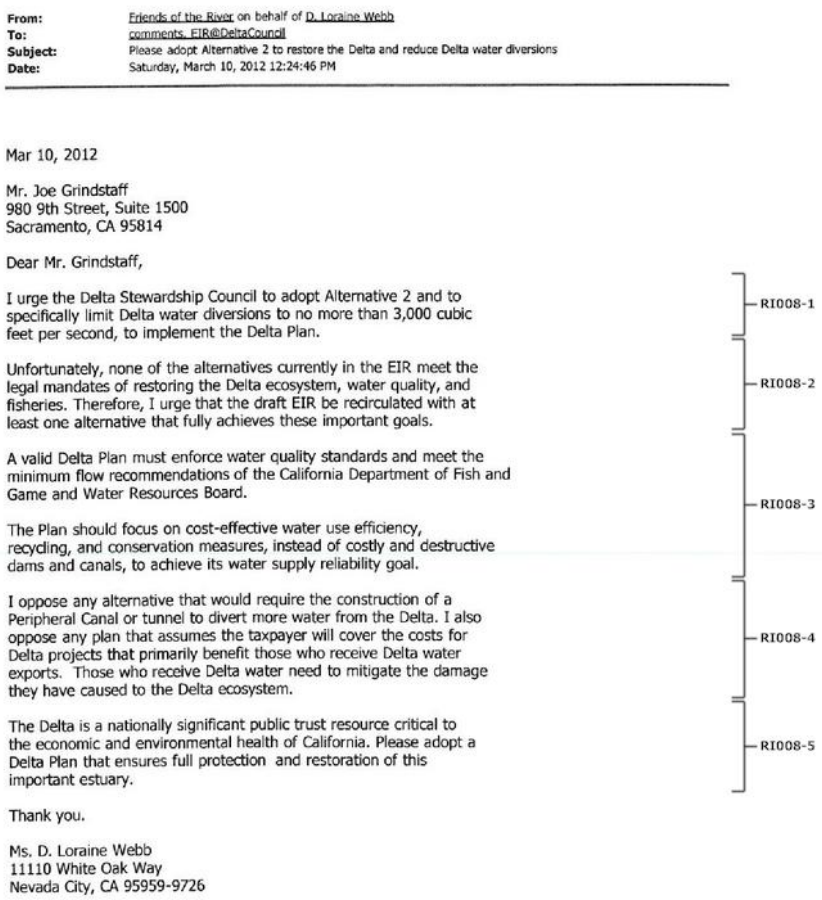
Response to comment RI007-4

This is a comment on the project, not on the EIR. None of the alternatives considered in the EIR, including the Final Draft Delta Plan (which is analyzed as the Revised Project in the Recirculated Draft PEIR) include a Peripheral Canal or a tunnel to convey water diverted from the Delta. Regarding the relationship between the Delta Plan and the Bay Delta Conservation Plan, which may include a conveyance facility, please see Master Response 1.

Response to comment RI007-5

This is a comment on the project, not on the EIR.

RI008 Loraine Webb



From: Friends of the River on behalf of D. Loraine Webb
To: comments. EIR@DeltaCouncil
Subject: Please adopt Alternative 2 to restore the Delta and reduce Delta water diversions
Date: Saturday, March 10, 2012 12:24:46 PM

Mar 10, 2012

Mr. Joe Grindstaff
980 9th Street, Suite 1500
Sacramento, CA 95814

Dear Mr. Grindstaff,

I urge the Delta Stewardship Council to adopt Alternative 2 and to specifically limit Delta water diversions to no more than 3,000 cubic feet per second, to implement the Delta Plan. RI008-1

Unfortunately, none of the alternatives currently in the EIR meet the legal mandates of restoring the Delta ecosystem, water quality, and fisheries. Therefore, I urge that the draft EIR be recirculated with at least one alternative that fully achieves these important goals. RI008-2

A valid Delta Plan must enforce water quality standards and meet the minimum flow recommendations of the California Department of Fish and Game and Water Resources Board. RI008-3

The Plan should focus on cost-effective water use efficiency, recycling, and conservation measures, instead of costly and destructive dams and canals, to achieve its water supply reliability goal.

I oppose any alternative that would require the construction of a Peripheral Canal or tunnel to divert more water from the Delta. I also oppose any plan that assumes the taxpayer will cover the costs for Delta projects that primarily benefit those who receive Delta water exports. Those who receive Delta water need to mitigate the damage they have caused to the Delta ecosystem. RI008-4

The Delta is a nationally significant public trust resource critical to the economic and environmental health of California. Please adopt a Delta Plan that ensures full protection and restoration of this important estuary. RI008-5

Thank you.

Ms. D. Loraine Webb
11110 White Oak Way
Nevada City, CA 95959-9726

Response to comment RI008-1

This is a comment on the project, not on the EIR.

Response to comment RI008-2

Regarding the range of alternatives analyzed in the EIR and the consideration of alternatives' ability to meet the coequal goals, please see Master Response 3.

Response to comment RI008-3

This is a comment on the project, not on the EIR.

Response to comment RI008-4

This is a comment on the project, not on the EIR. None of the alternatives considered in the EIR, including the Final Draft Delta Plan (which is analyzed as the Revised Project in the Recirculated Draft PEIR) include a Peripheral Canal or a tunnel to convey water diverted from the Delta. Regarding the relationship between the Delta Plan and the Bay Delta Conservation Plan, which may include a conveyance facility, please see Master Response 1.

Response to comment RI008-5

This is a comment on the project, not on the EIR.

RI009 George Wight

From: Friends of the River on behalf of george wight
To: comments. EIR@DeltaCouncil
Subject: Please adopt Alternative 2 to restore the Delta and reduce Delta water diversions
Date: Friday, February 24, 2012 7:48:01 PM

Feb 24, 2012

Mr. Joe Grindstaff
980 9th Street, Suite 1500
Sacramento, CA 95814

Dear Mr. Grindstaff,

I urge the Delta Stewardship Council to adopt Alternative 2 and to specifically limit Delta water diversions to no more than 3,000 cubic feet per second, to implement the Delta Plan. RI009-1

Unfortunately, none of the alternatives currently in the EIR meet the legal mandates of restoring the Delta ecosystem, water quality, and fisheries. Therefore, I urge that the draft EIR be recirculated with at least one alternative that fully achieves these important goals. RI009-2

A valid Delta Plan must enforce water quality standards and meet the minimum flow recommendations of the California Department of Fish and Game and Water Resources Board. RI009-3

The Plan should focus on cost-effective water use efficiency, recycling, and conservation measures, instead of costly and destructive dams and canals, to achieve its water supply reliability goal.

I oppose any alternative that would require the construction of a Peripheral Canal or tunnel to divert more water from the Delta. I also oppose any plan that assumes the taxpayer will cover the costs for Delta projects that primarily benefit those who receive Delta water exports. Those who receive Delta water need to mitigate the damage they have caused to the Delta ecosystem. RI009-4

The Delta is a nationally significant public trust resource critical to the economic and environmental health of California. Please adopt a Delta Plan that ensures full protection and restoration of this important estuary. RI009-5

Thank you.

Mr. george wight
1800 Athens Ln
Antioch, CA 94509-6821
(925) 757-0292

Response to comment RI009-1

This is a comment on the project, not on the EIR.

Response to comment RI009-2

Regarding the range of alternatives analyzed in the EIR and the consideration of alternatives' ability to meet the coequal goals, please see Master Response 3.

Response to comment RI009-3

This is a comment on the project, not on the EIR.

Response to comment RI009-4

This is a comment on the project, not on the EIR. None of the alternatives considered in the EIR, including the Final Draft Delta Plan (which is analyzed as the Revised Project in the Recirculated Draft PEIR) include a Peripheral Canal or a tunnel to convey water diverted from the Delta. Regarding the relationship between the Delta Plan and the Bay Delta Conservation Plan, which may include a conveyance facility, please see Master Response 1.

Response to comment RI009-5

This is a comment on the project, not on the EIR.

RI11 Bellrose

From: cheryl bellrose [mailto:virginsnow@frontiernet.net]
Sent: Monday, January 14, 2013 12:21 PM
To: Messer, Cindy@DeltaCouncil
Subject: Comments on proposed Rule Making–Final Draft Delta Plan
Importance: High

I have reviewed many of the changes from the last draft submitted for comments. I have several concerns which I will list below. But before I begin, please note that by background includes writing and reviewing environmental impact statements and assessments, human health and biological risk assessments, and issues pertaining to water quality, as well as numerous other environmental concerns . I have a Ph.D. from UC Davis in both Biological and Human Ecology and spent several years performing research there and other field locations as well as working in environmental consulting. RI11-1

First and foremost, I am disappointed that there is almost no data to support the pans and decisions being presented. Basing environmental impacts and naming mitigation efforts on no data seems to be putting the cart before the horse. I have never seen an EIS, EIR or EA written in this manner. Suffice it to say, that without proper documentation to support the mitigation efforts that are being planned is foolish and shows a lack of forethought as to the consequences. I am concerned that in the hurry to get this document approved, that valuable studies upon which the EIR should be based, are missing. RI11-2

For example, I did notice one mitigation that I found particularly odd. There was a mitigation to move nests where animals may be affected by construction activities. This is beyond absurd. Birds and other animals choose their nest sites. These cannot be moved around at will by individuals who think the animals will follow the nest. I have never in my years as wildlife scientist seen anything like this presented as a credible mitigation option.

Now, on to some major concerns regarding water flow and delivery.
Again, my primary objection to the plan is that there is no data determining how much water can be exported without causing harm to the Delta. This information needs to be included PRIOR to making decisions pertaining to water dissemination. How is it that any kind of decision can be made without feasibility studies providing essential information to determine the effects of allowing a specific amount of water to be diverted from the Delta. I would hope that any diversion would not be the result of the requirements of those who are to receive the water rather than taking appropriate measures to maintain and preserve the Delta first. In light of this, without including the peripheral canal as instrumental in the plan for the Delta, you are leaving out a major player. RI11-3

I also have a problem with the creation of the Peripheral Canal. Other options which have been presented by environmental groups seem to have been completely ignored. Also, Dr. Pyke's study has also received inadequate investigation as to being an alternative to the large tunnels. Apparently other alternatives have been disregarded without proper analysis either. RI11-4

Response to comment RI11-1

Comment noted.

Response to comment RI11-2

Please refer to Master Response 2 for a discussion of the EIR's programmatic approach to the Delta Plan's environmental impacts. As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR.

No mitigation measure identified in the EIR specifically calls for moving animals' nests. Mitigation Measure 4-2 provides that agencies shall, "[w]hen appropriate, relocate special-status plant and animal species or their habitats from project sites following USFWS, NMFS, and DFG protocols (e.g., for special-status plant species or elderberry shrubs)." Because such removals would necessarily follow the guidelines of expert resource agencies, the EIR appropriately determined that, if and when applied, this measure would be effective in most cases to reduce the relevant impacts to a less than significant level. However, because of the uncertainty regarding future projects encouraged by the Delta Plan, the EIR concludes that such impacts would be significant and unavoidable.

Response to comment RI11-3

Because the Delta Stewardship Council cannot direct the construction of specific projects nor would the projects be implemented under the direct authority of the Council, it is difficult to identify specific future projects, including their location. Due to this uncertainty and the programmatic nature of the EIR, it is not appropriate to speculate regarding details of future project-specific impacts. Analyses associated with specific projects

will provide such project-level details as they become available. See also Master Response 2.

Response to comment RI11-4

The proposed BDCP is a reasonably foreseeable future project that is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. For further discussion of the relationship between the BDCP and the Delta Plan, please see Master Response 1. Regarding the range of alternatives considered in the EIR, please see Master Response 3.

Regulatory issues also remain problematic. It is of primary concern that the contractors who support the peripheral canal are playing too much of a role in the decision making process. That you have only "contingent authority" over new conveyance facilities is of great concern. The Council should be making the determination as to the regulatory policies governing conveyance. RI11-4

Regulations pertaining to this large scale effort are vague in that there is no mention as to how you will decide to approve or disapprove the adequacy of the tunnel project either.

These concerns are general in nature, but reflect a constant problem throughout the entire process. Since so much effort is being made on reciting standard mitigation measures, almost to the point of boredom while perusing the document, without any kind of data to support exactly how each mitigation measure will be undertaken, appears to rob the document of its credibility. Simply because you have attempted to come up with every idea which may or may not be of concern, and then taking the time to classify it as a threat or not, does not make good science. Without the data, any mitigation planned or perceived as helpful at this point is moot. There are so many complexities to dealing with environmental issues that it should be clear by now that rhetorical responses are insufficient. The environment is a "gestalt", that is, the whole is greater than the sum of its parts. In any study, particularly one of this size, there are unknown complex issues which may arise, and without proper documentation utilizing data which is absolutely necessary to determine or at least look at the synergistic effects, so many things may be overlooked that may end up being more costly or being unable to "mitigate". RI11-5

The very thought of attempting a project of this size without proper studies beforehand is frightening. The Delta is a fragile and essential ecosystem that has been damaged without much concern in the past. Now, we live with the result, therefore, any work to be undertaken to reestablish it vitality needs to have been thoroughly thought out with data to support it PRIOR to any efforts to correct it. In that the peripheral canal will divert water that may be important to the health of the Delta, other alternatives should be explored before any final decision is made.

The plan is lofty in its intention and looks as though all the factors pertaining to its implementation have been brought forth and resolved through mitigation efforts where necessary, but it lacks quantitative value.

In addition, some of the agencies involved, are bureaucratic with clear political intentions of their own. From my previous observations and interactions with some of the agencies involved, I am somewhat skeptical of their ability to provide the best results given the political decisions which factor in to many of their decisions. It is imperative that political motivations be put aside for the welfare of the ecosystem. RI11-6

Sincerely,
Dr. Cheryl Bellrose

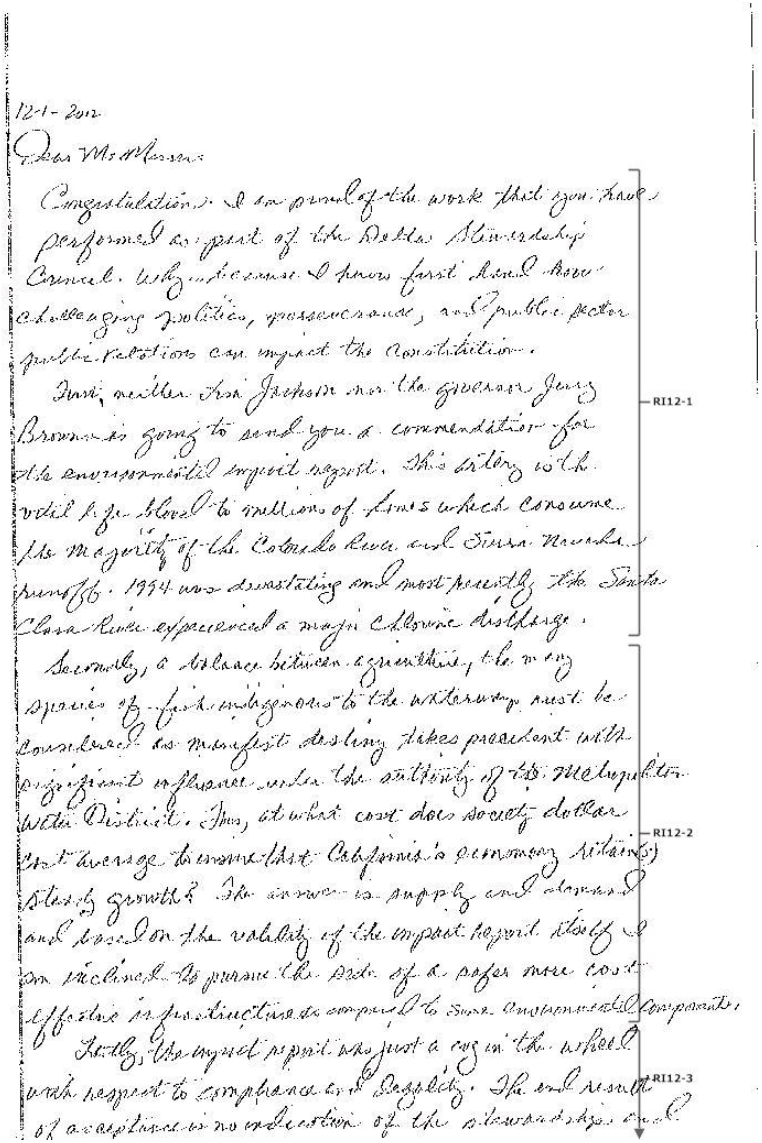
Response to comment RI11-5

Please see response to comments I11-2 and I11-4.

Response to comment RI11-6

Comment noted.

RI12 Clytus



12-1-2012

Dear Ms Marcus

Congratulations. I am proud of the work that you have performed as part of the Delta Stewardship Council. Why? Because I grew first hand how a challenging politics, possessiveness, and public sector public relations can impact the constitution.

Dan, neither Gov Jackson nor the governor Jerry Brown is going to send you a commendation for the environmental impact report. This drive with veil be blood to millions of lives which consume the majority of the Colorado River and Sierra Nevada runoff. 1994 was devastating and most recently the Santa Clara River experienced a major chlorine discharge.

Secondly, a balance between agriculture, the many species of fish indigenous to the waterways must be considered as manifest destiny takes precedent with original influence under the authority of the metropolitan Water District. Thus, at what cost does society dollar cost average to ensure last California's permanent citizens steady growth? The answer is supply and demand and based on the validity of the impact report itself I am inclined to pursue the path of a paper more cost effective in construction as compared to some environmental companies.

Lastly, the impact report was just a cog in the wheel with respect to compliance and legality. The end result of acceptance is no indication of the stewardship and

RI12-1

RI12-2

RI12-3

Response to comment RI12-1

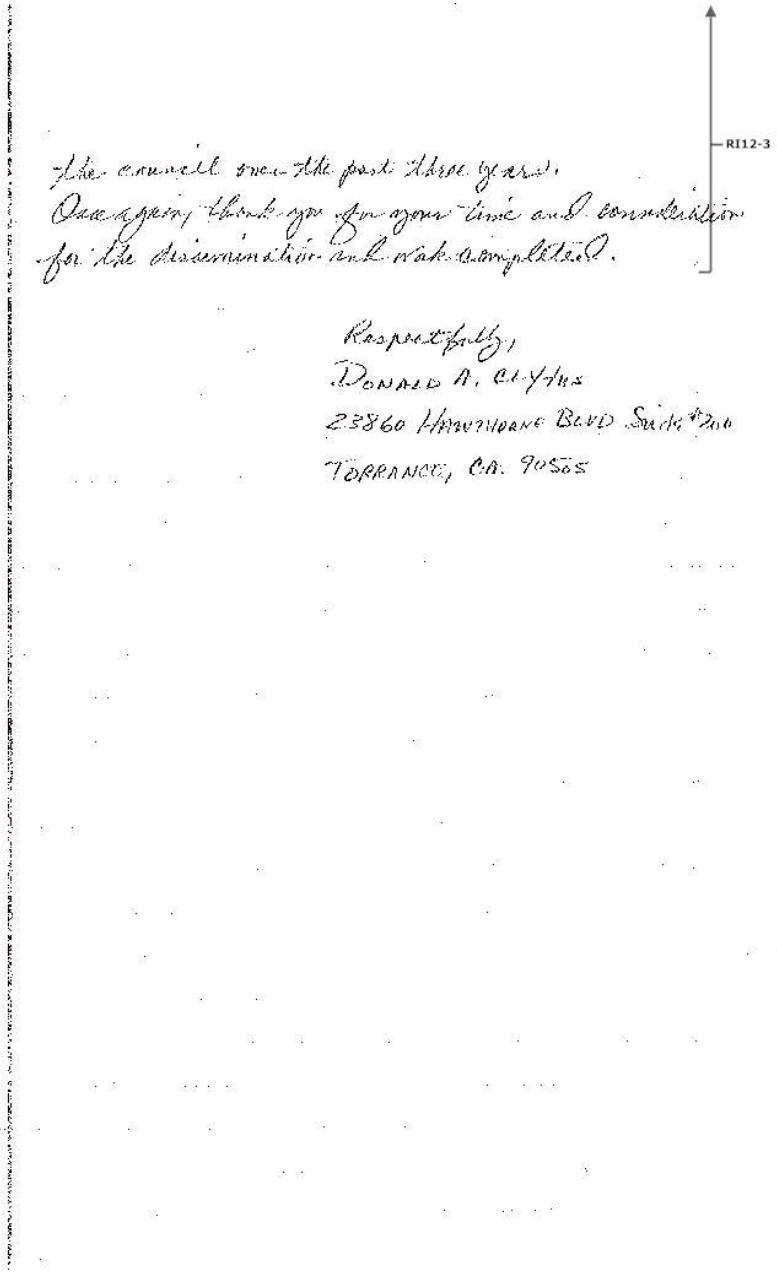
Comment noted.

Response to comment RI12-2

As stated in the Revised Draft PEIR at page ES-4, the Project's objectives are: "Furthering achievement of the coequal goals and the eight 'inherent' objectives, in a manner that (1) furthers the statewide policy to reduce reliance on the Delta in meeting the state's future water supply needs through regional self-reliance, (2) is consistent with specific statutory content requirements for the Delta Plan, (3) is implementable in a comprehensive, concurrent, and interrelated fashion, and (4) is accomplished as rapidly as realistically possible without jeopardizing ultimate success." These objectives reflect the priorities and goals that the Legislature set for the Delta Plan and the Delta Stewardship Council in the Delta Reform Act, including the coequal goals (Public Resources Code § 29702(a)), the objectives inherent in those goals (Water Code § 85020), and the statewide policy to reduce reliance on the delta (Water Code § 85021).

Response to comment RI12-3

Comment noted.



No comments

- n/a -

RI13 Conover

MATT CONOVER
c/o John McCormack Co.
2055 Twin Cities Rd.
Walnut Grove, CA 95690
(925) 366-8863
mattconover@yahoo.com

January 24, 2013

Delta Stewardship Council
Phil Isenburg, Chairman
c/o Cindy Messer
980 Ninth St., Suite 1500
Sacramento, CA 95814
(916) 445-0258
cindy.messer@deltacouncil.ca.gov

Dear Chair Isenburg, Council and Staff,

The enclosed comments are with respect to today's oral hearing on Notice of Proposed Rulemaking for the Delta Plan, California Code of Regulations Title 23, Waters. Division 6. Delta Stewardship Council. Chapter 2. Consistency with Regulatory Policies Contained in the The Delta Plan, and other sections in the Notice. RI13-1

As an overview of issues we are concerned that adoption of the proposed Final Delta Plan will disproportionately impact certain agricultural properties, and would like them exempted from the Plan, based on both science and economics. In particular, Appendix 5, Recommended Areas for Prioritization and Implementation of Habitat Restoration. Figure 5-1 designates a large zone North of the Cosumnes-Mokelumne Confluence which covers the entire farming operation of John McCormack Company at Glanrvale (erroneously labeled Glanville on maps) including hundred-year old pear orchards, as well as other property owners' vineyards within our block and across Twin Cities Road to the North.

We have enclosed an expanded zoom view map transcribed by hand from your very high altitude Figure 5-1, down into greater detail to show relevant reference features.

Also, expansion of Delta Meadows Park along Snodgrass Slough to the West, related levee use conversions could adversely impact our operations. Our packinghouse and roads for access between our fully mature orchards could be impacted.

Sec. 5002. Proposed action and Covered action would authorize further evaluations according to criteria that would prioritize areas based on historic marshes. Restoration to tidal influence might require breaching of levees that we built to keep tidal brackish and salty waters out, to let tidal waters in and potentially flood vineyards and orchards. It is all planted now, or already in progress of planting. RI13-2

Projected saltwater intrusion up the Sacramento River near its present extent around Sherman Island, would put increasingly salty water onto agricultural lands and interfere with plant growth. Brackish water extended during the 1937 drought all the way up to Courtland, several miles upriver from there before flushing actions from storm pushed the boundary downriver again.

Walnut Grove is at zero elevation, tidal influence is seen here, and tidal intrusion would have to come through a purposeful break in the levee.

Response to comment RI13-1

Comment noted.

Response to comment RI13-2

This is a comment on the project, not on the EIR.

Past breaks in the levee between 2 storms flooded this whole region, closing I-5 for weeks, disrupting traffic from Canada to Mexico, necessitating re-routing of truck traffic around the US. These kinds of impacts are not discussed in this plan. We enclose here photos from those 1986 floods, which also inundated much of the Central Valley.

Flooding where feasible for enhancement, discussed in definitions for encroachment, enhancement, including removal of barriers, for flooding, will affect our ability to get flood insurance from FEMA, unless there are setback levees to protect aexisting homes and ag-related structures.

Further, the elevation map and upland delineation on which the Habitat Prioritization Map is based does not appear to take into effect the projected inland extent or depth of waters expected to occur as the result of sealevel rise. 4.5 feet will make the daily rise and fall of tidal influence needed for goslings and salmon fry and smolts to feed on algae, bugs and plankton in protection of tule reed shallows temporary and short-term.

4-1/2 feet with sea level rise will make the depths far less useful, and will by then border on open water, which is less needed by those organisms at those life stages. Other chapters of the Recirculated Environmental Impact Report (REIR) say that more research is needed on the usefulness of open water to pelagic organisms at various life stages.

Sec. 5013(a). Restoring Habitats
This provision is to avoid conflicts with existing or planned uses when feasible, considering comments from agencies and the Delta Protection Plans, so that the proposer must consider sites on existing public lands when feasible and consistent with a project's purpose, before privately owned sites are purchased. We agree with this policy and support it.

We also support the last sentence of that paragraph, "Measures to mitigate conflicts with aadjacnt uses may include, but are not limited to, buffers to prevent adverse impacts on adjacent farmland." We would add to that the need for new levees to protect existing structures where marsh and tidelands are created for wildlife, to prevent flood impacts when floodwaters are released into restored natural floodplains and waterways. 200-year flood protection should be provided to existing rural farms as well. RI13-2

Our farm has been there for almost one hundred years, and our orchards are mature, productive, well-established economically within the global food distribution network, employ many people, and touch five generations of owners' families. Adjacent farms are the same. They deserve the protection afforded people in towns.

Section 5017. Flood Protection. (a) No encroachment permitted in floodplains without finding of no significant impact on floodplain values and functions, specifies in Subsection (2) the Cosumnes-Mokelumne River Confluence, (McCormack-Willimson Tract), "or as modified in the future by DWR or the US Army Corps of Engineers. This plan appears by its proposed Habitat Restoration Evaluation Zone, to be headed in that direction. Our Glannvale ranches are directly North of that Tract, and could be affected by potentially imminent studies and proposals for restoration.

Section 5018. Just Compensation.
If the habitat studies find our lands to be high land suitability, and other federal lands are not sufficient, and after better projection of inland extent of sealevel rise up the Cosumnes toward Elk Grove and the Mokelumne toward Galt, and some agency insists on breaking the levee, and flooding lands for swamp, just compensation should be determined according to a methodology that recognizes our longstanding productivity and the removal of profitable lands contributing to the 7th largest economy in the world.

No comments

- n/a -

The Income Method or another should be specified to be applicable, to reflect productivity and potential, in determining market value. Lands that have been started into production, with infrastructure investment, whether or not already planted, should be recognized as projected income. That data can be developed based on adjacent parcels and historical and projected market prices for pears, grapes and wines. It therefore should be required under these rules to be used in any potential condemnation proceedings by any agency involved in this process. RI13-2

At a larger scale the proposed Final Delta Plan REIR is missing some important information about economic impacts. Known economic impacts, such as the loss of 1,700 jobs projected by the input-output study reported at the Delta Science Conference in October, is a known impact that we did not see in the Executive Summary. It might be in a back chapter, but we did not have time in between taking care of our own businesses and incomes. We do not have paid staff to read these documents, and any time away for that purpose potentially threatens key stages in crop life cycles that will affect health and growth in the following season. RI13-3

The back-up documents were not sent to us, and no Notice was sent to us as "interested land owners." "Interested landowners" should be defined as not only those who contact you to express interest in receiving more documents or mere website postings. Any landowner in the region has an economic interest in the outcome of this Plan and its Rules. They should all receive paper notices in the mail, and reminders that these documents, so hard to read in downloaded files from the internet, are available for mailing out. Broadband internet is not available far off the main roads. RI13-4

CONCLUSION:
We do not understand how the Rule-making authorizing this to be a "Final Plan" can be legitimate when there is so much that is still unknown within the "Best Available Science," including economic science. It seems to have been accelerated on the fast track, with the minimal number of public hearings and shortest legally allowable review times after the proposed Final Plan was announced this fall.

We still do not know how much water is needed for in-stream beneficial uses, such as endangered species like salmon, nor how much is likely to be available, nor its timing. That is crucial for determining how much might be available for agriculture. RI13-5

Final adoption and rulemaking should be delayed, and the lands North of the Cosumnes-Mokelumne Confluence should be removed from consideration as habitat restoration areas. They are already in use for the protected agricultural priority for creating jobs and contributing to the State economy, core to the strategy of economic impact mitigation.

Sincerely,

Matt Conover.

Response to comment RI13-3

Social and economic impacts are not effects on the environment under CEQA, and are not analyzed in the EIR (CEQA Guidelines §§ 15064(e) and 15131; Master Response 2).

Response to comment RI13-4

The Notice of Rulemaking and the Notice of Availability of the Delta Plan EIR for public review and comment were sent to 58 county clerks and 1,650 recipients, including anyone who commented on previous Delta Plan documents or participated in the scoping meetings or other public meetings and requested notification of further developments. In addition, the Notices and copies of the entire EIR in both printed and CD-ROM formats were available in 27 county libraries for the public to review. The Notice of Availability describes how an individual can obtain copies of the full document on CD-ROM through contacting the Delta Stewardship Council (DSC) by phone or email, and notes that the documents are available for viewing at the DSC office and in the main branch of libraries in each potentially affected county.

Response to comment RI13-5

This is a comment on the project, not on the EIR.

From: Matt Conover [mailto:conovermatt@yahoo.com]
Sent: Thursday, January 24, 2013 5:02 PM
To: Messer, Cindy@DeltaCouncil
Subject: Map of Glannvale, north of Cosumnes

Cindy,

Here's a closer zoom view map transcribed by hand from your Fig. 5-1.

It belongs with my comment letter of today.

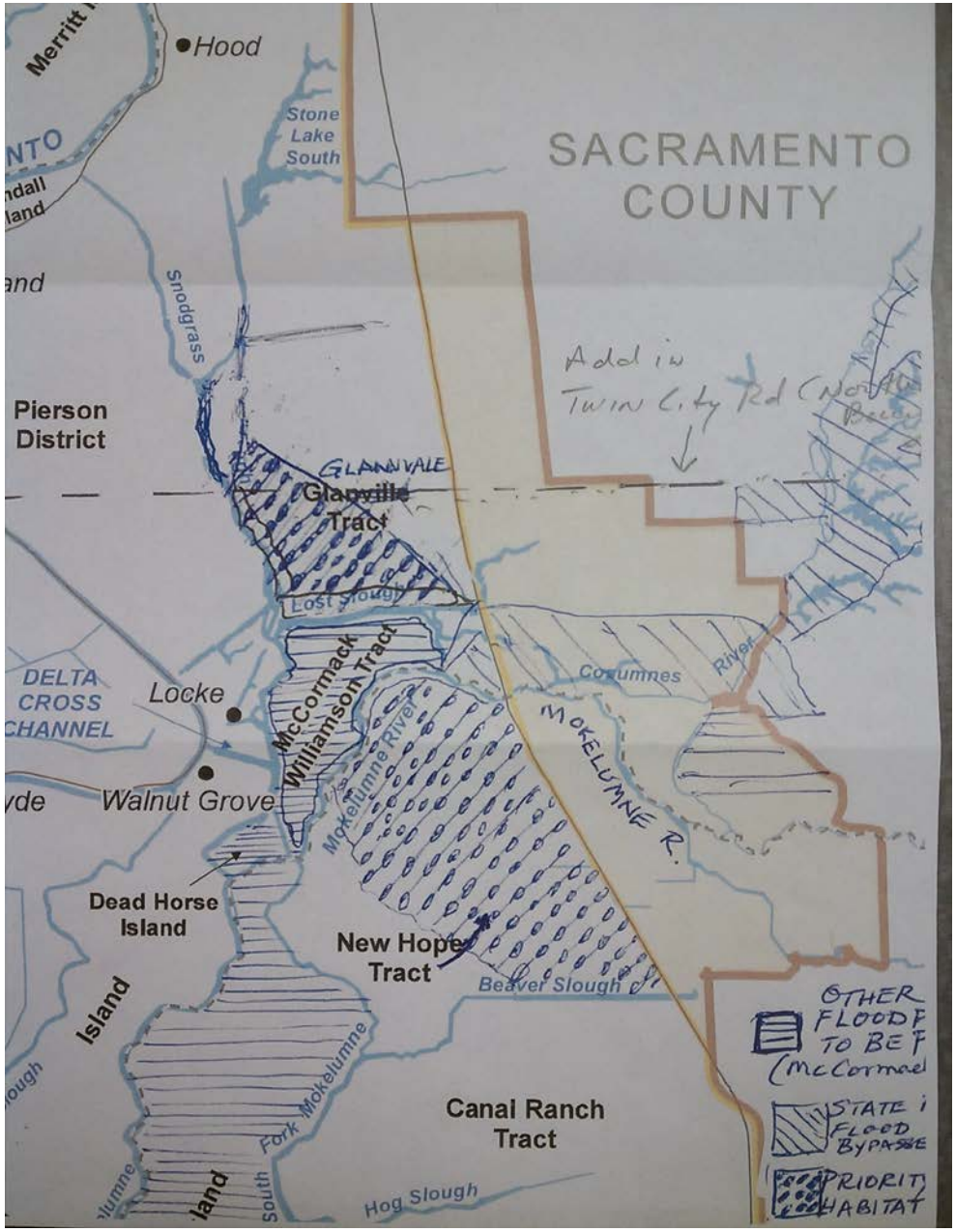
Sent to you, but not dedicated website yet.

Thanks,

Matr

No comments

- n/a -



No comments

- n/a -

From: Matt Conover [mailto:conovermatt@yahoo.com]
Sent: Thursday, January 24, 2013 5:05 PM
To: Messer, Cindy@DeltaCouncil
Subject: Flood photos, 1986

North of Cosumnes-Mokelumne Cobfluence, Lost Slough, showing mature orchards and vineyard lands not suited for frequent flooding or habitat restoration by levee breaching. 1986.

Additional notes on photos:

1. "Burchell" label on flood photo is Staten Isl.
2. Flood photos from 1986 include MWT as Bean Ranch.
3. Snodgrass Slough label might not be Lost Slough, but farther South on Snodgrass from confluence with Lost Slough

No comments

- n/a -

No comments

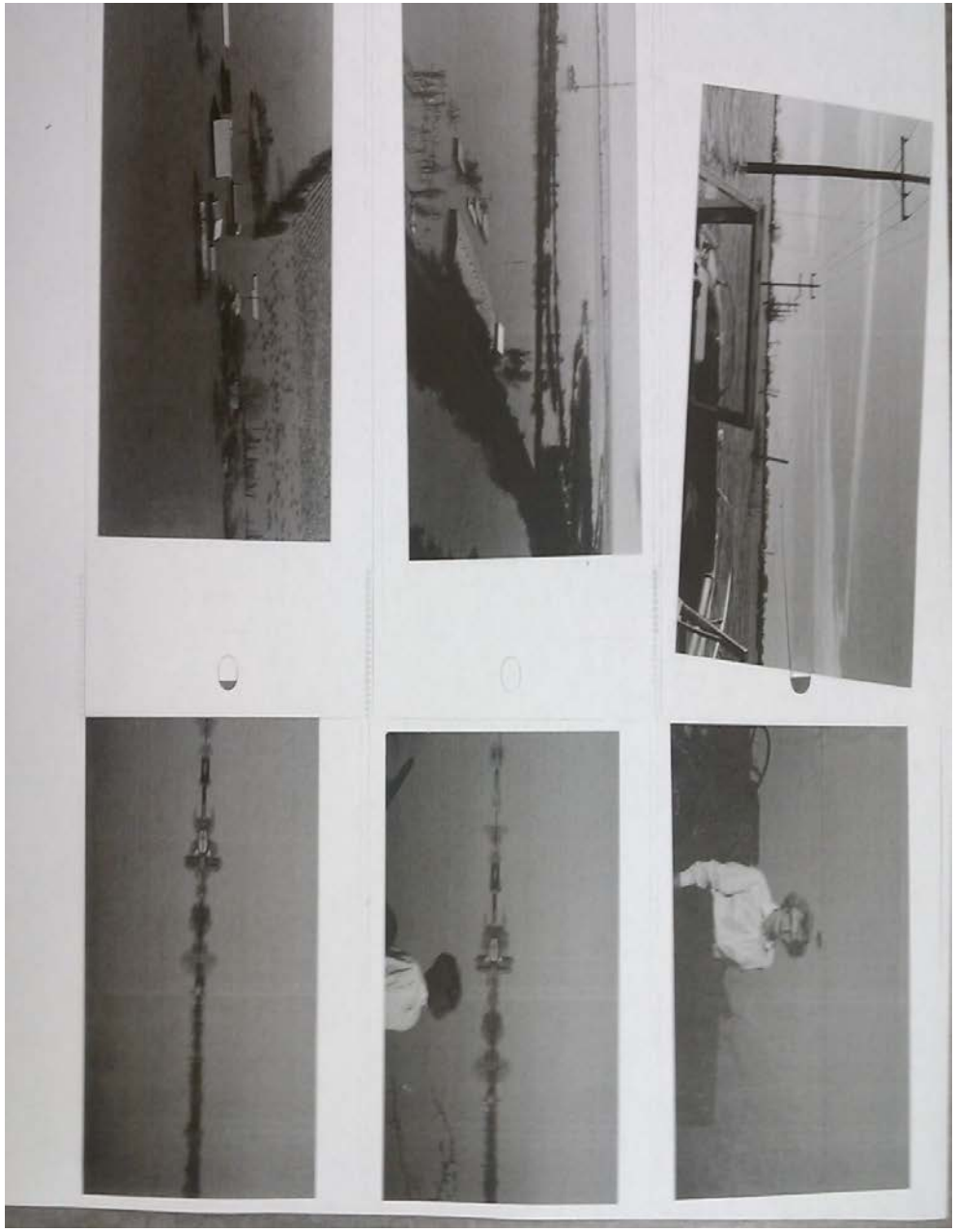
- n/a -

No comments

- n/a -

No comments

- n/a -



No comments

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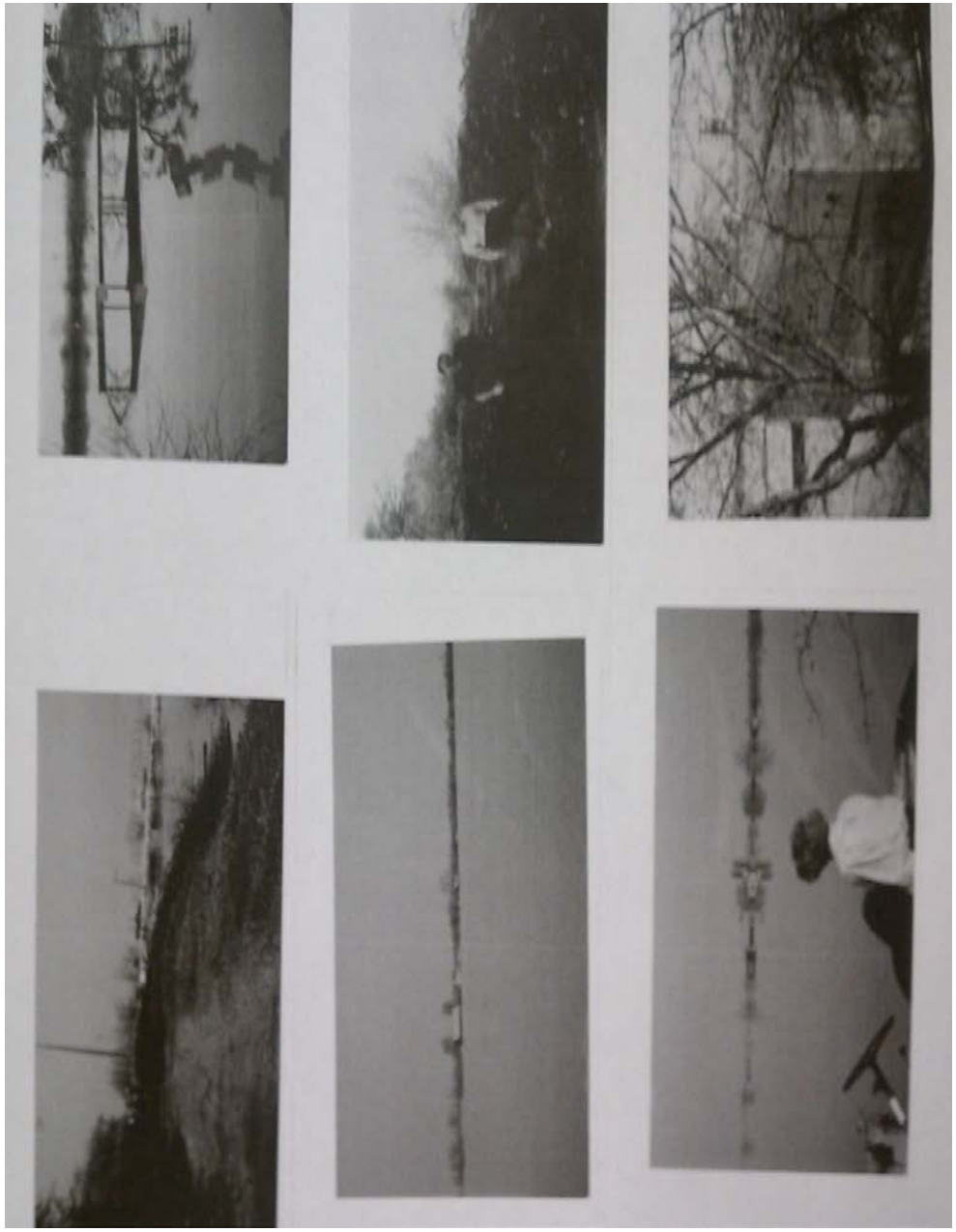

No comments

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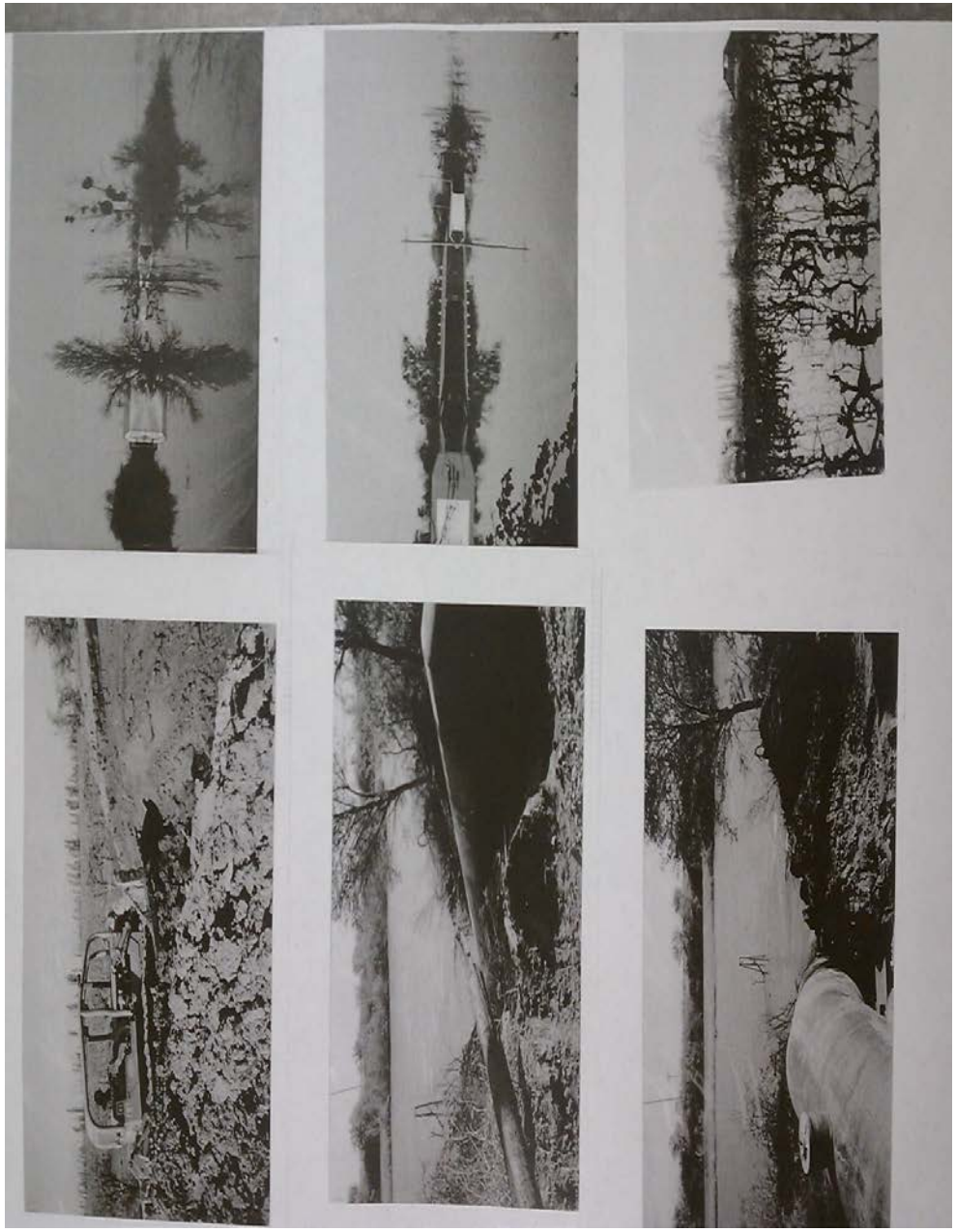

No comments

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No comments

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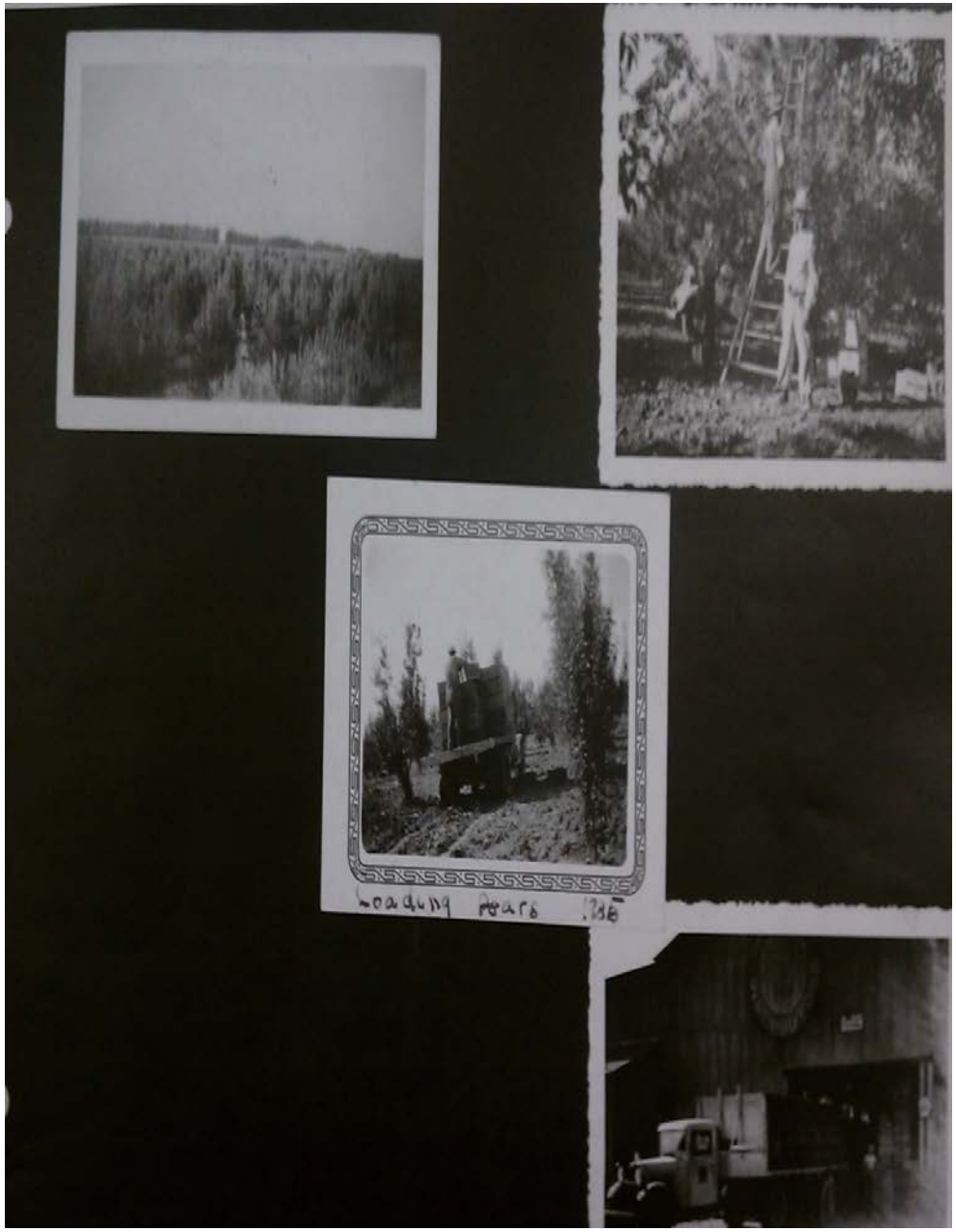

No comments

- n/a -

RI14 Public Hearing Transcript

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MEETING OF THE DELTA STEWARDSHIP COUNCIL

HELD AT THE DSC OFFICE

980 NINTH STREET, SUITE 1500

SACRAMENTO, CALIFORNIA 95814

FRIDAY, JANUARY 11, 2013

1:00 P.M.

---o0o---

REPORTED BY: JILLIAN M. BASSETT, CSR No. 13619

No comments

- n/a -

I N D E X

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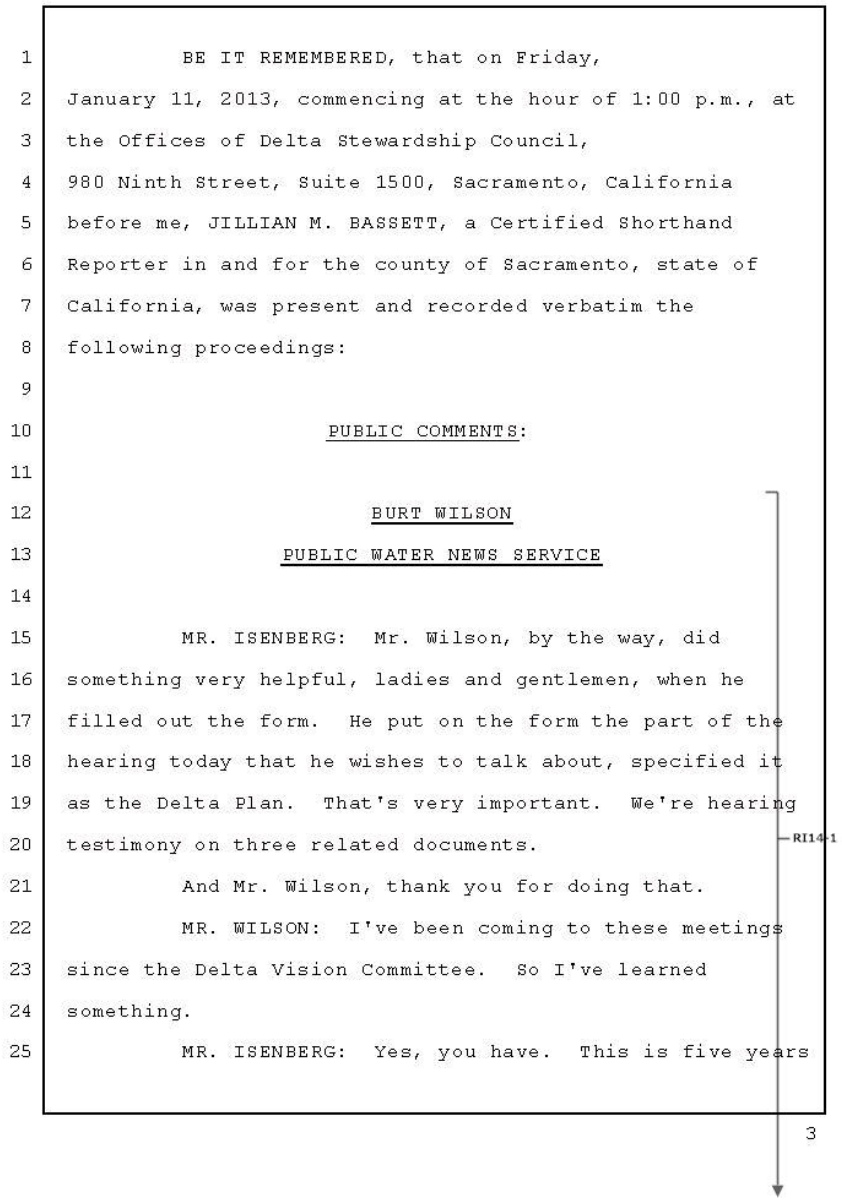
BOB WRIGHT	30
CHARLES GAUDINER	48
KATHY MANNION	58
JOHN CEBELEAN	65
LINDA DORN	68

No comments

- n/a -



BE IT REMEMBERED, that on Friday, January 11, 2013, commencing at the hour of 1:00 p.m., at the Offices of Delta Stewardship Council, 980 Ninth Street, Suite 1500, Sacramento, California before me, JILLIAN M. BASSETT, a Certified Shorthand Reporter in and for the county of Sacramento, state of California, was present and recorded verbatim the following proceedings:

PUBLIC COMMENTS:

BURT WILSON

PUBLIC WATER NEWS SERVICE

MR. ISENBERG: Mr. Wilson, by the way, did something very helpful, ladies and gentlemen, when he filled out the form. He put on the form the part of the hearing today that he wishes to talk about, specified it as the Delta Plan. That's very important. We're hearing testimony on three related documents.

And Mr. Wilson, thank you for doing that.

MR. WILSON: I've been coming to these meetings since the Delta Vision Committee. So I've learned something.

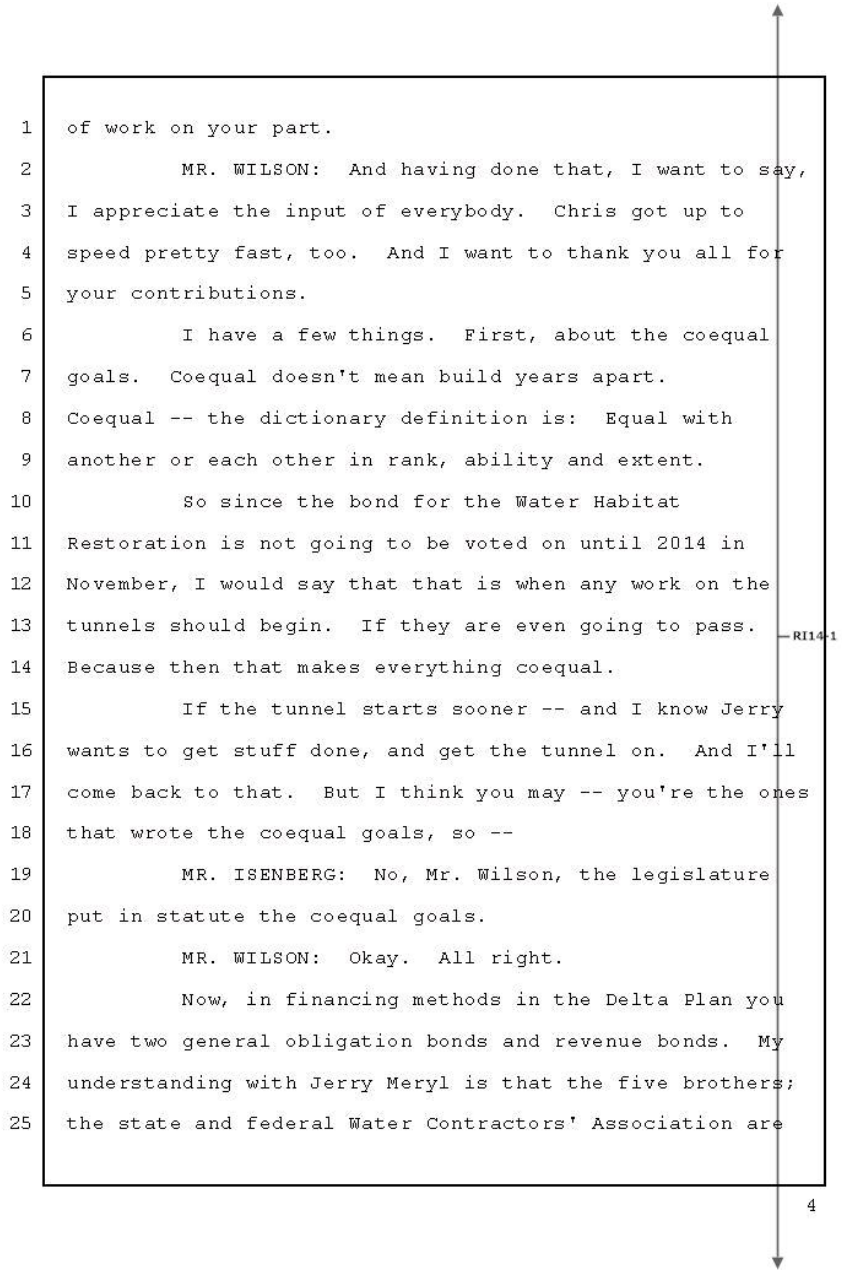
MR. ISENBERG: Yes, you have. This is five years

RI14-1

3

Response to comment RI14-1

This is a comment on the project, not on the EIR.



of work on your part.

MR. WILSON: And having done that, I want to say, I appreciate the input of everybody. Chris got up to speed pretty fast, too. And I want to thank you all for your contributions.

I have a few things. First, about the coequal goals. Coequal doesn't mean build years apart. Coequal -- the dictionary definition is: Equal with another or each other in rank, ability and extent.

So since the bond for the Water Habitat Restoration is not going to be voted on until 2014 in November, I would say that that is when any work on the tunnels should begin. If they are even going to pass. RI14-1

Because then that makes everything coequal.

If the tunnel starts sooner -- and I know Jerry wants to get stuff done, and get the tunnel on. And I'll come back to that. But I think you may -- you're the ones that wrote the coequal goals, so --

MR. ISENBERG: No, Mr. Wilson, the legislature put in statute the coequal goals.

MR. WILSON: Okay. All right.

Now, in financing methods in the Delta Plan you have two general obligation bonds and revenue bonds. My understanding with Jerry Meryl is that the five brothers; the state and federal Water Contractors' Association are

4

No comments

- n/a -

going to be the principal beneficiaries and put up the money by revenue bonds for the tunnel. That is my understanding.

Revenue bonds, of course, do not require voter approval. And I think anything of the measure of a $14-billion twin tunnels tearing up the Delta is something that should go before the People. Revenue bonds, the reason they don't require voter approval as it says here because they are secured by a dedicated revenue stream, such as water sales.

Now, are you going to tell me that MWD and Westlands Water District and all the others who are in the five brothers are going to make enough money off of this RI14-1 to finance $14-billion of the twin tunnels? I don't think so. But I'm going to come back to that.

As far as the Delta Plan, chapter 1, line 16 says: "Today the Delta is many things to many people. And is universally regarding crisis, because people have not yet been able to find balance in the tradeoffs among competing demands for the Delta's resources."

That sentence means nothing. The reason it's in crisis is because the Department of Water Resources increased the diversions to the Metropolitan Water District from 2000 to 2006 to make up for the MWD's loss of Colorado River water. I've given you a chart on this

No comments

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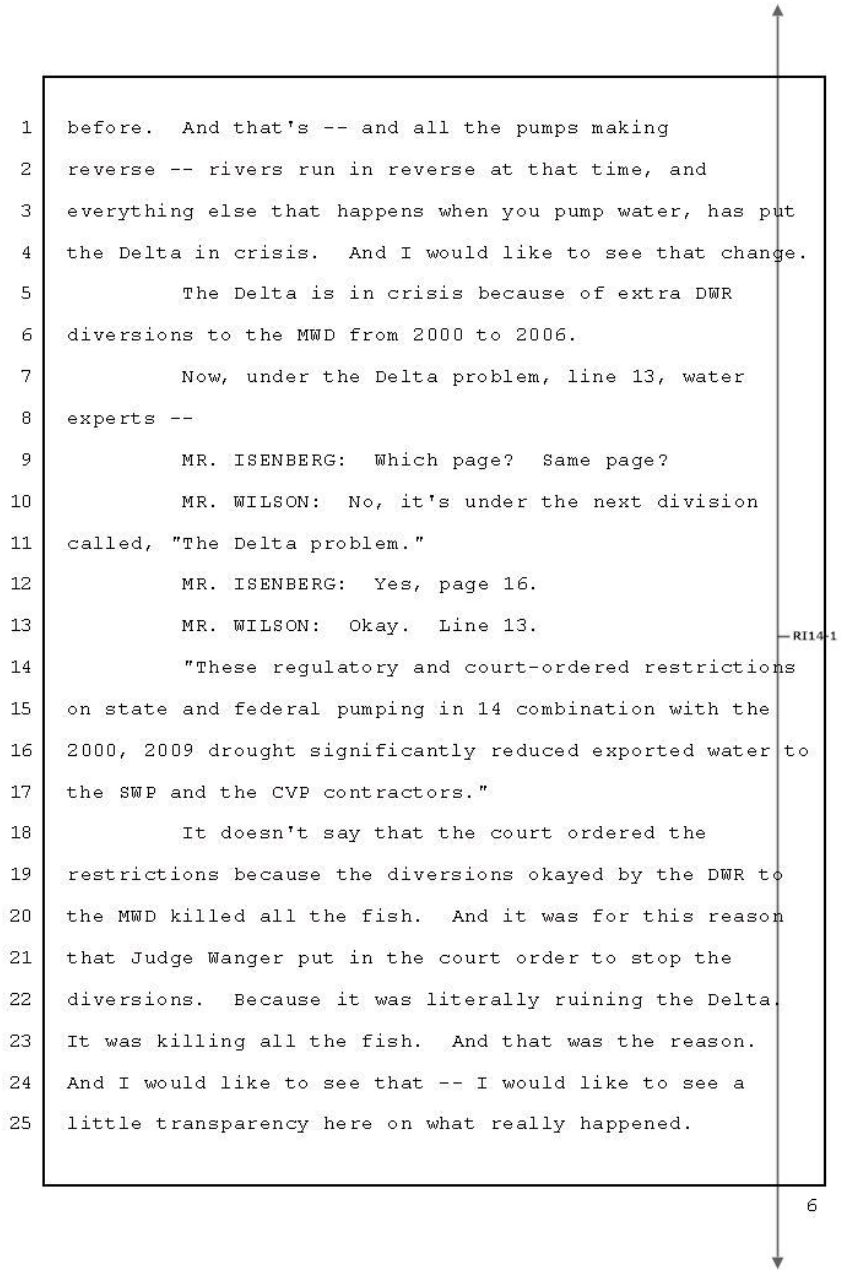


before. And that's -- and all the pumps making reverse -- rivers run in reverse at that time, and everything else that happens when you pump water, has put the Delta in crisis. And I would like to see that change.

The Delta is in crisis because of extra DWR diversions to the MWD from 2000 to 2006.

Now, under the Delta problem, line 13, water experts --

MR. ISENBERG: Which page? Same page?

MR. WILSON: No, it's under the next division called, "The Delta problem."

MR. ISENBERG: Yes, page 16.

MR. WILSON: Okay. Line 13. — RI14-1

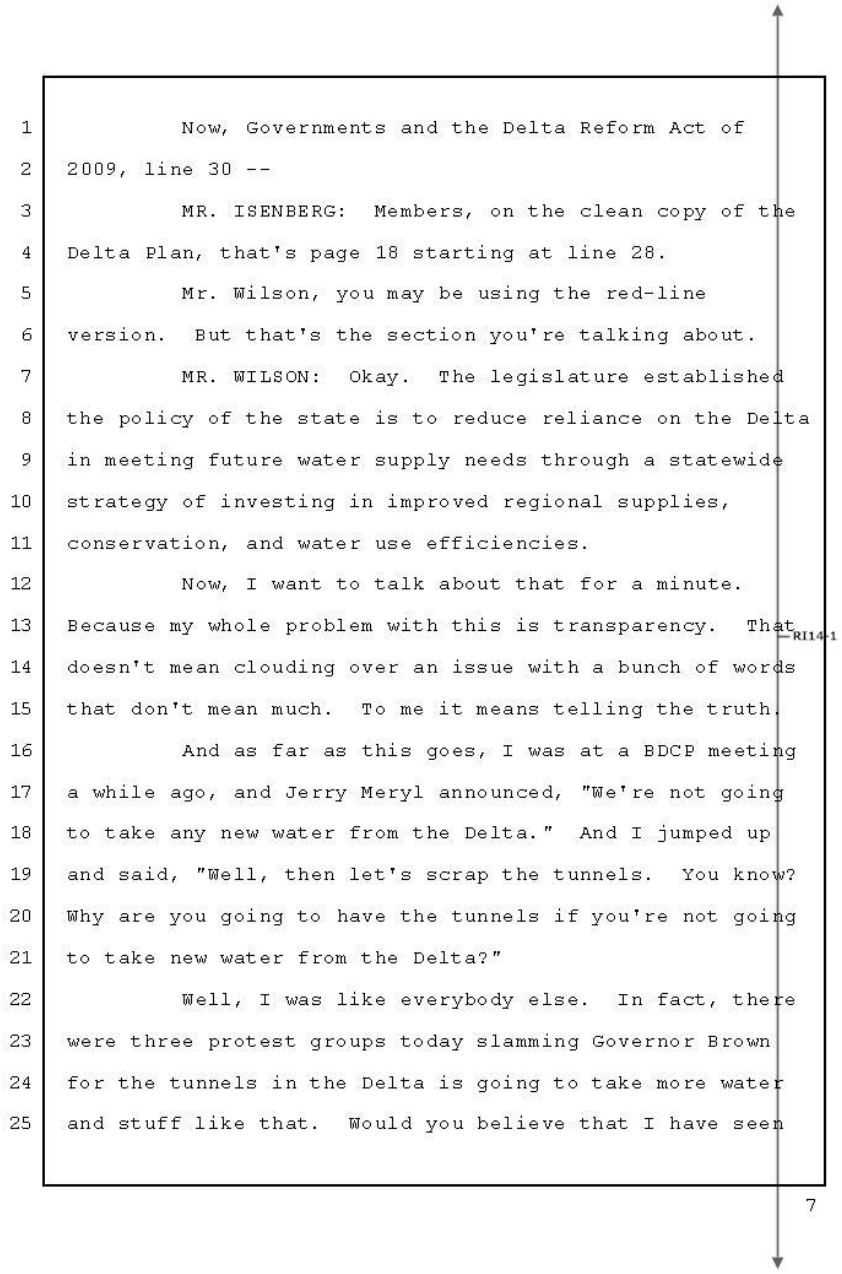
"These regulatory and court-ordered restrictions on state and federal pumping in 14 combination with the 2000, 2009 drought significantly reduced exported water to the SWP and the CVP contractors."

It doesn't say that the court ordered the restrictions because the diversions okayed by the DWR to the MWD killed all the fish. And it was for this reason that Judge Wanger put in the court order to stop the diversions. Because it was literally ruining the Delta. It was killing all the fish. And that was the reason. And I would like to see that -- I would like to see a little transparency here on what really happened.

6

No comments

- n/a -



Now, Governments and the Delta Reform Act of 2009, line 30 --

MR. ISENBERG: Members, on the clean copy of the Delta Plan, that's page 18 starting at line 28.

Mr. Wilson, you may be using the red-line version. But that's the section you're talking about.

MR. WILSON: Okay. The legislature established the policy of the state is to reduce reliance on the Delta in meeting future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiencies.

Now, I want to talk about that for a minute. Because my whole problem with this is transparency. That doesn't mean clouding over an issue with a bunch of words that don't mean much. To me it means telling the truth. RI14-1

And as far as this goes, I was at a BDCP meeting a while ago, and Jerry Meryl announced, "We're not going to take any new water from the Delta." And I jumped up and said, "Well, then let's scrap the tunnels. You know? Why are you going to have the tunnels if you're not going to take new water from the Delta?"

Well, I was like everybody else. In fact, there were three protest groups today slamming Governor Brown for the tunnels in the Delta is going to take more water and stuff like that. Would you believe that I have seen

No comments

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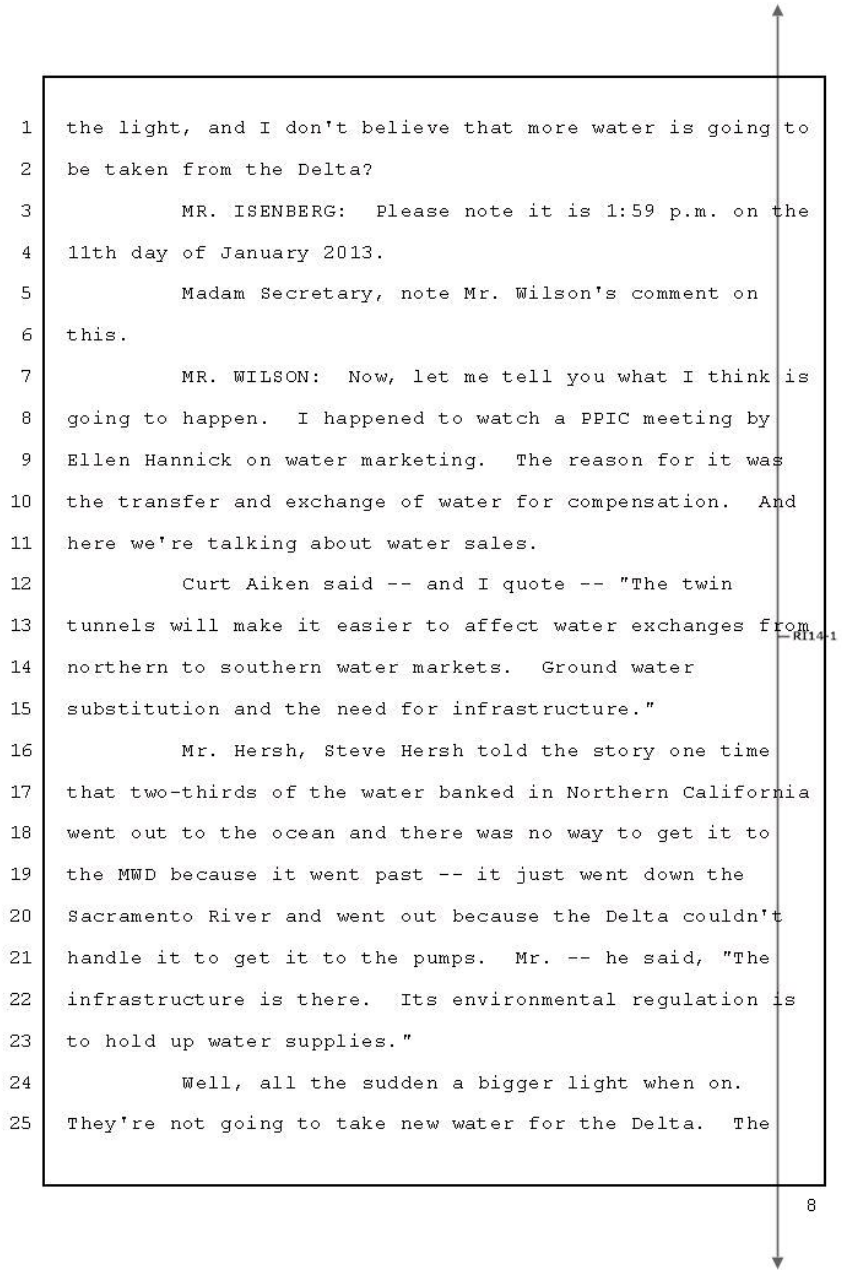
the light, and I don't believe that more water is going to be taken from the Delta?

MR. ISENBERG: Please note it is 1:59 p.m. on the 11th day of January 2013.

Madam Secretary, note Mr. Wilson's comment on this.

MR. WILSON: Now, let me tell you what I think is going to happen. I happened to watch a PPIC meeting by Ellen Hannick on water marketing. The reason for it was the transfer and exchange of water for compensation. And here we're talking about water sales.

Curt Aiken said -- and I quote -- "The twin tunnels will make it easier to affect water exchanges from northern to southern water markets. Ground water substitution and the need for infrastructure."

Mr. Hersh, Steve Hersh told the story one time that two-thirds of the water banked in Northern California went out to the ocean and there was no way to get it to the MWD because it went past -- it just went down the Sacramento River and went out because the Delta couldn't handle it to get it to the pumps. Mr. -- he said, "The infrastructure is there. Its environmental regulation is to hold up water supplies."

Well, all the sudden a bigger light when on. They're not going to take new water for the Delta. The

RI14-1

8

No comments

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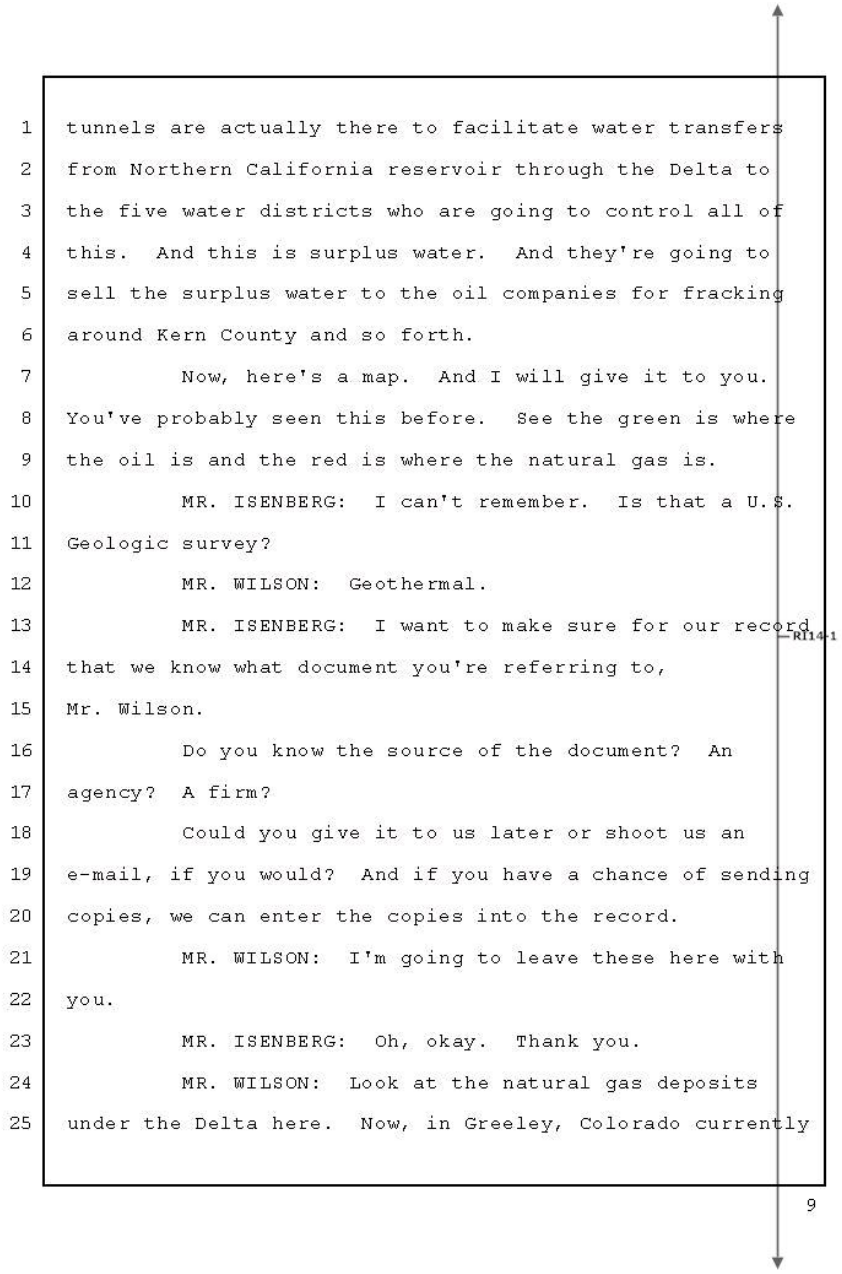


tunnels are actually there to facilitate water transfers from Northern California reservoir through the Delta to the five water districts who are going to control all of this. And this is surplus water. And they're going to sell the surplus water to the oil companies for fracking around Kern County and so forth.

Now, here's a map. And I will give it to you. You've probably seen this before. See the green is where the oil is and the red is where the natural gas is.

MR. ISENBERG: I can't remember. Is that a U.S. Geologic survey?

MR. WILSON: Geothermal.

MR. ISENBERG: I want to make sure for our record that we know what document you're referring to, Mr. Wilson. RI14-1

Do you know the source of the document? An agency? A firm?

Could you give it to us later or shoot us an e-mail, if you would? And if you have a chance of sending copies, we can enter the copies into the record.

MR. WILSON: I'm going to leave these here with you.

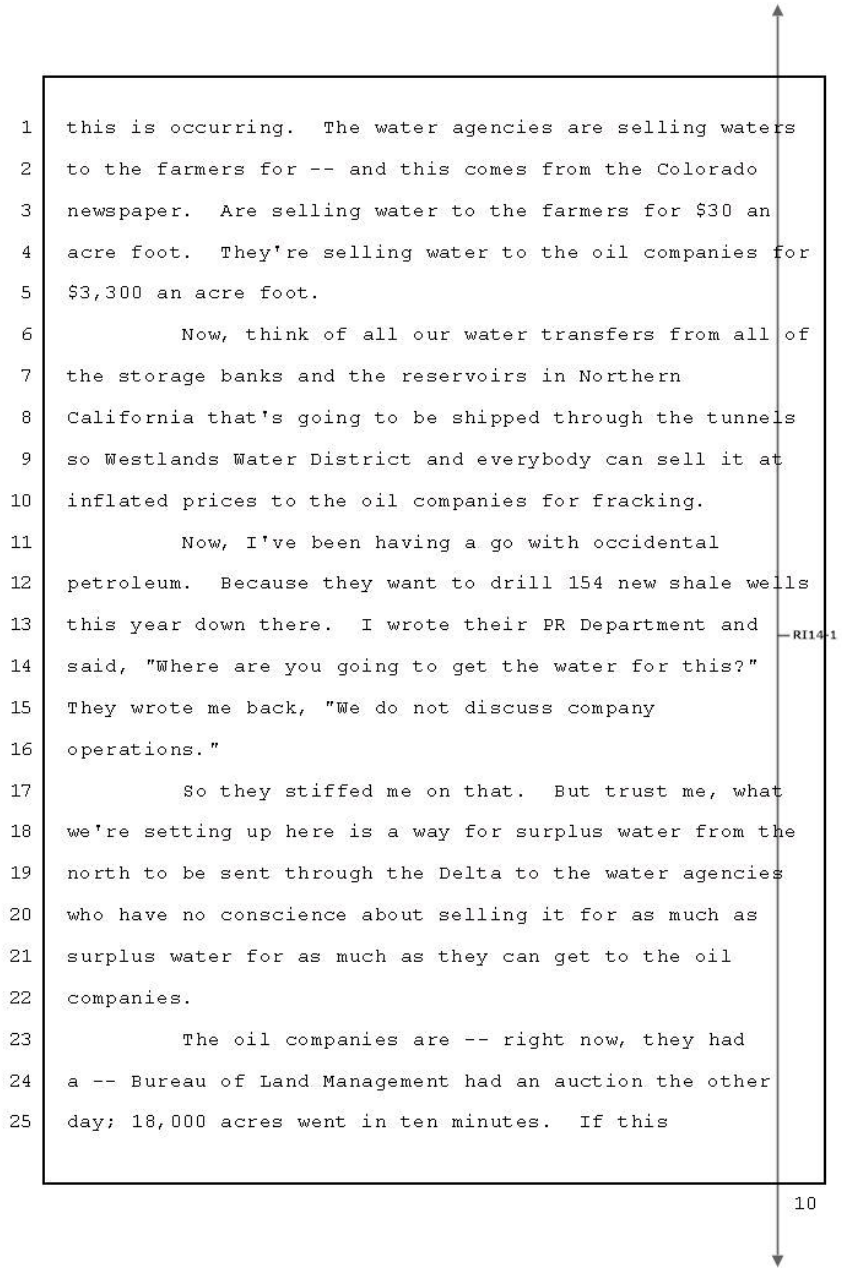
MR. ISENBERG: Oh, okay. Thank you.

MR. WILSON: Look at the natural gas deposits under the Delta here. Now, in Greeley, Colorado currently

9

No comments

- n/a -



this is occurring. The water agencies are selling waters to the farmers for -- and this comes from the Colorado newspaper. Are selling water to the farmers for $30 an acre foot. They're selling water to the oil companies for $3,300 an acre foot.

Now, think of all our water transfers from all of the storage banks and the reservoirs in Northern California that's going to be shipped through the tunnels so Westlands Water District and everybody can sell it at inflated prices to the oil companies for fracking.

Now, I've been having a go with occidental petroleum. Because they want to drill 154 new shale wells this year down there. I wrote their PR Department and said, "Where are you going to get the water for this?" They wrote me back, "We do not discuss company operations."

So they stiffed me on that. But trust me, what we're setting up here is a way for surplus water from the north to be sent through the Delta to the water agencies who have no conscience about selling it for as much as surplus water for as much as they can get to the oil companies.

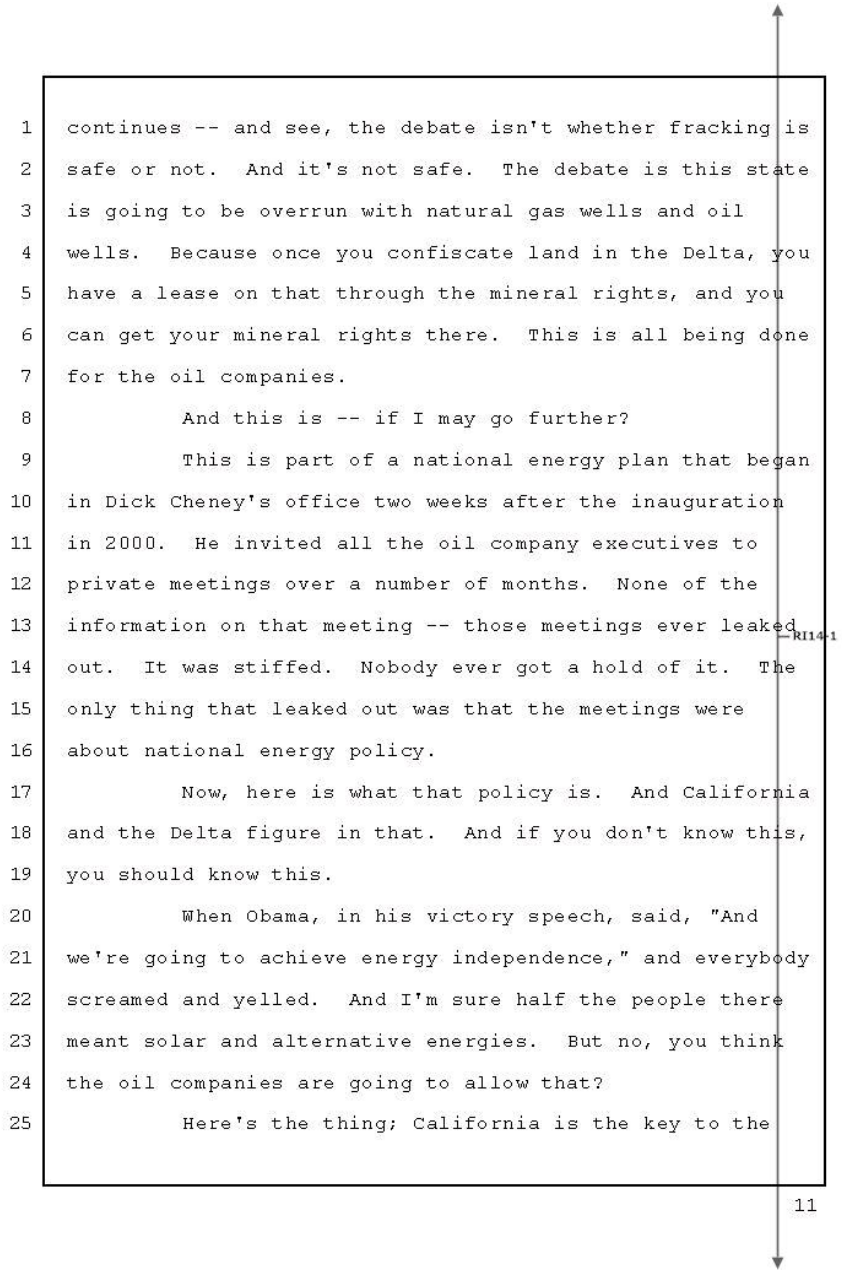
The oil companies are -- right now, they had a -- Bureau of Land Management had an auction the other day; 18,000 acres went in ten minutes. If this

RI14-1

10

No comments

- n/a -


continues -- and see, the debate isn't whether fracking is safe or not. And it's not safe. The debate is this state is going to be overrun with natural gas wells and oil wells. Because once you confiscate land in the Delta, you have a lease on that through the mineral rights, and you can get your mineral rights there. This is all being done for the oil companies.

And this is -- if I may go further?

This is part of a national energy plan that began in Dick Cheney's office two weeks after the inauguration in 2000. He invited all the oil company executives to private meetings over a number of months. None of the information on that meeting -- those meetings ever leaked out. It was stiffed. Nobody ever got a hold of it. The only thing that leaked out was that the meetings were about national energy policy. RI14-1

Now, here is what that policy is. And California and the Delta figure in that. And if you don't know this, you should know this.

When Obama, in his victory speech, said, "And we're going to achieve energy independence," and everybody screamed and yelled. And I'm sure half the people there meant solar and alternative energies. But no, you think the oil companies are going to allow that?

Here's the thing; California is the key to the

11

No comments

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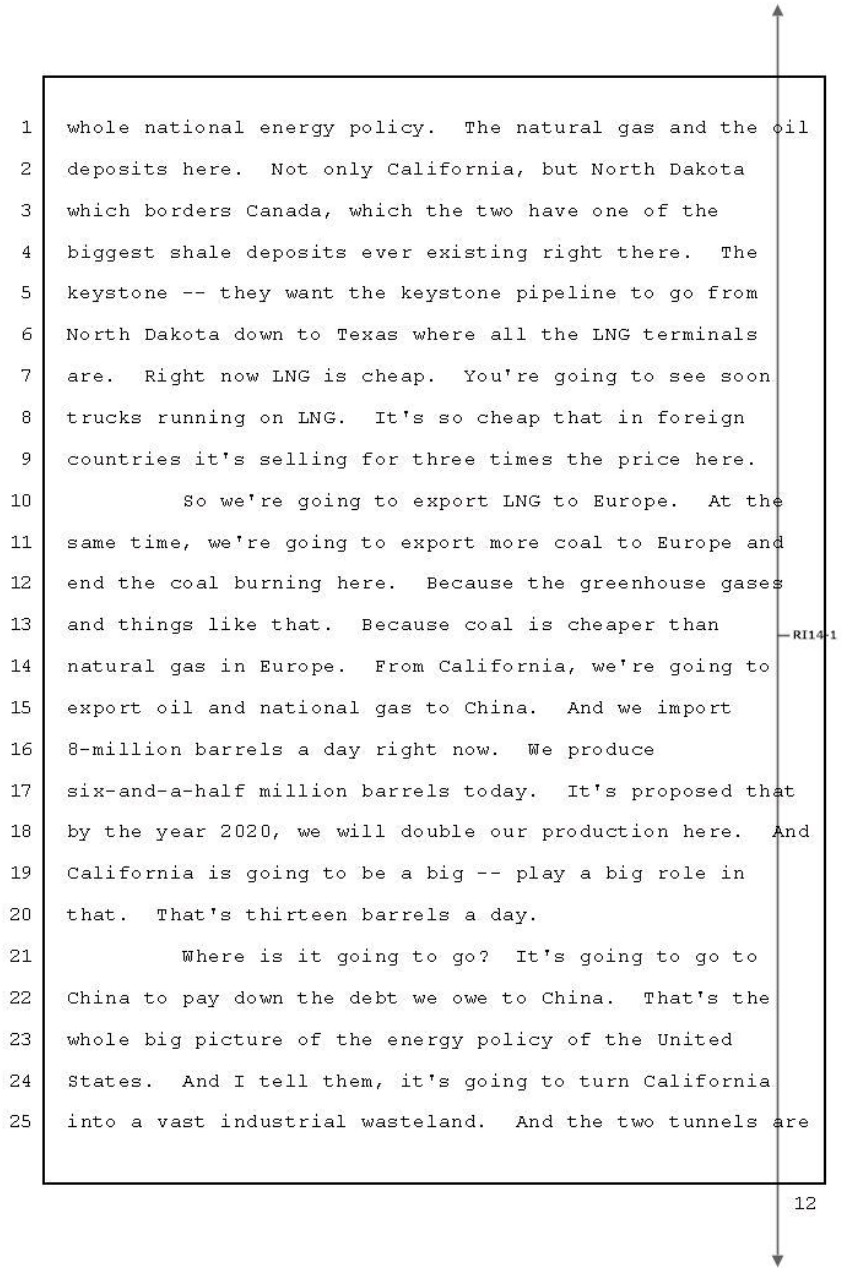
whole national energy policy. The natural gas and the oil deposits here. Not only California, but North Dakota which borders Canada, which the two have one of the biggest shale deposits ever existing right there. The keystone -- they want the keystone pipeline to go from North Dakota down to Texas where all the LNG terminals are. Right now LNG is cheap. You're going to see soon trucks running on LNG. It's so cheap that in foreign countries it's selling for three times the price here.

So we're going to export LNG to Europe. At the same time, we're going to export more coal to Europe and end the coal burning here. Because the greenhouse gases and things like that. Because coal is cheaper than natural gas in Europe. From California, we're going to export oil and national gas to China. And we import 8-million barrels a day right now. We produce six-and-a-half million barrels today. It's proposed that by the year 2020, we will double our production here. And California is going to be a big -- play a big role in that. That's thirteen barrels a day.

Where is it going to go? It's going to go to China to pay down the debt we owe to China. That's the whole big picture of the energy policy of the United States. And I tell them, it's going to turn California into a vast industrial wasteland. And the two tunnels are

RI14-1

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No comments

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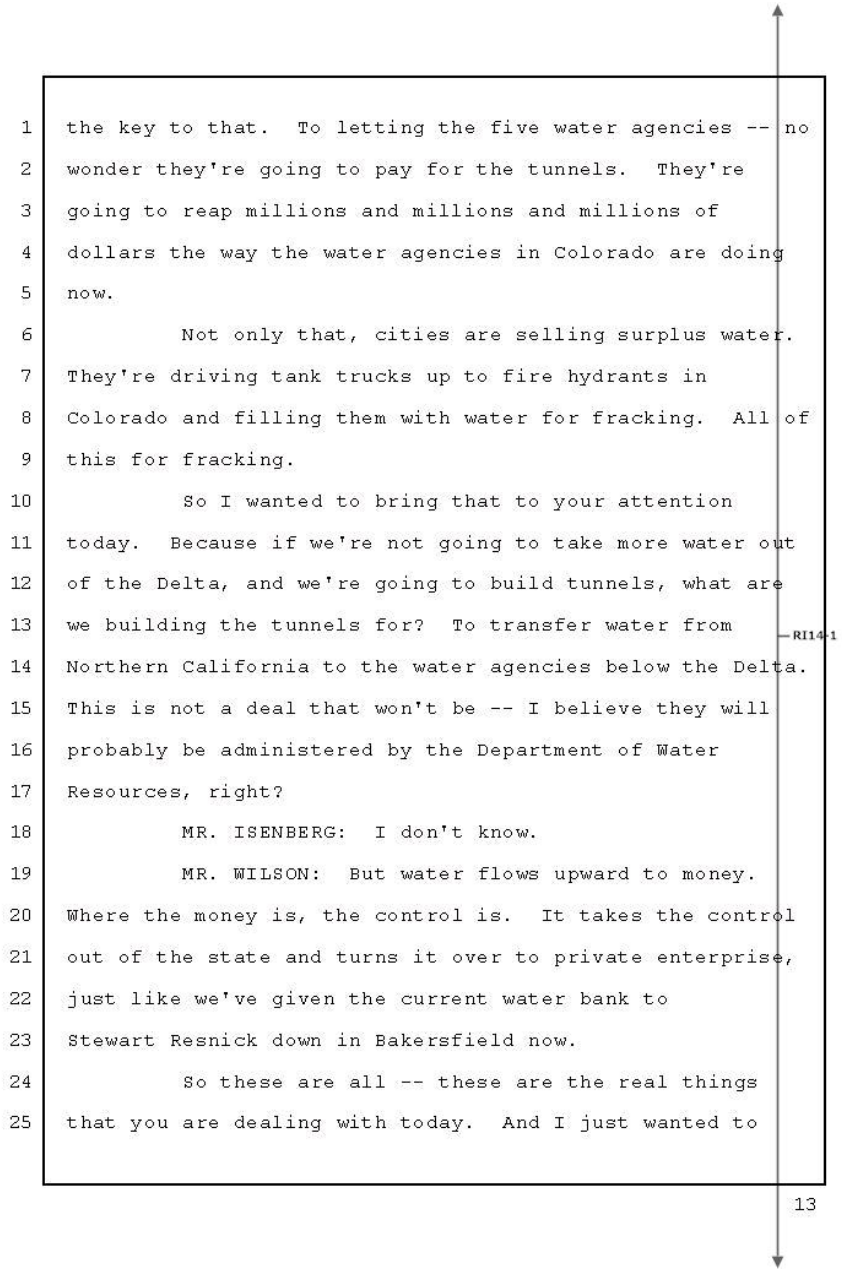
the key to that. To letting the five water agencies -- no wonder they're going to pay for the tunnels. They're going to reap millions and millions and millions of dollars the way the water agencies in Colorado are doing now.

Not only that, cities are selling surplus water. They're driving tank trucks up to fire hydrants in Colorado and filling them with water for fracking. All of this for fracking.

So I wanted to bring that to your attention today. Because if we're not going to take more water out of the Delta, and we're going to build tunnels, what are we building the tunnels for? To transfer water from Northern California to the water agencies below the Delta. This is not a deal that won't be -- I believe they will probably be administered by the Department of Water Resources, right?

MR. ISENBERG: I don't know.

MR. WILSON: But water flows upward to money. Where the money is, the control is. It takes the control out of the state and turns it over to private enterprise, just like we've given the current water bank to Stewart Resnick down in Bakersfield now.

So these are all -- these are the real things that you are dealing with today. And I just wanted to

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RI14-1

No comments

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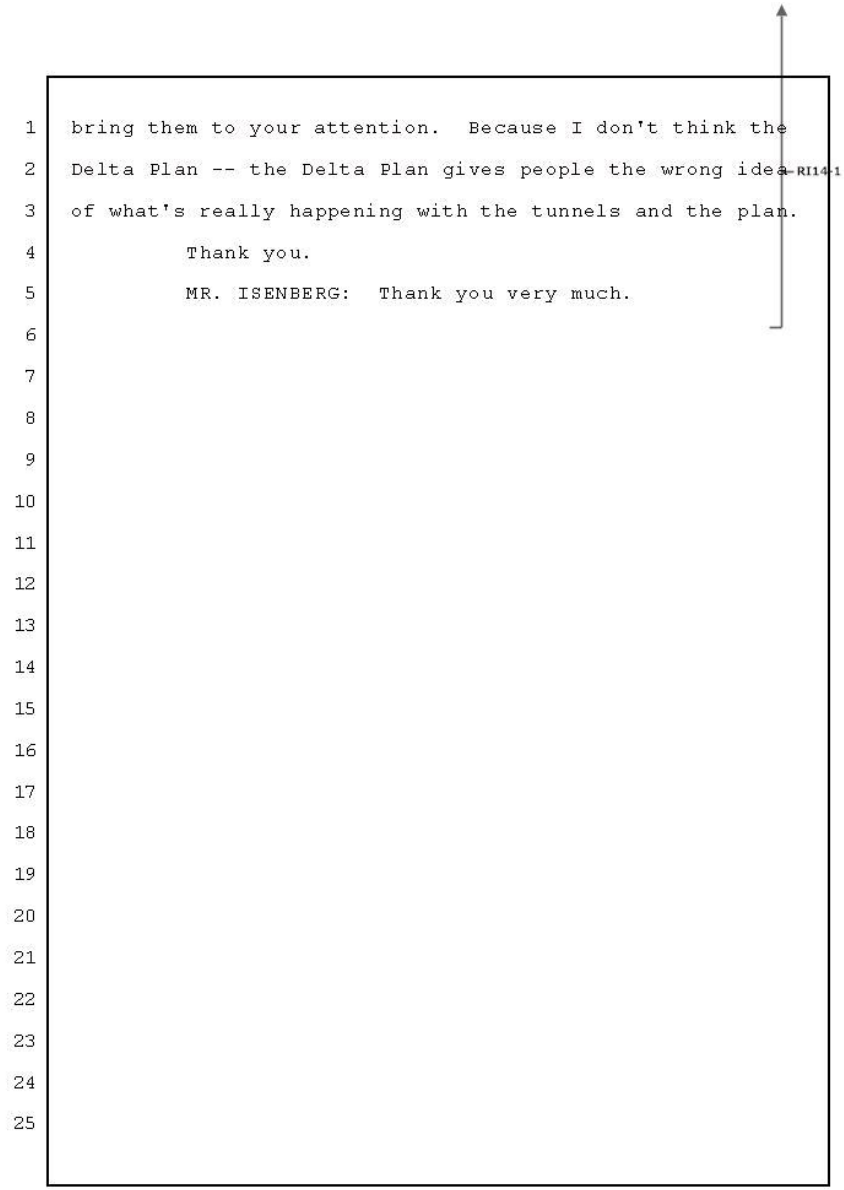

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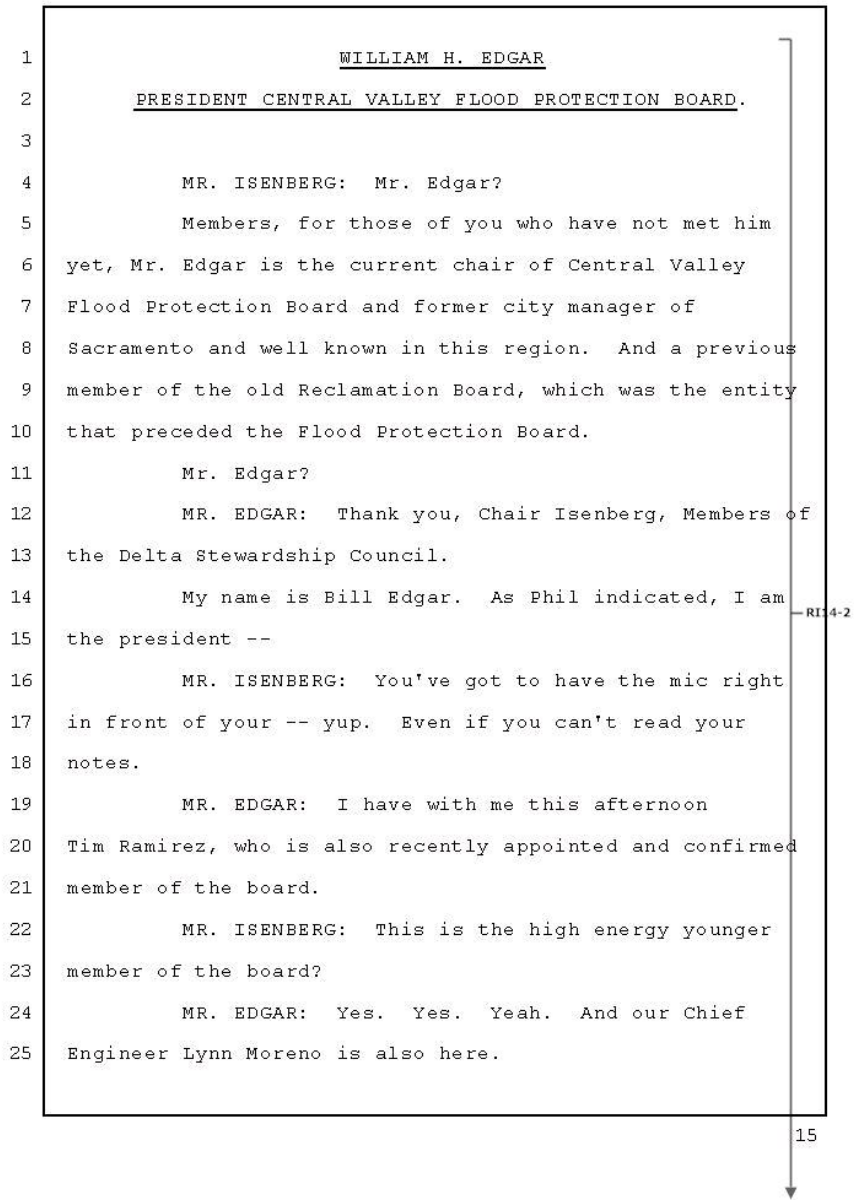


WILLIAM H. EDGAR

PRESIDENT CENTRAL VALLEY FLOOD PROTECTION BOARD.

MR. ISENBERG: Mr. Edgar?

Members, for those of you who have not met him yet, Mr. Edgar is the current chair of Central Valley Flood Protection Board and former city manager of Sacramento and well known in this region. And a previous member of the old Reclamation Board, which was the entity that preceded the Flood Protection Board.

Mr. Edgar?

MR. EDGAR: Thank you, Chair Isenberg, Members of the Delta Stewardship Council.

My name is Bill Edgar. As Phil indicated, I am the president --

RI14-2

MR. ISENBERG: You've got to have the mic right in front of your -- yup. Even if you can't read your notes.

MR. EDGAR: I have with me this afternoon Tim Ramirez, who is also recently appointed and confirmed member of the board.

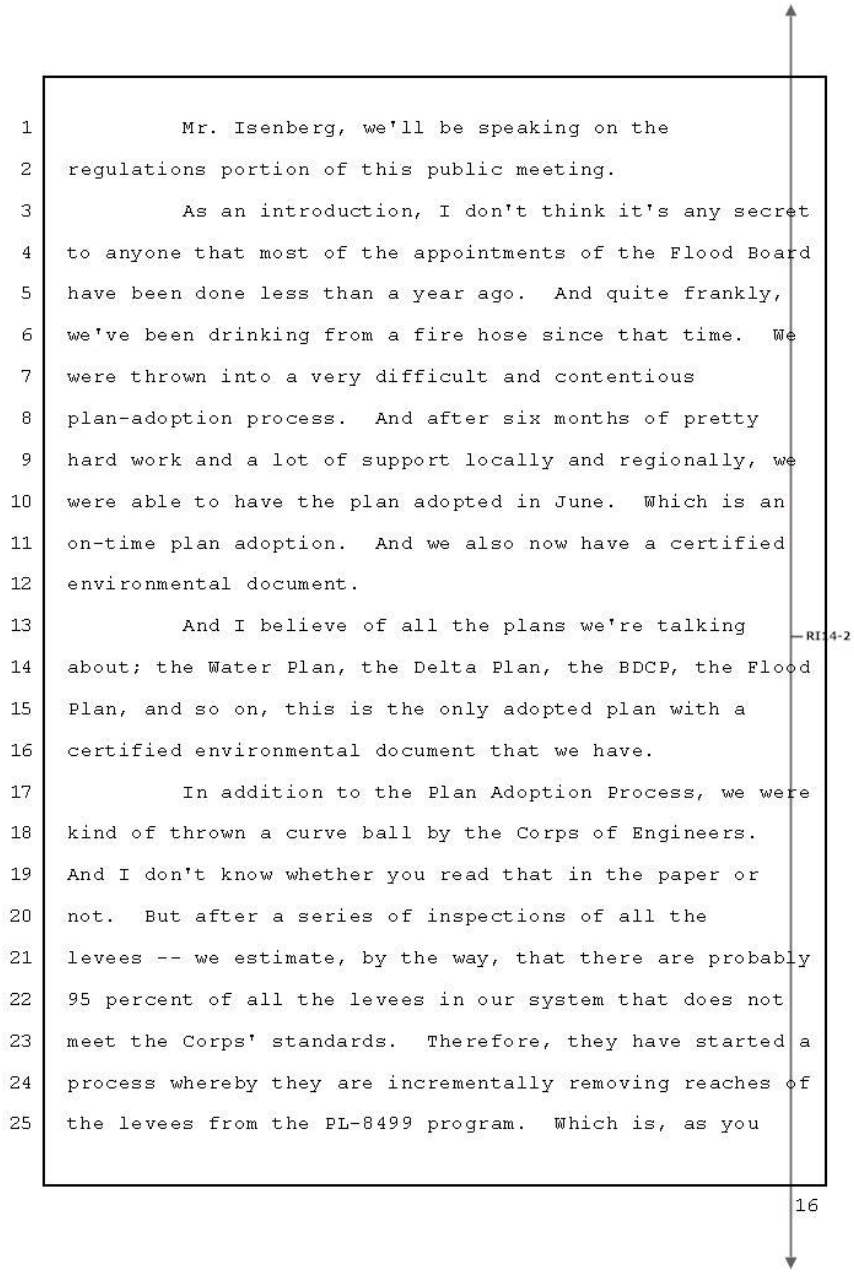
MR. ISENBERG: This is the high energy younger member of the board?

MR. EDGAR: Yes. Yes. Yeah. And our Chief Engineer Lynn Moreno is also here.

15

Response to comment RI14-2

This is a comment on the project, not on the EIR.



Mr. Isenberg, we'll be speaking on the regulations portion of this public meeting.

As an introduction, I don't think it's any secret to anyone that most of the appointments of the Flood Board have been done less than a year ago. And quite frankly, we've been drinking from a fire hose since that time. We were thrown into a very difficult and contentious plan-adoption process. And after six months of pretty hard work and a lot of support locally and regionally, we were able to have the plan adopted in June. Which is an on-time plan adoption. And we also now have a certified environmental document.

And I believe of all the plans we're talking about; the Water Plan, the Delta Plan, the BDCP, the Flood Plan, and so on, this is the only adopted plan with a certified environmental document that we have. RI14-2

In addition to the Plan Adoption Process, we were kind of thrown a curve ball by the Corps of Engineers. And I don't know whether you read that in the paper or not. But after a series of inspections of all the levees -- we estimate, by the way, that there are probably 95 percent of all the levees in our system that does not meet the Corps' standards. Therefore, they have started a process whereby they are incrementally removing reaches of the levees from the PL-8499 program. Which is, as you

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No comments

- n/a -

probably know, the program which gives federal money to local agencies to rebuild levees after floods.

So this is a pretty big deal for us. Particularly, the local LMAs who are concerned about that.

Anyway, we've been worried about that. We've been fighting with them and going back and forth and talking about fixing levees; what we'd do about illegal encroachments; encroachments that are illegal that have, in fact, been permitted. Which is an interesting concept. And a number of other issues.

And the so-called U.S. Corps of Engineers Variance Process, which is called a SWIF, Systemwide Improvement Framework that the Department of Water Resources hates because it kind of diverts us from the implementation of plan. RI14-2

But anyway, the Corps of Engineers is dealing with that. We understand now that the Corps is requiring a SWIF on almost every permit that you seek from the Corps, even though it's not statutorily permitted or required or anything else.

For example, the 408 Process, which is the federal process for reviewing flood improvements. For example, Safe Ca in the Natomas area has done that, Sabuf Ca (phonetic) is working on a 408 Process.

And the 104 Process, which is the reimbursement

No comments

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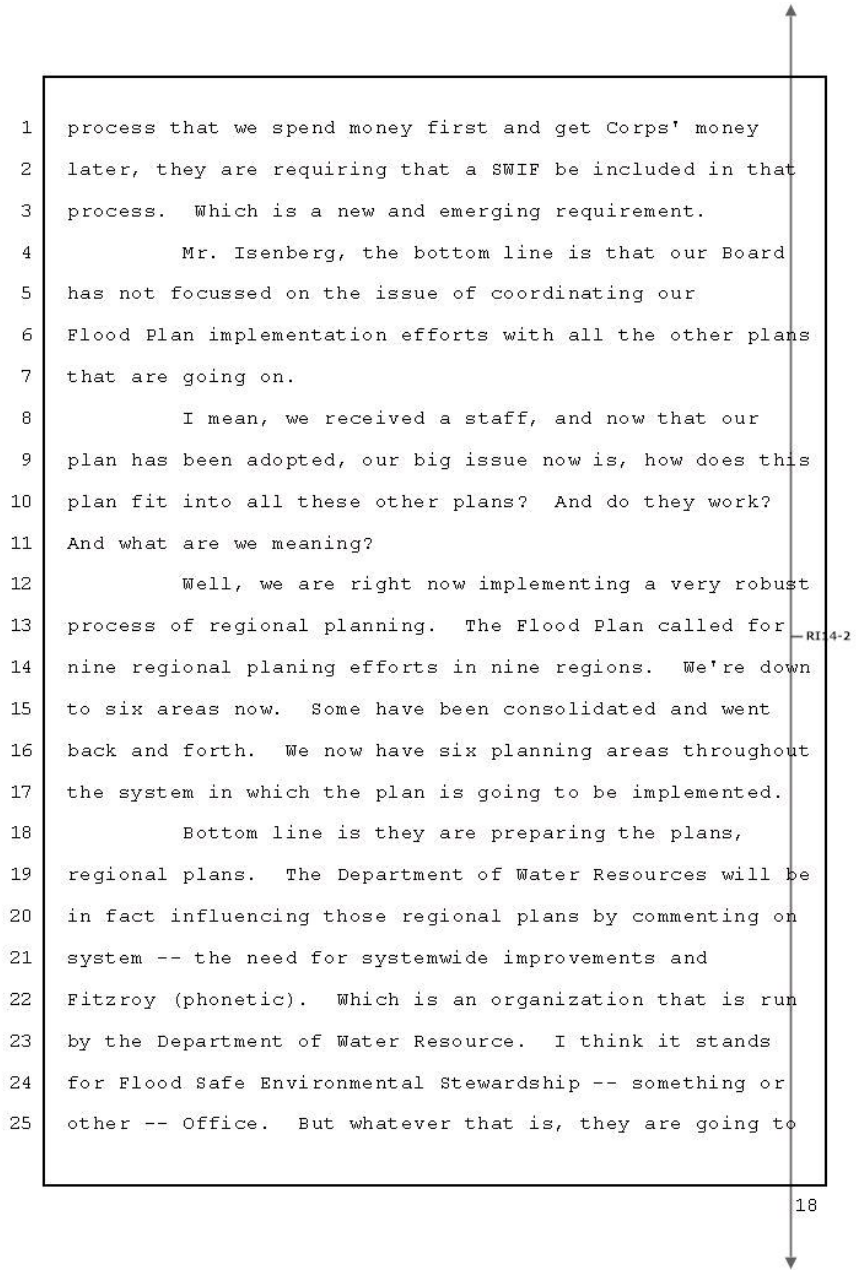

process that we spend money first and get Corps' money later, they are requiring that a SWIF be included in that process. Which is a new and emerging requirement.

Mr. Isenberg, the bottom line is that our Board has not focussed on the issue of coordinating our Flood Plan implementation efforts with all the other plans that are going on.

I mean, we received a staff, and now that our plan has been adopted, our big issue now is, how does this plan fit into all these other plans? And do they work? And what are we meaning?

Well, we are right now implementing a very robust process of regional planning. The Flood Plan called for nine regional planing efforts in nine regions. We're down to six areas now. Some have been consolidated and went back and forth. We now have six planning areas throughout the system in which the plan is going to be implemented.

Bottom line is they are preparing the plans, regional plans. The Department of Water Resources will be in fact influencing those regional plans by commenting on system -- the need for systemwide improvements and Fitzroy (phonetic). Which is an organization that is run by the Department of Water Resource. I think it stands for Flood Safe Environmental Stewardship -- something or other -- Office. But whatever that is, they are going to

RI14-2

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No comments

- n/a -

be coming out with their environmental goals and objectives and of course they also have to be involved in the planning.

Now, all of this said, as we move towards designing of projects and implementation planning and toward construction, we are going to have to figure out how these plans -- how these implementations, who gets what permit from what and how these all work with all these other plans that are going on. And to be honest, I don't have a clue how that's going to happen.

Gary Bardini in Department of Water Resources has a vision for how this is all going to work. But you've got me on how it's all going to work. And it may work. RI14-2
And he's tried to explain it to me, and I don't understand it. But he's good at it. So he can do that.

We had a presentation at our board meeting this morning given by the department on how the Water Management Plan is going to integrate all of these different plans that are going on. And we were told this morning that nobody's statutory authority, nobody's current area of responsibilities and jurisdictions are going to change. We are going to work together, is what we were told. Well, that's funny. And that's what we want to do.

But getting back to the subject at hand, which is

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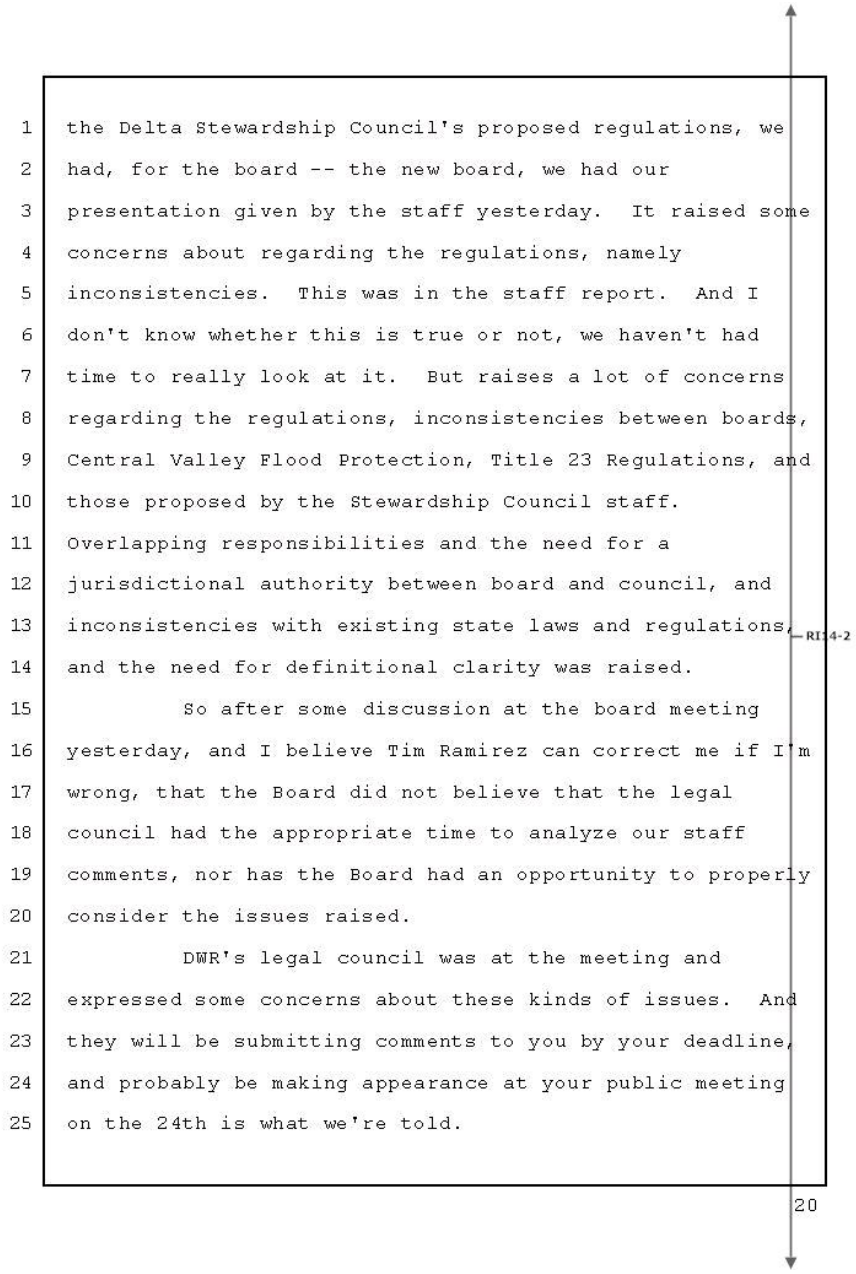
the Delta Stewardship Council's proposed regulations, we had, for the board -- the new board, we had our presentation given by the staff yesterday. It raised some concerns about regarding the regulations, namely inconsistencies. This was in the staff report. And I don't know whether this is true or not, we haven't had time to really look at it. But raises a lot of concerns regarding the regulations, inconsistencies between boards, Central Valley Flood Protection, Title 23 Regulations, and those proposed by the Stewardship Council staff. Overlapping responsibilities and the need for a jurisdictional authority between board and council, and inconsistencies with existing state laws and regulations, and the need for definitional clarity was raised.

So after some discussion at the board meeting yesterday, and I believe Tim Ramirez can correct me if I'm wrong, that the Board did not believe that the legal council had the appropriate time to analyze our staff comments, nor has the Board had an opportunity to properly consider the issues raised.

DWR's legal council was at the meeting and expressed some concerns about these kinds of issues. And they will be submitting comments to you by your deadline, and probably be making appearance at your public meeting on the 24th is what we're told.

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RI14-2

No comments

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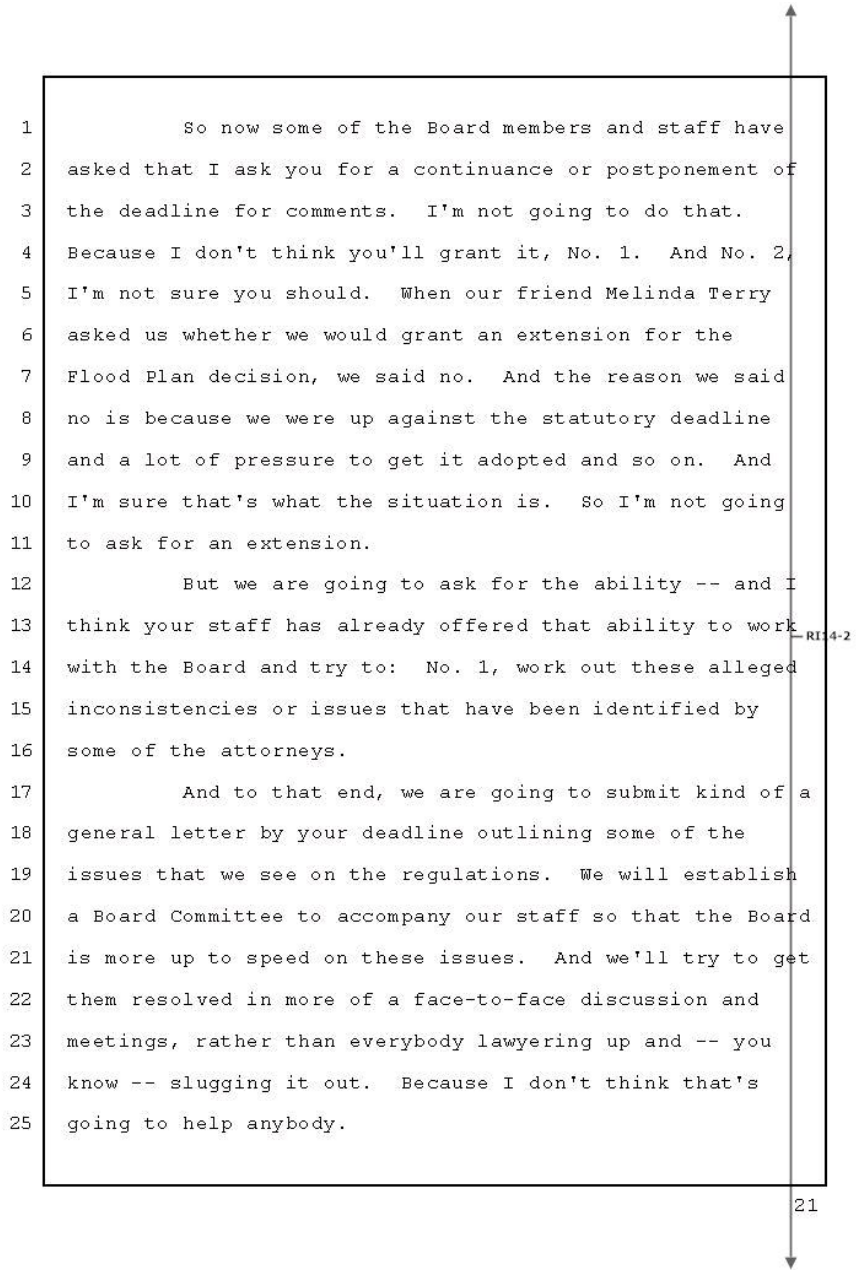

So now some of the Board members and staff have asked that I ask you for a continuance or postponement of the deadline for comments. I'm not going to do that. Because I don't think you'll grant it, No. 1. And No. 2, I'm not sure you should. When our friend Melinda Terry asked us whether we would grant an extension for the Flood Plan decision, we said no. And the reason we said no is because we were up against the statutory deadline and a lot of pressure to get it adopted and so on. And I'm sure that's what the situation is. So I'm not going to ask for an extension.

But we are going to ask for the ability -- and I think your staff has already offered that ability to work with the Board and try to: No. 1, work out these alleged inconsistencies or issues that have been identified by some of the attorneys.

RI14-2

And to that end, we are going to submit kind of a general letter by your deadline outlining some of the issues that we see on the regulations. We will establish a Board Committee to accompany our staff so that the Board is more up to speed on these issues. And we'll try to get them resolved in more of a face-to-face discussion and meetings, rather than everybody lawyering up and -- you know -- slugging it out. Because I don't think that's going to help anybody.

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No comments

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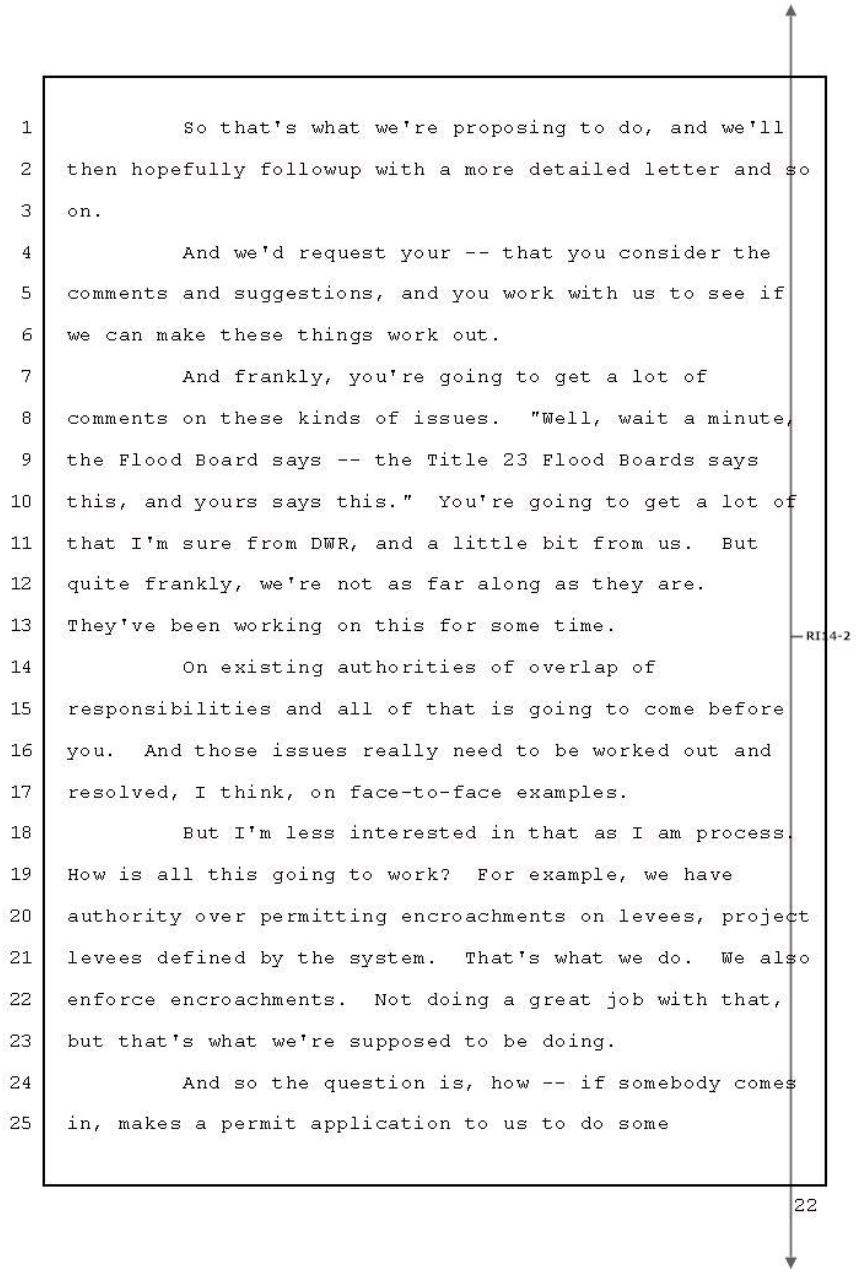

So that's what we're proposing to do, and we'll then hopefully followup with a more detailed letter and so on.

And we'd request your -- that you consider the comments and suggestions, and you work with us to see if we can make these things work out.

And frankly, you're going to get a lot of comments on these kinds of issues. "Well, wait a minute, the Flood Board says -- the Title 23 Flood Boards says this, and yours says this." You're going to get a lot of that I'm sure from DWR, and a little bit from us. But quite frankly, we're not as far along as they are. They've been working on this for some time.

RI14-2

On existing authorities of overlap of responsibilities and all of that is going to come before you. And those issues really need to be worked out and resolved, I think, on face-to-face examples.

But I'm less interested in that as I am process. How is all this going to work? For example, we have authority over permitting encroachments on levees, project levees defined by the system. That's what we do. We also enforce encroachments. Not doing a great job with that, but that's what we're supposed to be doing.

And so the question is, how -- if somebody comes in, makes a permit application to us to do some

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No comments

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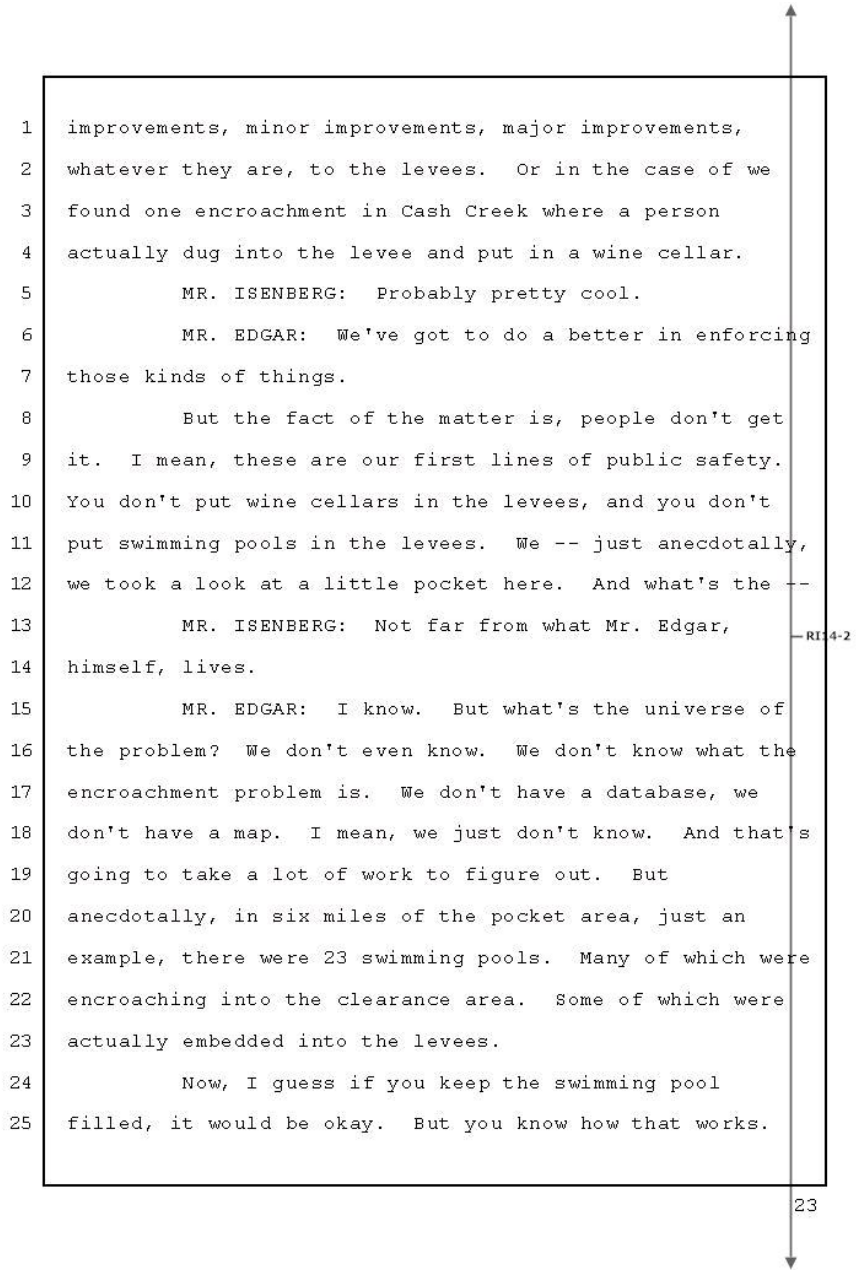

improvements, minor improvements, major improvements, whatever they are, to the levees. Or in the case of we found one encroachment in Cash Creek where a person actually dug into the levee and put in a wine cellar.

MR. ISENBERG: Probably pretty cool.

MR. EDGAR: We've got to do a better in enforcing those kinds of things.

But the fact of the matter is, people don't get it. I mean, these are our first lines of public safety. You don't put wine cellars in the levees, and you don't put swimming pools in the levees. We -- just anecdotally, we took a look at a little pocket here. And what's the --

MR. ISENBERG: Not far from what Mr. Edgar, himself, lives. — RI14-2

MR. EDGAR: I know. But what's the universe of the problem? We don't even know. We don't know what the encroachment problem is. We don't have a database, we don't have a map. I mean, we just don't know. And that's going to take a lot of work to figure out. But anecdotally, in six miles of the pocket area, just an example, there were 23 swimming pools. Many of which were encroaching into the clearance area. Some of which were actually embedded into the levees.

Now, I guess if you keep the swimming pool filled, it would be okay. But you know how that works.

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No comments

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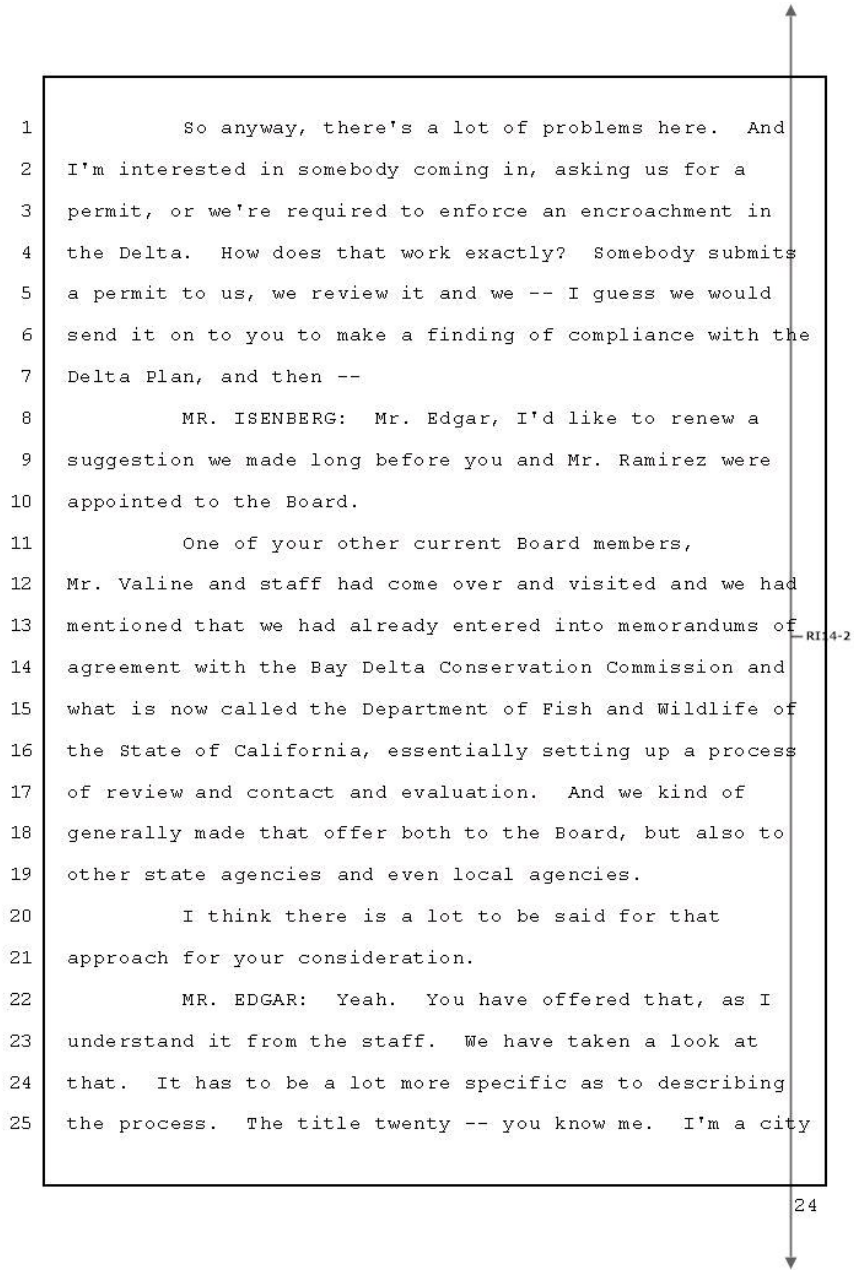

So anyway, there's a lot of problems here. And I'm interested in somebody coming in, asking us for a permit, or we're required to enforce an encroachment in the Delta. How does that work exactly? Somebody submits a permit to us, we review it and we -- I guess we would send it on to you to make a finding of compliance with the Delta Plan, and then --

MR. ISENBERG: Mr. Edgar, I'd like to renew a suggestion we made long before you and Mr. Ramirez were appointed to the Board.

One of your other current Board members, Mr. Valine and staff had come over and visited and we had mentioned that we had already entered into memorandums of agreement with the Bay Delta Conservation Commission and what is now called the Department of Fish and Wildlife of the State of California, essentially setting up a process of review and contact and evaluation. And we kind of generally made that offer both to the Board, but also to other state agencies and even local agencies.

I think there is a lot to be said for that approach for your consideration.

MR. EDGAR: Yeah. You have offered that, as I understand it from the staff. We have taken a look at that. It has to be a lot more specific as to describing the process. The title twenty -- you know me. I'm a city

RI14-2

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No comments

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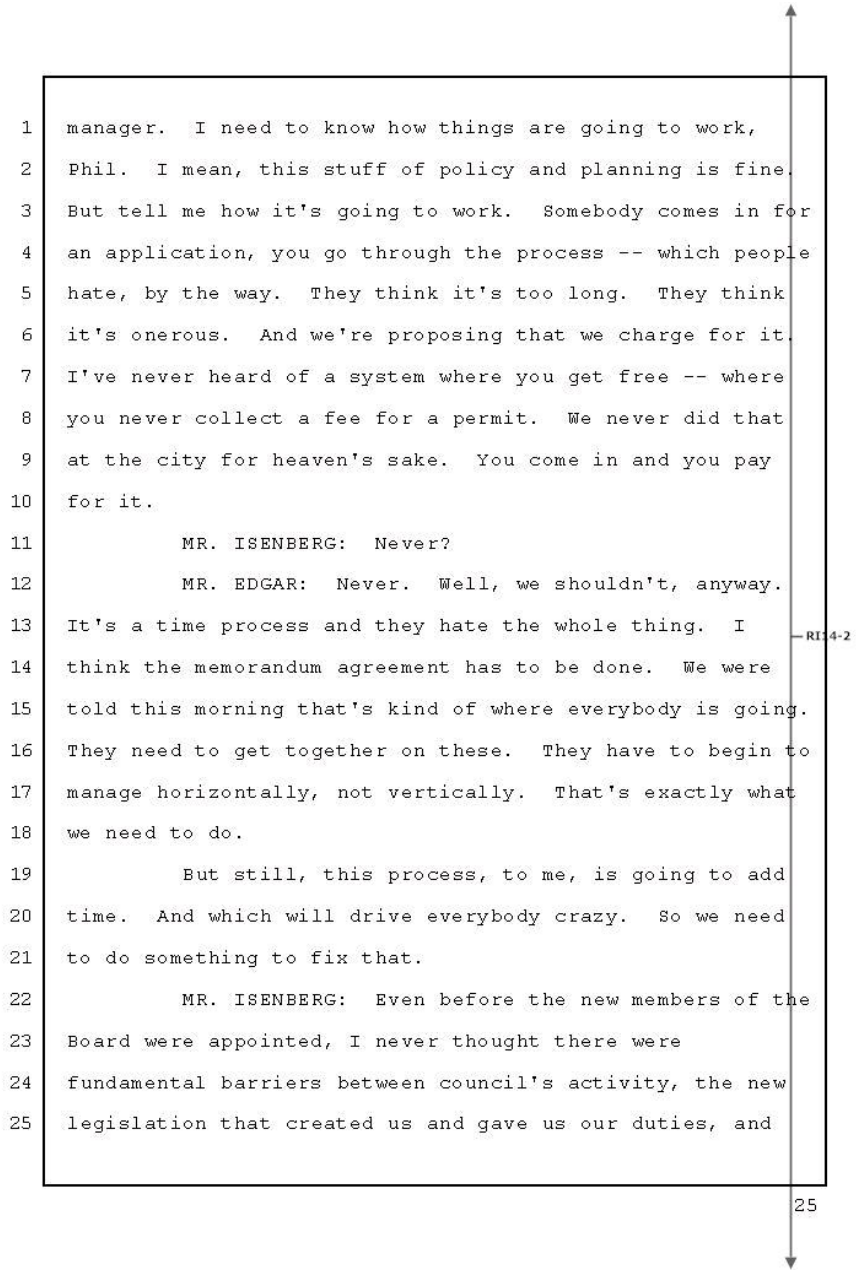

manager. I need to know how things are going to work, Phil. I mean, this stuff of policy and planning is fine. But tell me how it's going to work. Somebody comes in for an application, you go through the process -- which people hate, by the way. They think it's too long. They think it's onerous. And we're proposing that we charge for it. I've never heard of a system where you get free -- where you never collect a fee for a permit. We never did that at the city for heaven's sake. You come in and you pay for it.

MR. ISENBERG: Never?

MR. EDGAR: Never. Well, we shouldn't, anyway. It's a time process and they hate the whole thing. I think the memorandum agreement has to be done. We were told this morning that's kind of where everybody is going. They need to get together on these. They have to begin to manage horizontally, not vertically. That's exactly what we need to do.

But still, this process, to me, is going to add time. And which will drive everybody crazy. So we need to do something to fix that.

MR. ISENBERG: Even before the new members of the Board were appointed, I never thought there were fundamental barriers between council's activity, the new legislation that created us and gave us our duties, and

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RI14-2

No comments

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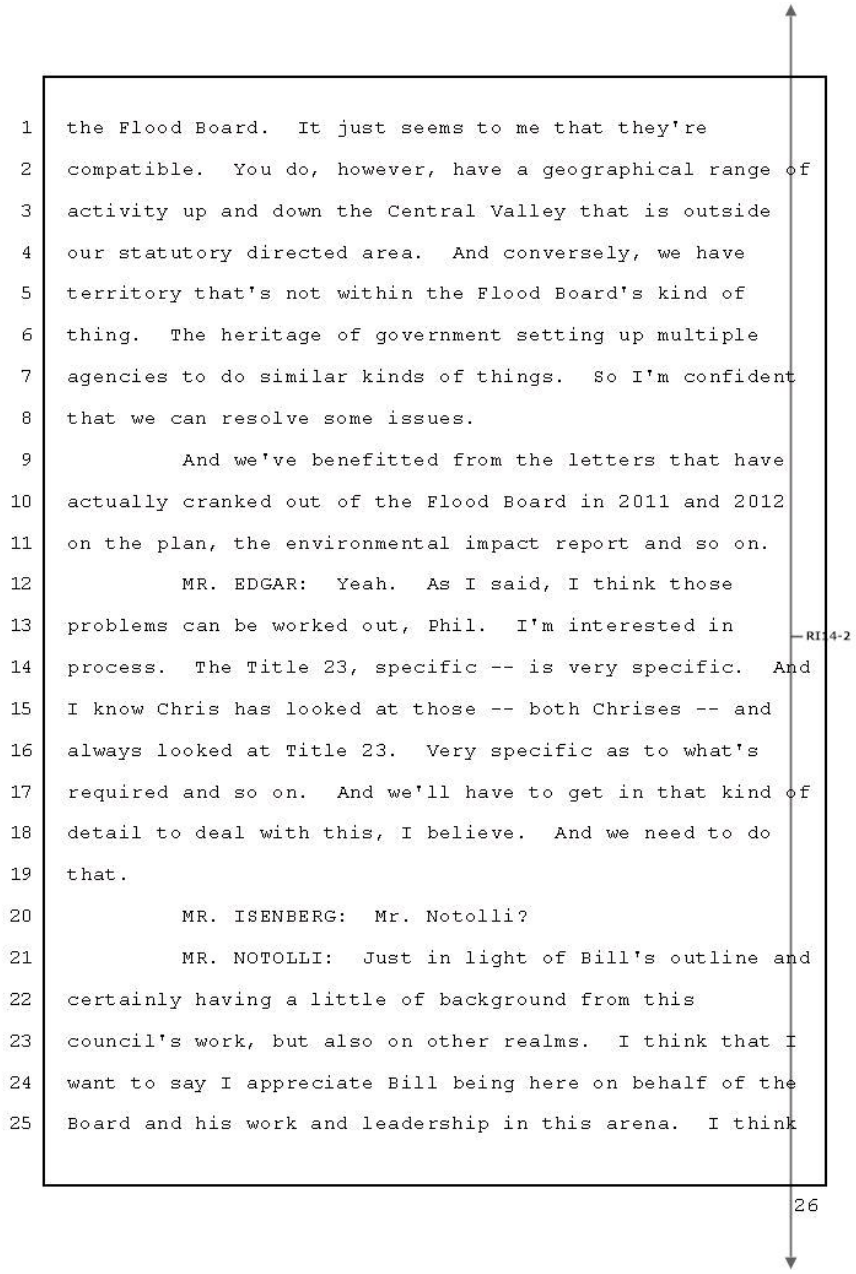

the Flood Board. It just seems to me that they're compatible. You do, however, have a geographical range of activity up and down the Central Valley that is outside our statutory directed area. And conversely, we have territory that's not within the Flood Board's kind of thing. The heritage of government setting up multiple agencies to do similar kinds of things. So I'm confident that we can resolve some issues.

And we've benefitted from the letters that have actually cranked out of the Flood Board in 2011 and 2012 on the plan, the environmental impact report and so on.

MR. EDGAR: Yeah. As I said, I think those problems can be worked out, Phil. I'm interested in process. The Title 23, specific -- is very specific. And I know Chris has looked at those -- both Chrises -- and always looked at Title 23. Very specific as to what's required and so on. And we'll have to get in that kind of detail to deal with this, I believe. And we need to do that.

MR. ISENBERG: Mr. Notolli?

MR. NOTOLLI: Just in light of Bill's outline and certainly having a little of background from this council's work, but also on other realms. I think that I want to say I appreciate Bill being here on behalf of the Board and his work and leadership in this arena. I think

RI14-2

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No comments

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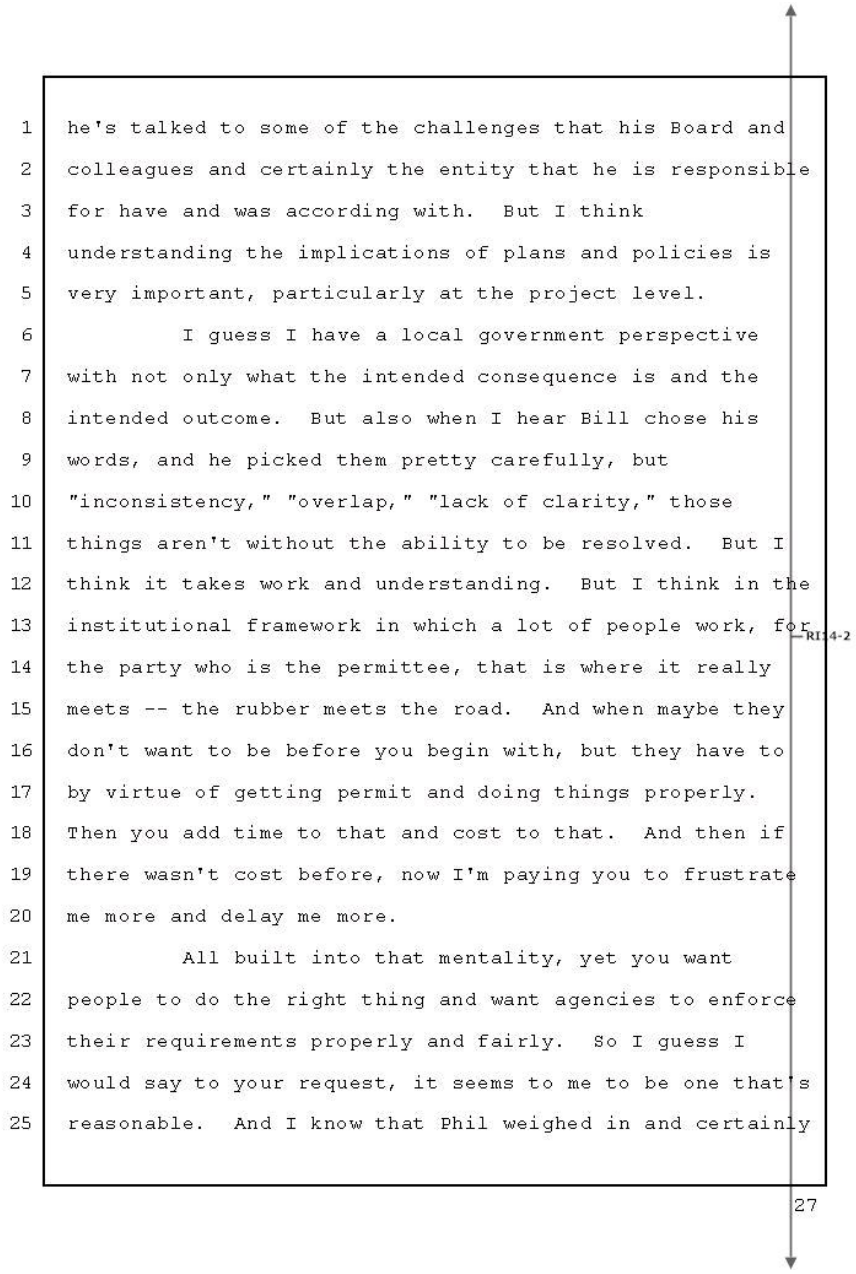

he's talked to some of the challenges that his Board and colleagues and certainly the entity that he is responsible for have and was according with. But I think understanding the implications of plans and policies is very important, particularly at the project level.

I guess I have a local government perspective with not only what the intended consequence is and the intended outcome. But also when I hear Bill chose his words, and he picked them pretty carefully, but "inconsistency," "overlap," "lack of clarity," those things aren't without the ability to be resolved. But I think it takes work and understanding. But I think in the institutional framework in which a lot of people work, for the party who is the permittee, that is where it really meets -- the rubber meets the road. And when maybe they don't want to be before you begin with, but they have to by virtue of getting permit and doing things properly. Then you add time to that and cost to that. And then if there wasn't cost before, now I'm paying you to frustrate me more and delay me more.

All built into that mentality, yet you want people to do the right thing and want agencies to enforce their requirements properly and fairly. So I guess I would say to your request, it seems to me to be one that's reasonable. And I know that Phil weighed in and certainly

RI14-2

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No comments

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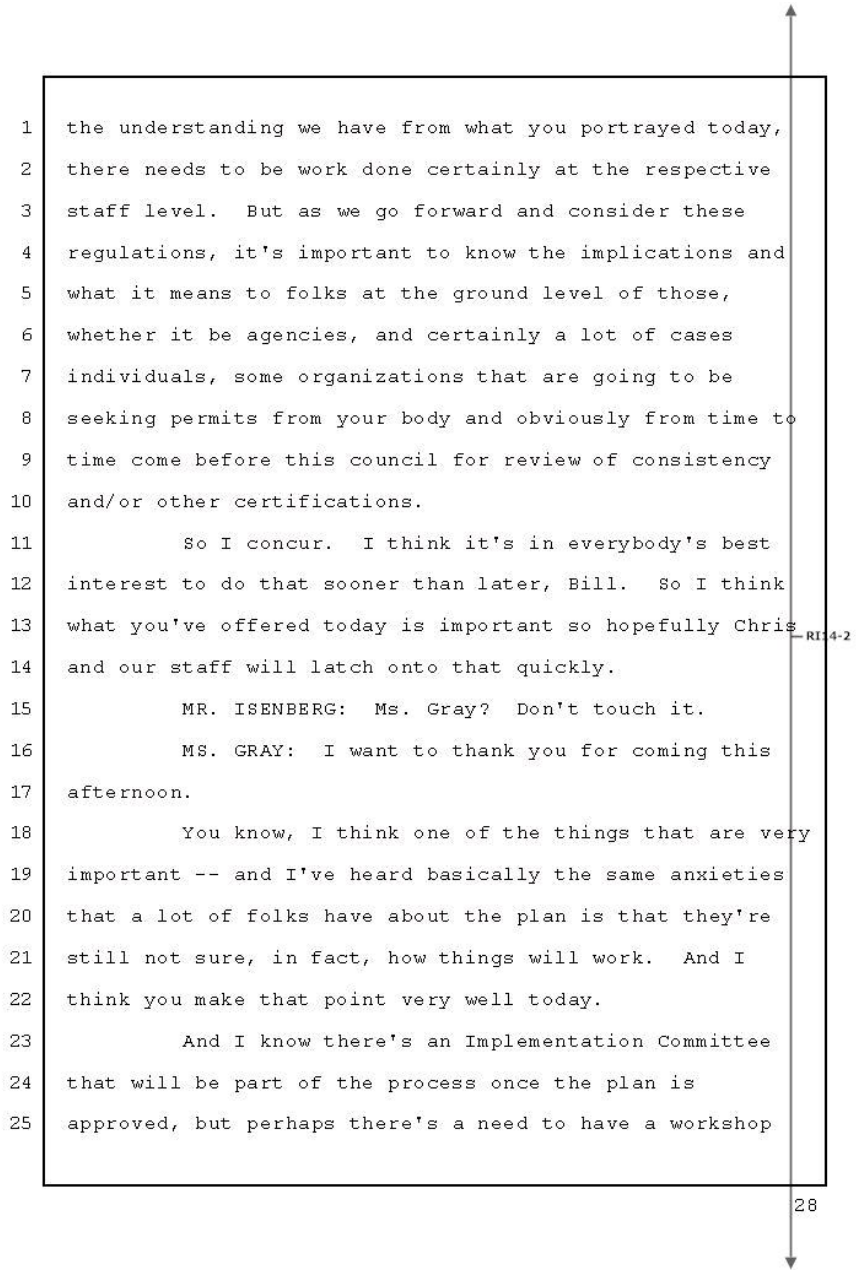
the understanding we have from what you portrayed today, there needs to be work done certainly at the respective staff level. But as we go forward and consider these regulations, it's important to know the implications and what it means to folks at the ground level of those, whether it be agencies, and certainly a lot of cases individuals, some organizations that are going to be seeking permits from your body and obviously from time to time come before this council for review of consistency and/or other certifications.

So I concur. I think it's in everybody's best interest to do that sooner than later, Bill. So I think what you've offered today is important so hopefully Chris and our staff will latch onto that quickly.

MR. ISENBERG: Ms. Gray? Don't touch it.

MS. GRAY: I want to thank you for coming this afternoon.

You know, I think one of the things that are very important -- and I've heard basically the same anxieties that a lot of folks have about the plan is that they're still not sure, in fact, how things will work. And I think you make that point very well today.

And I know there's an Implementation Committee that will be part of the process once the plan is approved, but perhaps there's a need to have a workshop

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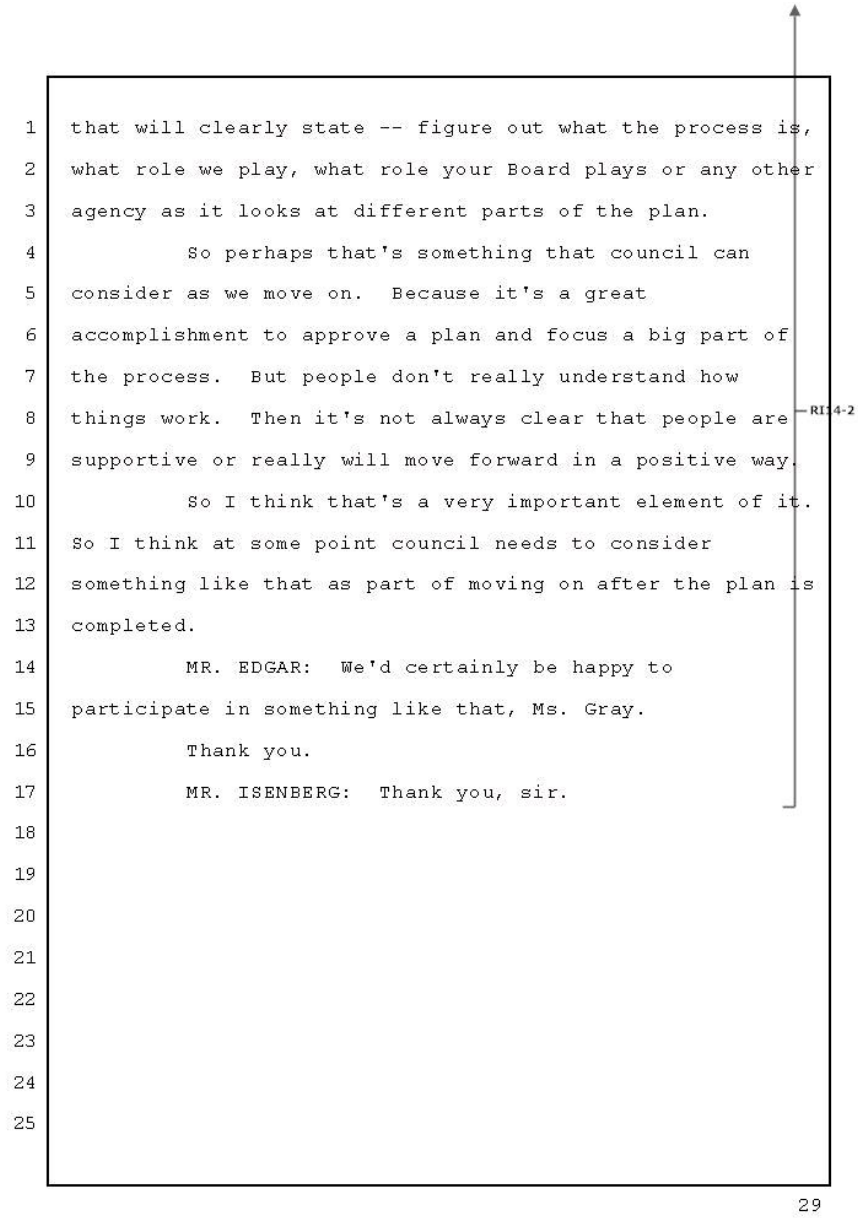
RI14-2

No comments

- n/a -


that will clearly state -- figure out what the process is, what role we play, what role your Board plays or any other agency as it looks at different parts of the plan.

So perhaps that's something that council can consider as we move on. Because it's a great accomplishment to approve a plan and focus a big part of the process. But people don't really understand how things work. Then it's not always clear that people are supportive or really will move forward in a positive way.

So I think that's a very important element of it. So I think at some point council needs to consider something like that as part of moving on after the plan is completed.

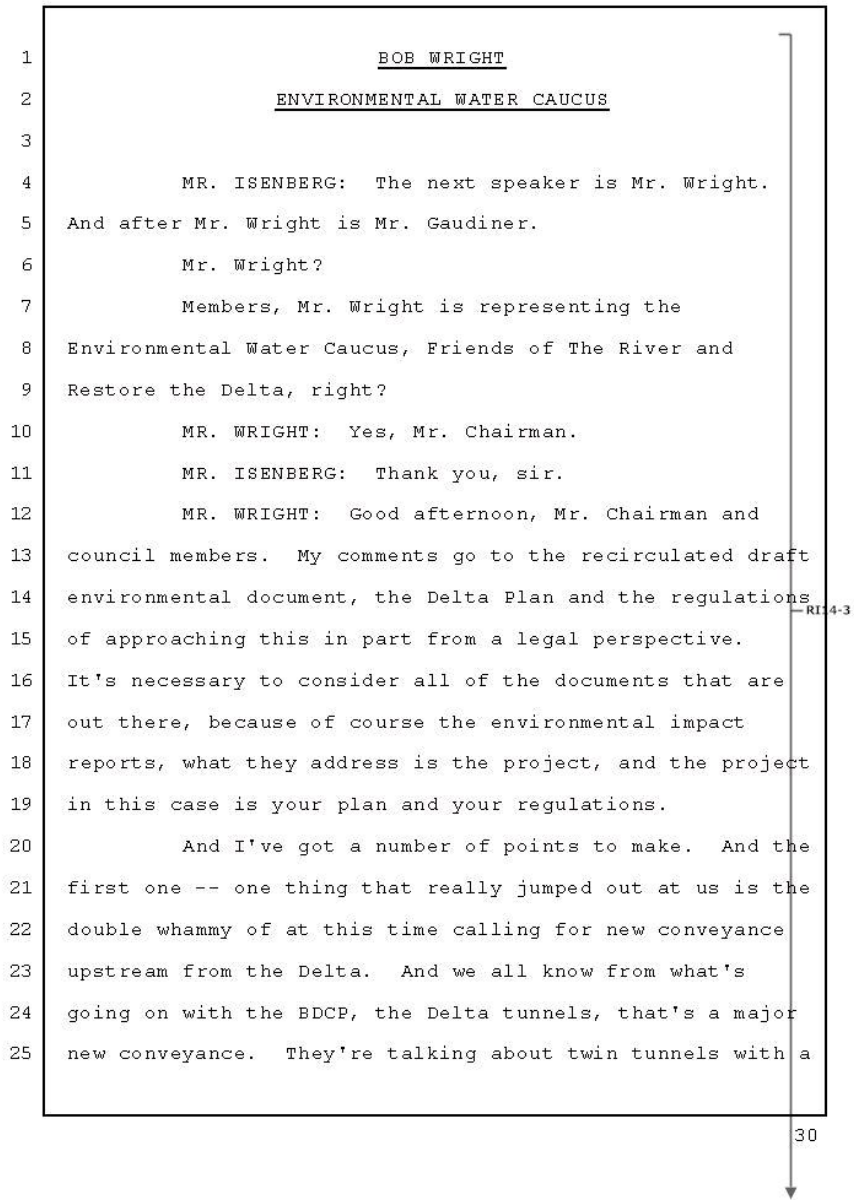
MR. EDGAR: We'd certainly be happy to participate in something like that, Ms. Gray.

Thank you.

MR. ISENBERG: Thank you, sir.

No comments

- n/a -



BOB WRIGHT

ENVIRONMENTAL WATER CAUCUS

MR. ISENBERG: The next speaker is Mr. Wright. And after Mr. Wright is Mr. Gaudiner.

Mr. Wright?

Members, Mr. Wright is representing the Environmental Water Caucus, Friends of The River and Restore the Delta, right?

MR. WRIGHT: Yes, Mr. Chairman.

MR. ISENBERG: Thank you, sir.

MR. WRIGHT: Good afternoon, Mr. Chairman and council members. My comments go to the recirculated draft environmental document, the Delta Plan and the regulations of approaching this in part from a legal perspective. It's necessary to consider all of the documents that are out there, because of course the environmental impact reports, what they address is the project, and the project in this case is your plan and your regulations.

And I've got a number of points to make. And the first one -- one thing that really jumped out at us is the double whammy of at this time calling for new conveyance upstream from the Delta. And we all know from what's going on with the BDCP, the Delta tunnels, that's a major new conveyance. They're talking about twin tunnels with a

RI14-3

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Response to comment RI14-3

The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1.

capacity of diverting 15,000 cubic feet per second out of the Sacramento River in the Clarksburg vicinity and taking it around to the Tracy pumping plants.

They have said that -- they claim they've scaled it down by calling for three intakes instead of five, so the intakes would be capable of diverting 9,000 cubic feet per second. The tunnels are 35 miles long. They're going to cost billions of dollars. Obviously you would only build tunnels at that capacity if that was the water you eventually intended to take. And it would be very easy to add two more intakes down the road. And we submit that, with all due respect, that's what must be considered under SEQUA, our environmental laws.

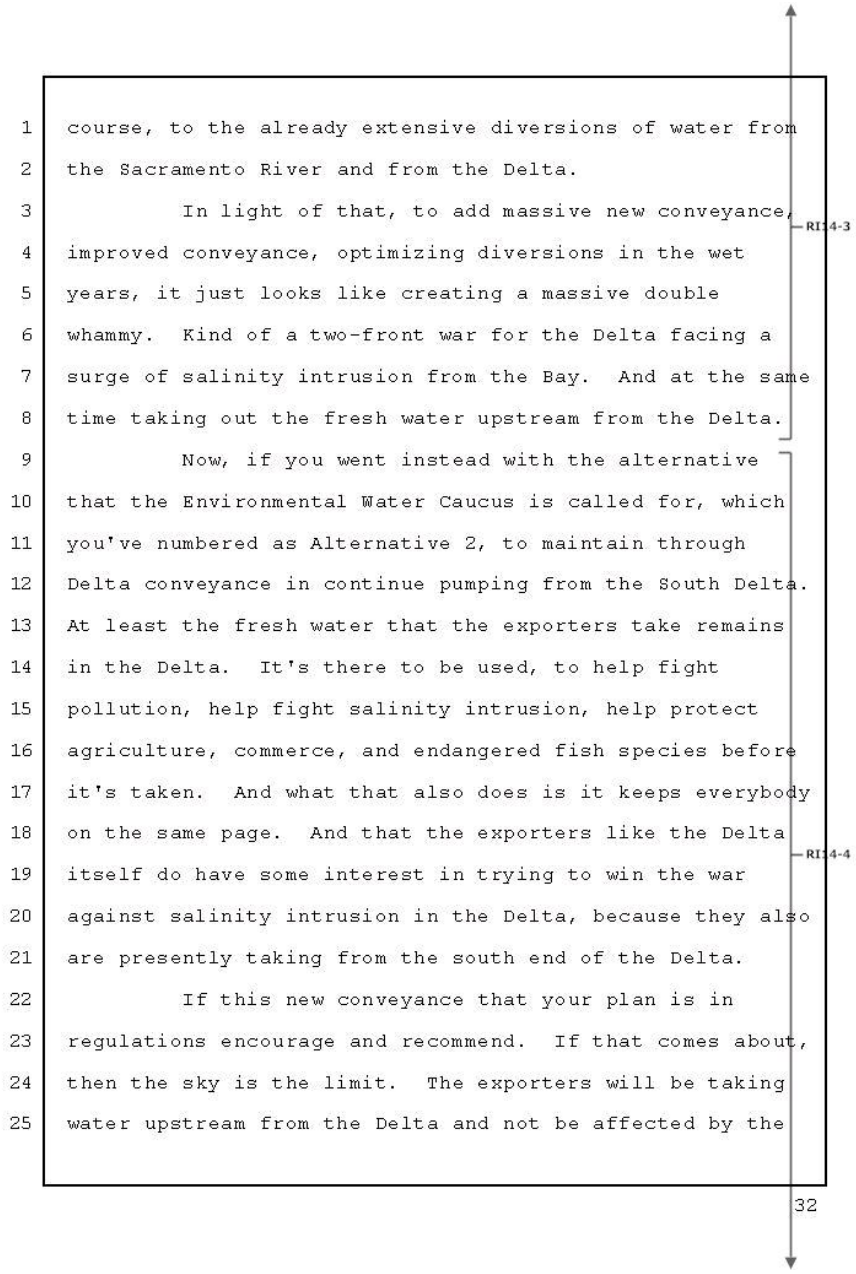
RI14-3

The thing that jumps out, is in your own plan, at page 80, there is some candor there. And it says that as a result of climate change we can see sea level rise as much as 55 inches by 2100. And it says that that will result in high salinity levels in the Delta interior, which will impair water quality for agriculture and municipal uses and change habitat for fish species.

So what just jumps out as being absolutely astonishing is recognizing that. We all know the Delta already has a problem with salinity intrusion from the bay. The plan has statements in it where it recognizes and candidly does admit that a lot of that is due, of

No comments

- n/a -



course, to the already extensive diversions of water from the Sacramento River and from the Delta.

In light of that, to add massive new conveyance, improved conveyance, optimizing diversions in the wet years, it just looks like creating a massive double whammy. Kind of a two-front war for the Delta facing a surge of salinity intrusion from the Bay. And at the same time taking out the fresh water upstream from the Delta. RI14-3

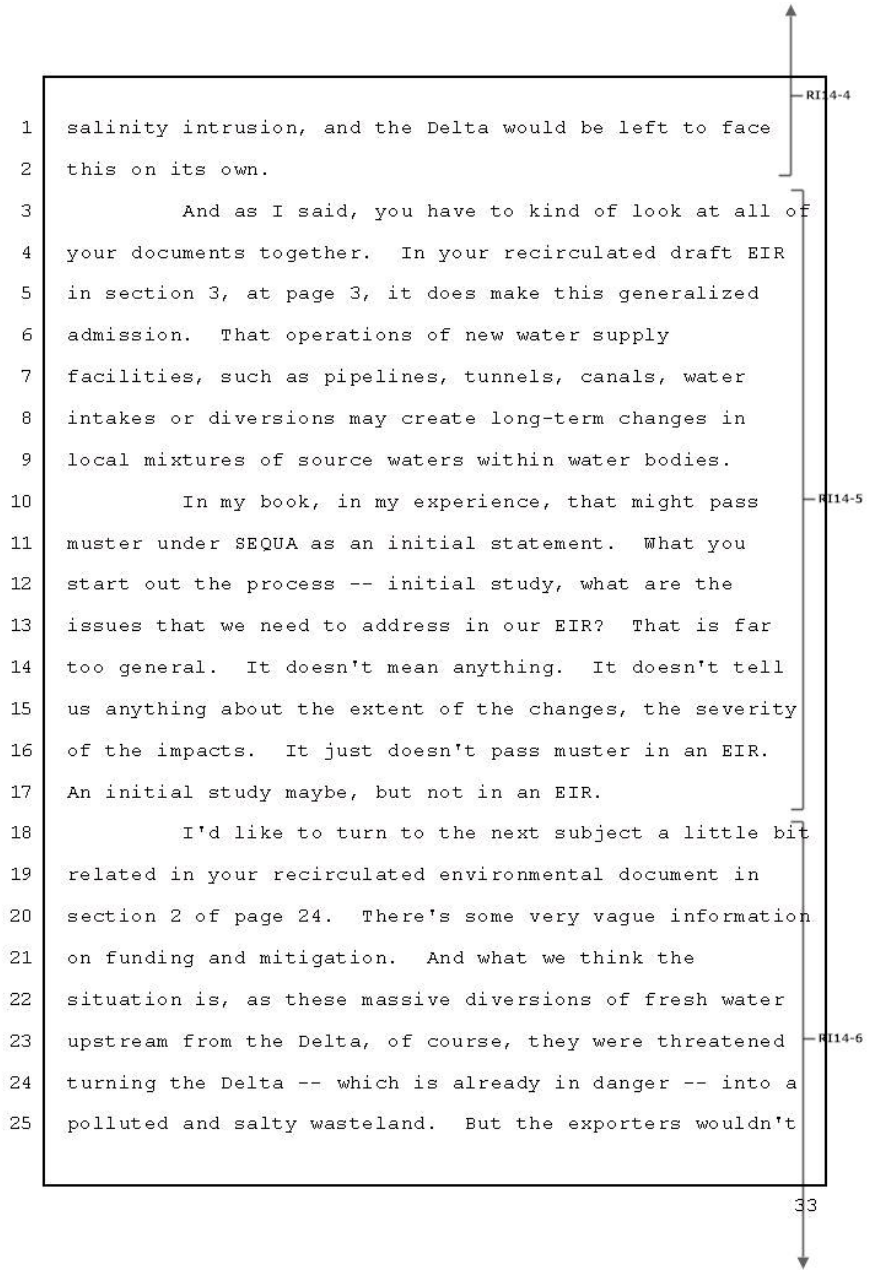
Now, if you went instead with the alternative that the Environmental Water Caucus is called for, which you've numbered as Alternative 2, to maintain through Delta conveyance in continue pumping from the South Delta. At least the fresh water that the exporters take remains in the Delta. It's there to be used, to help fight pollution, help fight salinity intrusion, help protect agriculture, commerce, and endangered fish species before it's taken. And what that also does is it keeps everybody on the same page. And that the exporters like the Delta itself do have some interest in trying to win the war against salinity intrusion in the Delta, because they also are presently taking from the south end of the Delta. RI14-4

If this new conveyance that your plan is in regulations encourage and recommend. If that comes about, then the sky is the limit. The exporters will be taking water upstream from the Delta and not be affected by the

32

Response to comment RI14-4

The range of alternatives analyzed in the EIR is a reasonable range of alternatives based on thorough consideration of public input and the requirements of CEQA. The Delta Plan does not include a Delta conveyance facility of the type described in the comment, and thus the EIR neither analyzes the impacts of such a facility nor considers alternatives to one. Regarding the relationship of BDCP and the Delta Plan, please see Master Response 1. Regarding the development and selection of the range of alternatives considered in the EIR, please refer to Master Response 3.



Response to comment RI14-5

Please see the response to comment RI14-3. The Delta Plan EIR is a program-level EIR and the level of detail is adequate for the program EIR approach, as described in Master Response 2.

Response to comment RI14-6

Please see the response to comment RI14-3 and Master Response 1. Future lead agencies will have the obligation under CEQA to mitigate the significant impacts of projects regardless of bond measures or any other circumstances. Please see Master Response 4. The EIR is not intended to, and could not, provide take authorization under the federal Endangered Species Act for the Delta Plan, or for any project encouraged by the Delta Plan. The Delta Plan's significant adverse impacts related to biological resources, including special-status species, are discussed in Section 4 of the EIR. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in DEIR and RDEIR Sections 22 and 23.

be paying to fight that problem or attempt to mitigate it. That would be stuck on the taxpayers and the business and agricultural and fishing interest in the Delta itself.

We think that's wrong. And we think if you're going to encourage this kind of diversion of water upstream from the Delta, then the exporter should be taking the water and benefitting from it. The only right and just thing to do would be to have them pay for everything caused by what they've taken.

Now, that's kind of a policy view, but there's also a legal issue there under the Endangered Species Act. The 9th Circuit recently came out with a decision in Center for Biological Diversity versus United States Bureau of Land Management. It's called the Ruby Pipeline Case. We're citing it in our written comments. I'll be happy to furnish citations orally if you want me to. RI14-6

MR. ISENBERG: It'll come in the written version.

MR. WRIGHT: It'll be in the written version.

They've made it really clear, there's no discretion under the Endangered Species Act to authorize a project that would jeopardize survival of listed fish or adversely modify critical habitat. And also mitigation measures, they must be there, they must be real and assured. And what I said earlier about the exporters trying to shift the cost of attempting to deal with a

No comments

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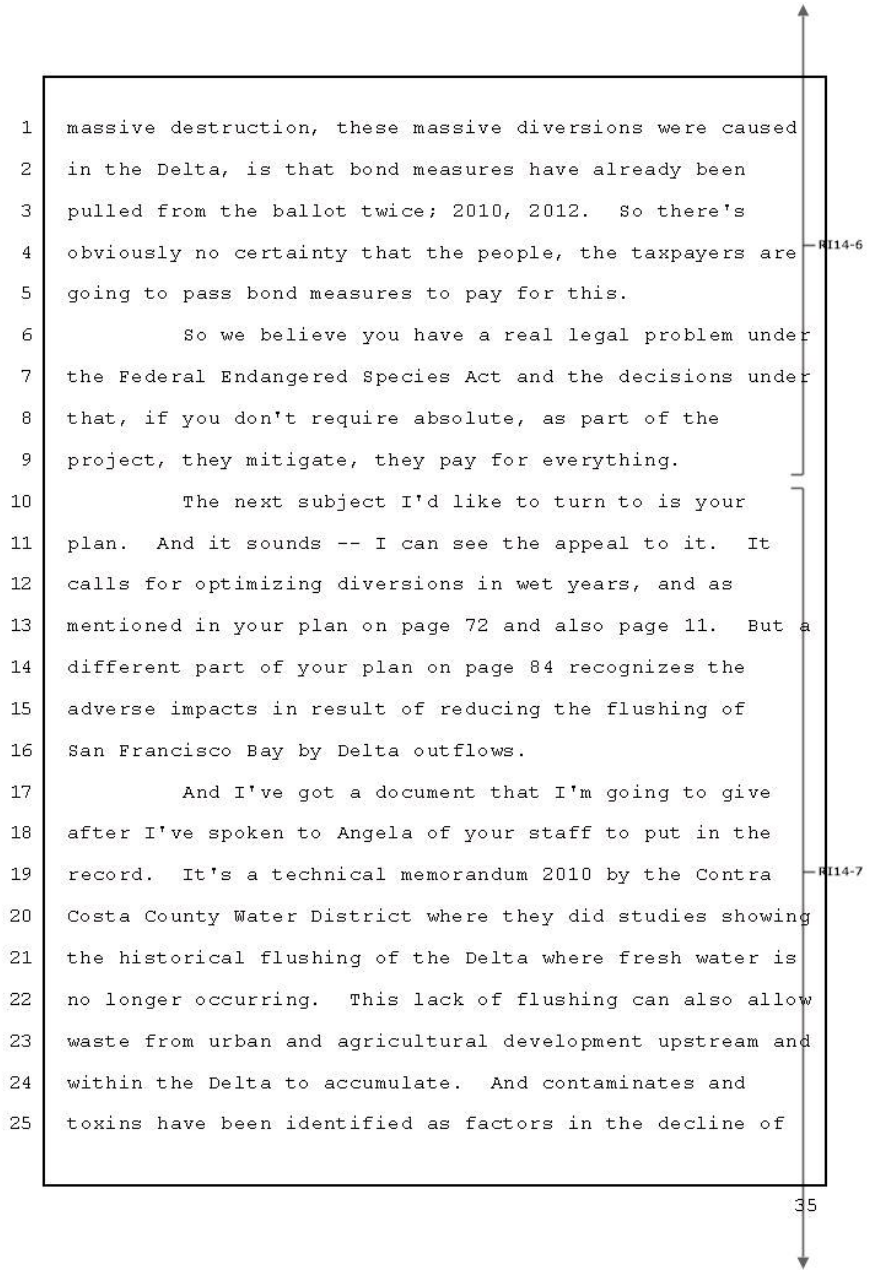


massive destruction, these massive diversions were caused in the Delta, is that bond measures have already been pulled from the ballot twice; 2010, 2012. So there's obviously no certainty that the people, the taxpayers are going to pass bond measures to pay for this. RI14-6

So we believe you have a real legal problem under the Federal Endangered Species Act and the decisions under that, if you don't require absolute, as part of the project, they mitigate, they pay for everything.

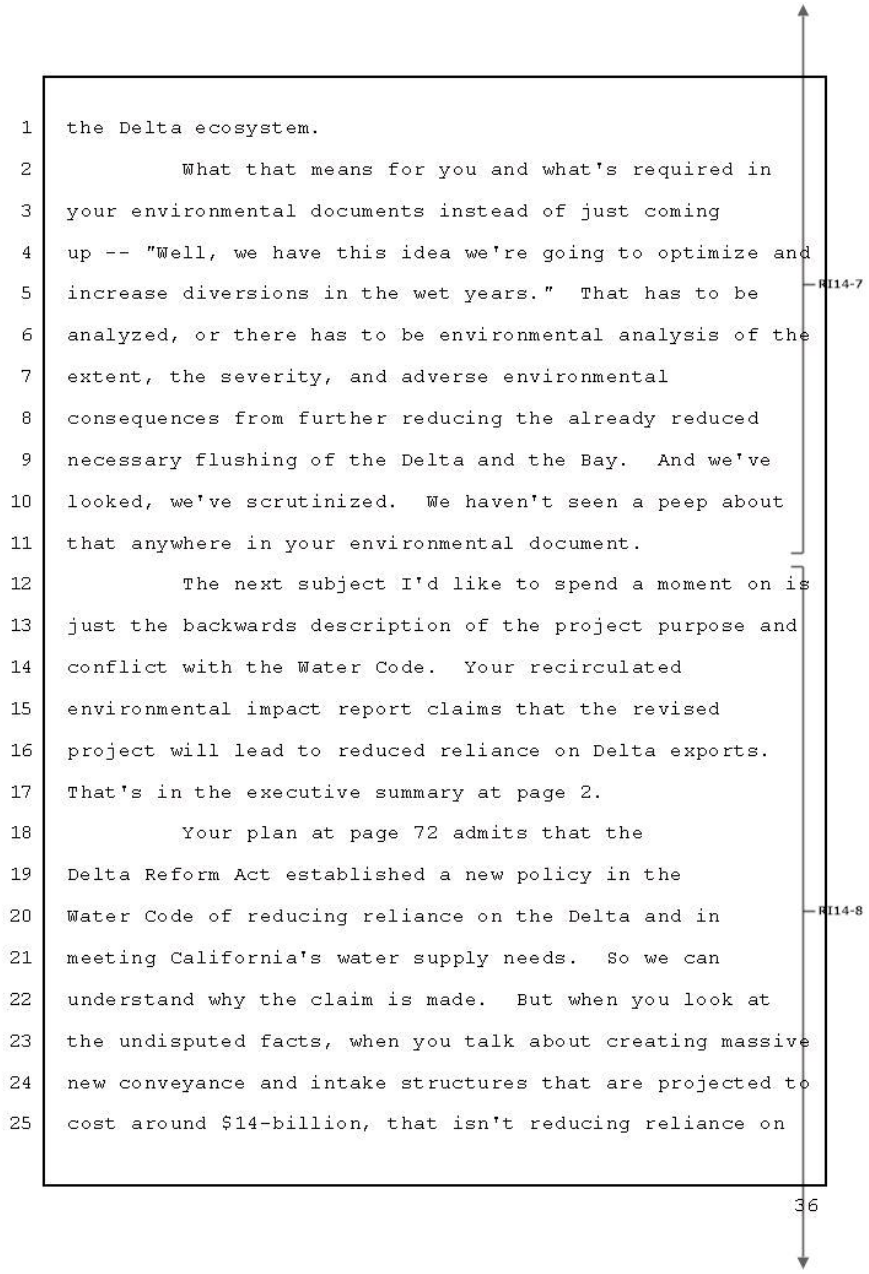
The next subject I'd like to turn to is your plan. And it sounds -- I can see the appeal to it. It calls for optimizing diversions in wet years, and as mentioned in your plan on page 72 and also page 11. But a different part of your plan on page 84 recognizes the adverse impacts in result of reducing the flushing of San Francisco Bay by Delta outflows.

And I've got a document that I'm going to give after I've spoken to Angela of your staff to put in the record. It's a technical memorandum 2010 by the Contra Costa County Water District where they did studies showing the historical flushing of the Delta where fresh water is no longer occurring. This lack of flushing can also allow waste from urban and agricultural development upstream and within the Delta to accumulate. And contaminates and toxins have been identified as factors in the decline of RI14-7

35

Response to comment RI14-7

Policy ER P1 has been recategorized as Recommendation ER R1 and has been amended. It states that the SWRCB should adopt updated flow objectives for the Delta by 2014 and flow objectives for high-priority tributaries by 2018. Under ER P1, after the flow objectives are revised, they will be used to determine consistency with the Delta Plan. As described on page 2A-39, Lines 38 through 40, of the Draft Program EIR and Master Response 5, it is anticipated that implementation of updated water quality and flow objectives by the State Water Resources Control Board (SWRCB) could increase Delta outflow, reduce current reverse flow conditions in the south Delta, increase flows in restored Delta floodplains, and result in a more “natural flow regime” in the Delta. The potentially significant water resources impacts of the Final Draft Delta Plan–including those related to water quality—are analyzed in Section 3 of the RDPEIR. Water resources mitigation measures are indentified in RDPEIR subsection 3.4.3.6. Section 4 of the EIR analyzes impacts on biological resources.



the Delta ecosystem.

What that means for you and what's required in your environmental documents instead of just coming up -- "Well, we have this idea we're going to optimize and increase diversions in the wet years." That has to be analyzed, or there has to be environmental analysis of the extent, the severity, and adverse environmental consequences from further reducing the already reduced necessary flushing of the Delta and the Bay. And we've looked, we've scrutinized. We haven't seen a peep about that anywhere in your environmental document.

RI14-7

The next subject I'd like to spend a moment on is just the backwards description of the project purpose and conflict with the Water Code. Your recirculated environmental impact report claims that the revised project will lead to reduced reliance on Delta exports. That's in the executive summary at page 2.

Your plan at page 72 admits that the Delta Reform Act established a new policy in the Water Code of reducing reliance on the Delta and in meeting California's water supply needs. So we can understand why the claim is made. But when you look at the undisputed facts, when you talk about creating massive new conveyance and intake structures that are projected to cost around $14-billion, that isn't reducing reliance on

RI14-8

36

Response to comment RI14-8

This is a comment on the project, not on the EIR. Please see the response to comment RI14-3 and Master Response 1. As stated in the Revised Draft PEIR at page ES-4, the Project's objectives are: "Furthering achievement of the coequal goals and the eight 'inherent' objectives, in a manner that (1) furthers the statewide policy to reduce reliance on the Delta in meeting the state's future water supply needs through regional self-reliance, (2) is consistent with specific statutory content requirements for the Delta Plan, (3) is implementable in a comprehensive, concurrent, and interrelated fashion, and (4) is accomplished as rapidly as realistically possible without jeopardizing ultimate success." These objectives reflect the priorities and goals that the Legislature set for the Delta Plan and the Delta Stewardship Council in the Delta Reform Act, including the coequal goals (Public Resources Code § 29702(a), the objectives inherent in those goals (Water Code § 85020), and the statewide policy to reduce reliance on the delta (Water Code § 85021). Policy WR P1 in the Delta Plan implements the State policy to reduce reliance on the Delta and improve regional self reliance.

the Delta. That's increasing it. That's a huge expensive Public Work's Project. And what we call upon you to do is either, well, drop the call for new conveyance, improve conveyance, anything other than maintaining existing through-Delta conveyance. Or require your EIR consultants and repairs to candidly set forth that this would not reduce reliance on the Delta. The truth is this would increase reliance on the Delta.

And that's what we call upon you to do. Is either drop it -- that's our first choice. But if you don't drop it, require candor and serve the people and all of the folks involved in this and interested in it with a really candid admission. Because that's the kind of thing RI14-8
that nobody is really going to buy that. It's just kind of like if I was to claim right now that it's nighttime outside. Well, it's not. It's daytime. Anybody can say that, but it doesn't make it so.

And in fact in your recirculated environmental document in section 24 at pages 13 and 14, there that sets out that when you use resources, you make a large commitment of resources, that makes removal or nonuse therefore unlikely and generally commits future generations to similar uses.

So in other words, if you build it, it's going to be used. And that's going to be increasing reliance on

No comments

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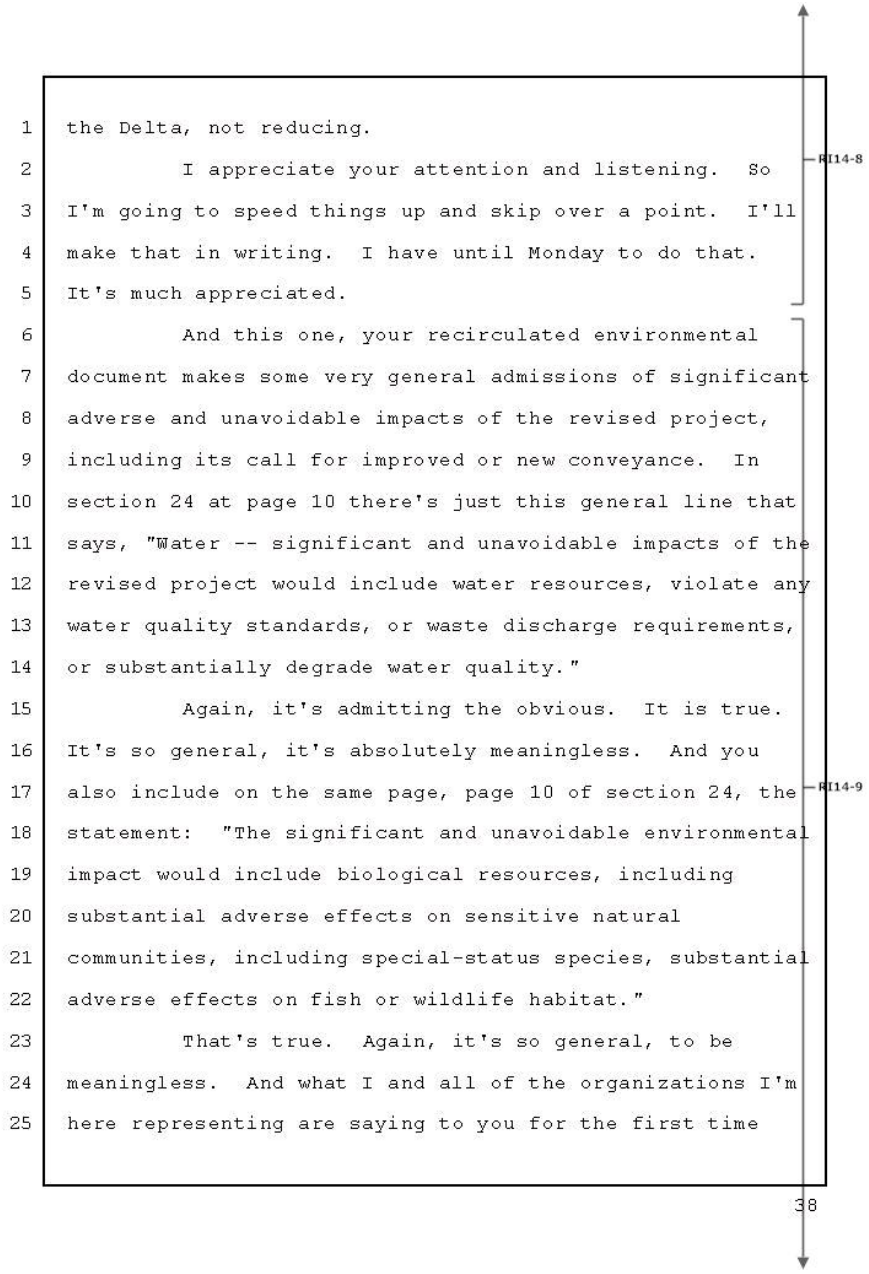

the Delta, not reducing.

I appreciate your attention and listening. So I'm going to speed things up and skip over a point. I'll make that in writing. I have until Monday to do that. It's much appreciated. RI14-8

And this one, your recirculated environmental document makes some very general admissions of significant adverse and unavoidable impacts of the revised project, including its call for improved or new conveyance. In section 24 at page 10 there's just this general line that says, "Water -- significant and unavoidable impacts of the revised project would include water resources, violate any water quality standards, or waste discharge requirements, or substantially degrade water quality."

Again, it's admitting the obvious. It is true. It's so general, it's absolutely meaningless. And you also include on the same page, page 10 of section 24, the statement: "The significant and unavoidable environmental impact would include biological resources, including substantial adverse effects on sensitive natural communities, including special-status species, substantial adverse effects on fish or wildlife habitat." RI14-9

That's true. Again, it's so general, to be meaningless. And what I and all of the organizations I'm here representing are saying to you for the first time

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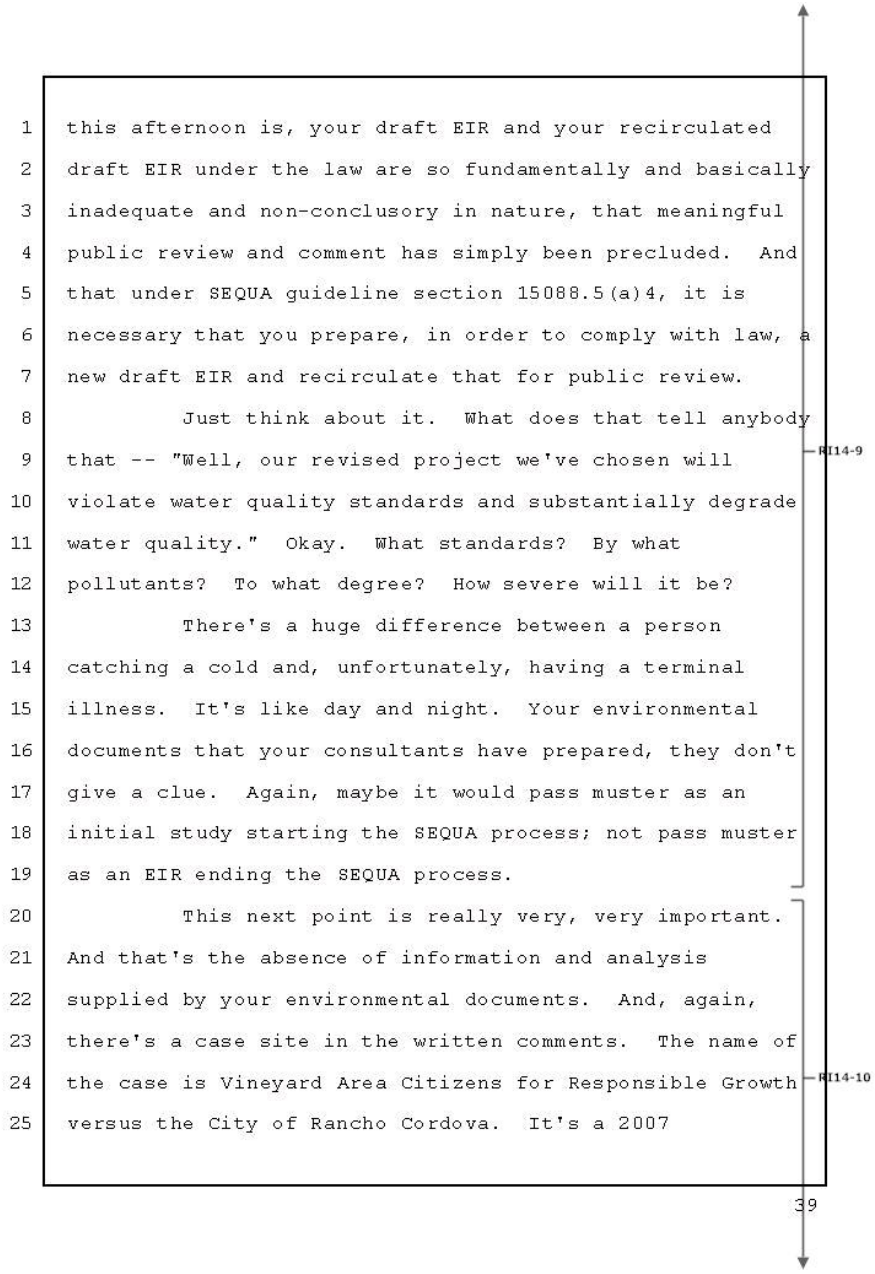
Response to comment RI14-9

Please refer to Master Response 2. As described in Section 2B of the Draft Program EIR, the Delta Stewardship Council does not propose or contemplate directly authorizing any physical activities, including but not limited to construction or operation of infrastructure. Rather, through the Delta Plan, the Delta Stewardship Council seeks to influence the actions, activities, and/or projects of other agencies, the details of which would be under the jurisdiction and authority of the agencies that will propose them in the future and conduct future environmental review. To the extent known, projects that may be encouraged by the Delta Plan are named in the EIR. In addition, types of projects that may be encouraged by the Delta Plan are identified. Accordingly, in the absence of specific proposed physical projects, this EIR makes a good faith effort to disclose the potentially significant environmental effects of the types of projects that may be encouraged by the Delta Plan and to identify program-level mitigation measures. Impacts on each of the potentially affected resources areas are analyzed at a program level in Sections 3 through 21 of this EIR.



this afternoon is, your draft EIR and your recirculated draft EIR under the law are so fundamentally and basically inadequate and non-conclusory in nature, that meaningful public review and comment has simply been precluded. And that under SEQUA guideline section 15088.5(a)4, it is necessary that you prepare, in order to comply with law, a new draft EIR and recirculate that for public review.

Just think about it. What does that tell anybody that -- "Well, our revised project we've chosen will violate water quality standards and substantially degrade water quality." Okay. What standards? By what pollutants? To what degree? How severe will it be? RI14-9

There's a huge difference between a person catching a cold and, unfortunately, having a terminal illness. It's like day and night. Your environmental documents that your consultants have prepared, they don't give a clue. Again, maybe it would pass muster as an initial study starting the SEQUA process; not pass muster as an EIR ending the SEQUA process.

This next point is really very, very important. And that's the absence of information and analysis supplied by your environmental documents. And, again, there's a case site in the written comments. The name of the case is Vineyard Area Citizens for Responsible Growth versus the City of Rancho Cordova. It's a 2007 RI14-10

39

Response to comment RI14-10

Please see Master Response 1. As described in Section 23 of the Recirculated Draft Program EIR, if completed and approved by the California Department of Fish and Wildlife, the BDCP must be considered by the Delta Stewardship Council and included in the Delta Plan as required by the Delta Reform Act (Water Code section 85320 et seq.). DWR is the California Environmental Quality Act (CEQA) lead agency for the BDCP. Policy ER P1 has been recategorized as Recommendation ER R1 and has been amended. It states that the SWRCB should adopt updated flow objectives for the Delta by 2014 and flow objectives for high-priority tributaries by 2018. Under ER P1, after the flow objectives are revised, they will be used to determine consistency with the Delta Plan. Please see Section 2 of this FEIR for the complete text of the policies and recommendations. CEQA does not require a cost-benefit analysis. CEQA Guidelines §§ 15064(e), 15131; see also Master Response 2.

California Supreme Court Case. It's SEQUA case dealing with water supply issues that frankly paled in significance -- that was for a development project -- to the water supply issues here. And the California Supreme Court made it clear that the EIR must provide facts that allow the reader to evaluate the pros and cons of supplying the needed amount of water, must analyze the environmental impacts of utilizing the particular resources of long-term water supply, and that the key is that an EIR that neglects to explain the likely sources of water and analyzer impacts, but leaves long-term water supply considerations to later stages of the project, does not share the purpose of sounding an environmental alarm bell before the project has taken on overwhelming bureaucratic and financial momentum.

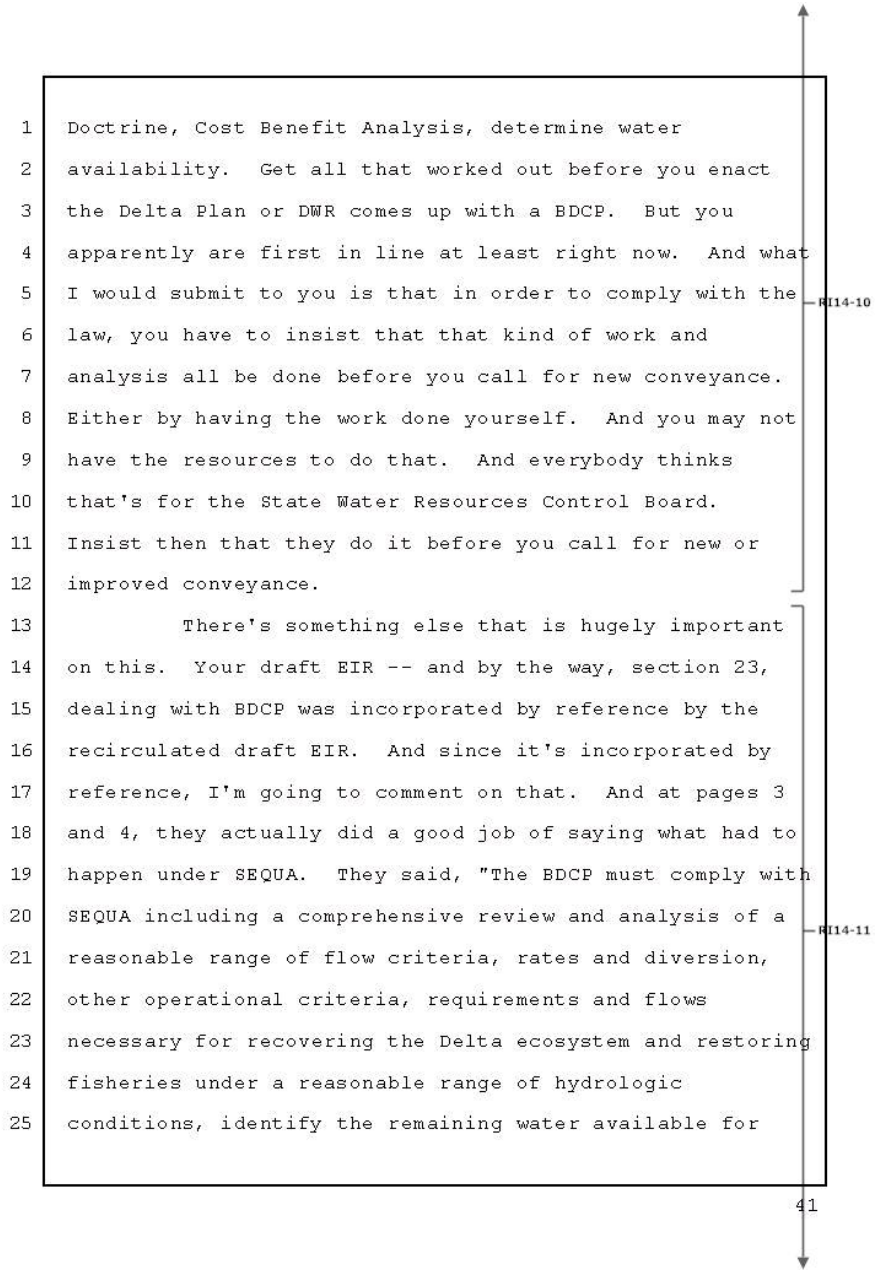
RI14-10

And that's absolutely what we're concerned about here. Delta Plan calls for new and improved conveyance. Then the BDC process, they finish Delta tunnels. And, oh by the way, this is consistent with the Delta Plan, because the Delta Plan called for new and improved conveyance. And that's what we're doing.

What I'm saying to you, Mr. Chairman and council members, is that you're in a historic position. I would submit to you that the State Water Resources should be going first to do its analysis under the Public Trust

No comments

- n/a -



Doctrine, Cost Benefit Analysis, determine water availability. Get all that worked out before you enact the Delta Plan or DWR comes up with a BDCP. But you apparently are first in line at least right now. And what I would submit to you is that in order to comply with the law, you have to insist that that kind of work and analysis all be done before you call for new conveyance. Either by having the work done yourself. And you may not have the resources to do that. And everybody thinks that's for the State Water Resources Control Board. Insist then that they do it before you call for new or improved conveyance.

RI14-10

There's something else that is hugely important on this. Your draft EIR -- and by the way, section 23, dealing with BDCP was incorporated by reference by the recirculated draft EIR. And since it's incorporated by reference, I'm going to comment on that. And at pages 3 and 4, they actually did a good job of saying what had to happen under SEQUA. They said, "The BDCP must comply with SEQUA including a comprehensive review and analysis of a reasonable range of flow criteria, rates and diversion, other operational criteria, requirements and flows necessary for recovering the Delta ecosystem and restoring fisheries under a reasonable range of hydrologic conditions, identify the remaining water available for

RI14-11

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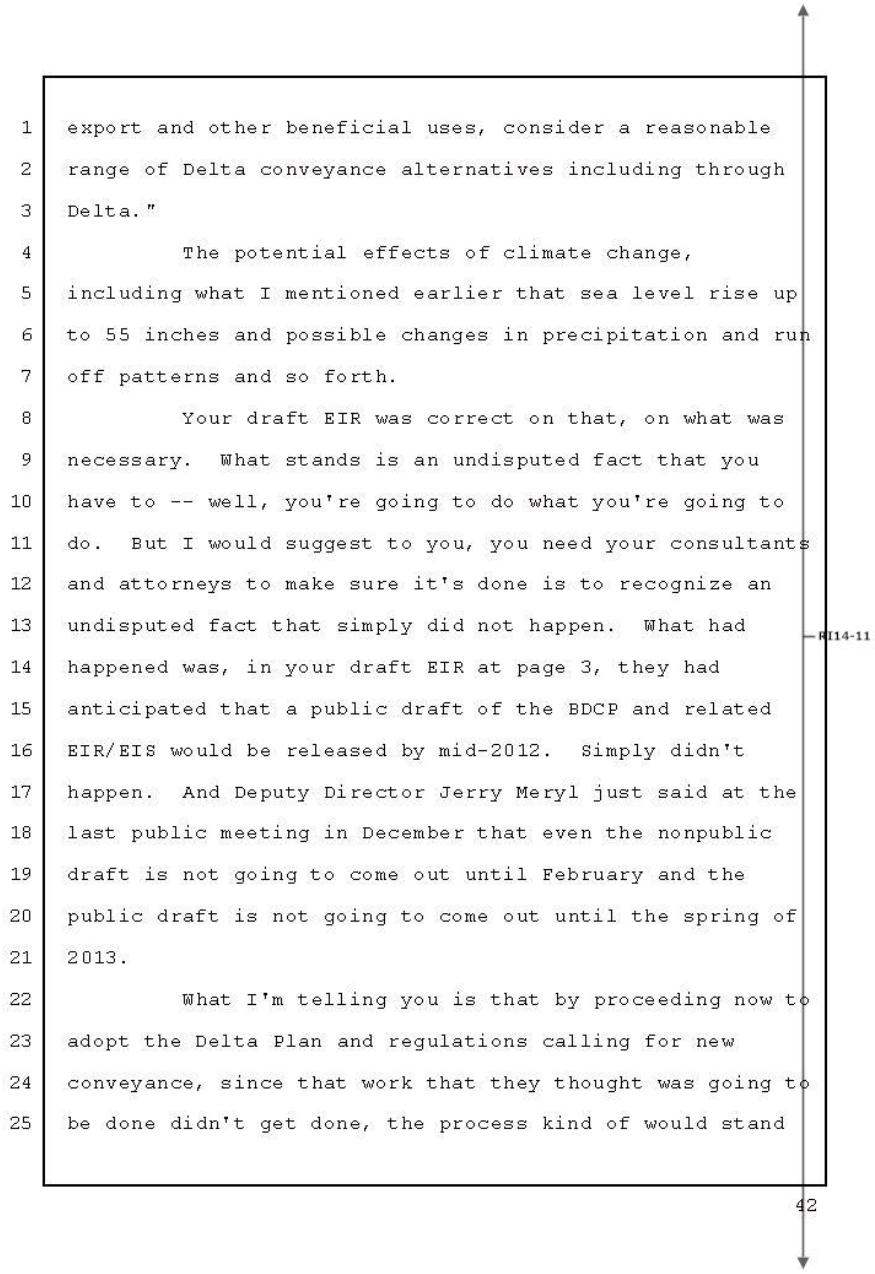
Response to comment RI14-11

Please see the response to comments RI14-3 and RI14-10, as well as Master Response 1. As described in Section 23 of the Recirculated Draft Program EIR, if completed and approved by the California Department of Fish and Wildlife, the BDCP must be considered by the Delta Stewardship Council and included in the Delta Plan as required by the Delta Reform Act (Water Code section 85320 et seq.). DWR is the California Environmental Quality Act (CEQA) lead agency for the BDCP. The Delta Reform Act potentially gives the Council three distinct but connected roles related to Delta water conveyance: contingent authority to approve proposed conveyance improvements, authority to generally recommend conveyance options in the Delta Plan, and authority to provide comments to other agencies during the BDCP process. Conveyance options are currently being studied in detail by the agencies and interested parties preparing the BDCP and the related EIR/EIS. If a government agency, such as DWR, proposes to implement the BDCP preferred conveyance project, the BDCP preferred conveyance project would be consistent with the Delta Plan regardless of whether the Delta Plan had previously endorsed a different conveyance option. Accordingly, the Council's regulatory authority over conveyance is contingent upon a different conveyance project being proposed and becoming a covered action prior to BDCP's incorporation into the Delta Plan. It is highly unlikely that a non-BDCP conveyance project would be proposed as a covered action to come before the Council prior to BDCP completion. For this reason, the Delta Plan does not include any regulatory policies regarding Delta conveyance. The Delta Plan includes recommendations to DWR should the BDCP process not be completed by December 31, 2014, for the Council to consider approaches to develop and complete the ecosystem and conveyance planning process without BDCP. If the Council then decides to amend the Delta Plan to include regulatory policies regarding Delta conveyance, the Council would do so only after extensive analysis of the conveyance options and associated detailed environmental review. The environmental setting (baseline) for the analysis in this EIR consists of the existing conditions at the time of the publication of the Notice of Preparation of this EIR in December 2010, which is the normal CEQA environmental baseline pursuant to CEQA Guidelines section 15125(a). As discussed in Master Response 3 and section 25 of the Recirculated Draft PEIR, Alternative 2 is not environmental superior to the Revised Project (the Final Draft Delta Plan), because it would bring about more uncertainty regarding water supply and more conversion of agricultural land to non-agricultural uses than the Revised Project.


export and other beneficial uses, consider a reasonable range of Delta conveyance alternatives including through Delta."

The potential effects of climate change, including what I mentioned earlier that sea level rise up to 55 inches and possible changes in precipitation and run off patterns and so forth.

Your draft EIR was correct on that, on what was necessary. What stands is an undisputed fact that you have to -- well, you're going to do what you're going to do. But I would suggest to you, you need your consultants and attorneys to make sure it's done is to recognize an undisputed fact that simply did not happen. What had happened was, in your draft EIR at page 3, they had anticipated that a public draft of the BDCP and related EIR/EIS would be released by mid-2012. Simply didn't happen. And Deputy Director Jerry Meryl just said at the last public meeting in December that even the nonpublic draft is not going to come out until February and the public draft is not going to come out until the spring of 2013.

What I'm telling you is that by proceeding now to adopt the Delta Plan and regulations calling for new conveyance, since that work that they thought was going to be done didn't get done, the process kind of would stand

RI14-11

42

No comments

- n/a -

indicted and convicted by your own draft EIR. And that's a pretty serious problem.

Again, our point is that some public agency has to do this work under SEQUA, the Public Trust Doctrine, before new conveyance is called for. That's the most important part of the whole decision making process. Whether or not to build or not to build. To build or not to build new conveyance. That's huge, and that's what has simply been absolutely overlooked; just treated as a given, an ipse dixit or an assumption.

And that jumps into my next point; not now, not ever. Back in May of 2011 the National Academy of Science, when it was reviewing the draft BDCP plan said that choosing the alternative project before evaluating alternative ways to reach your preferred outcome, would be post-talk rationalization. In other words, putting the cart before the horse. Scientific reasons for not considering alternative actions are not presented in the plan. That's still true today. Scientific reasons have not been considered and evaluated for not considering alternatives grounded on not building and developing new conveyance. RI14-11

There's another problem with your recirculated draft EIR, is between your last environmental document and the recirculated one, the federal and state fishery

No comments

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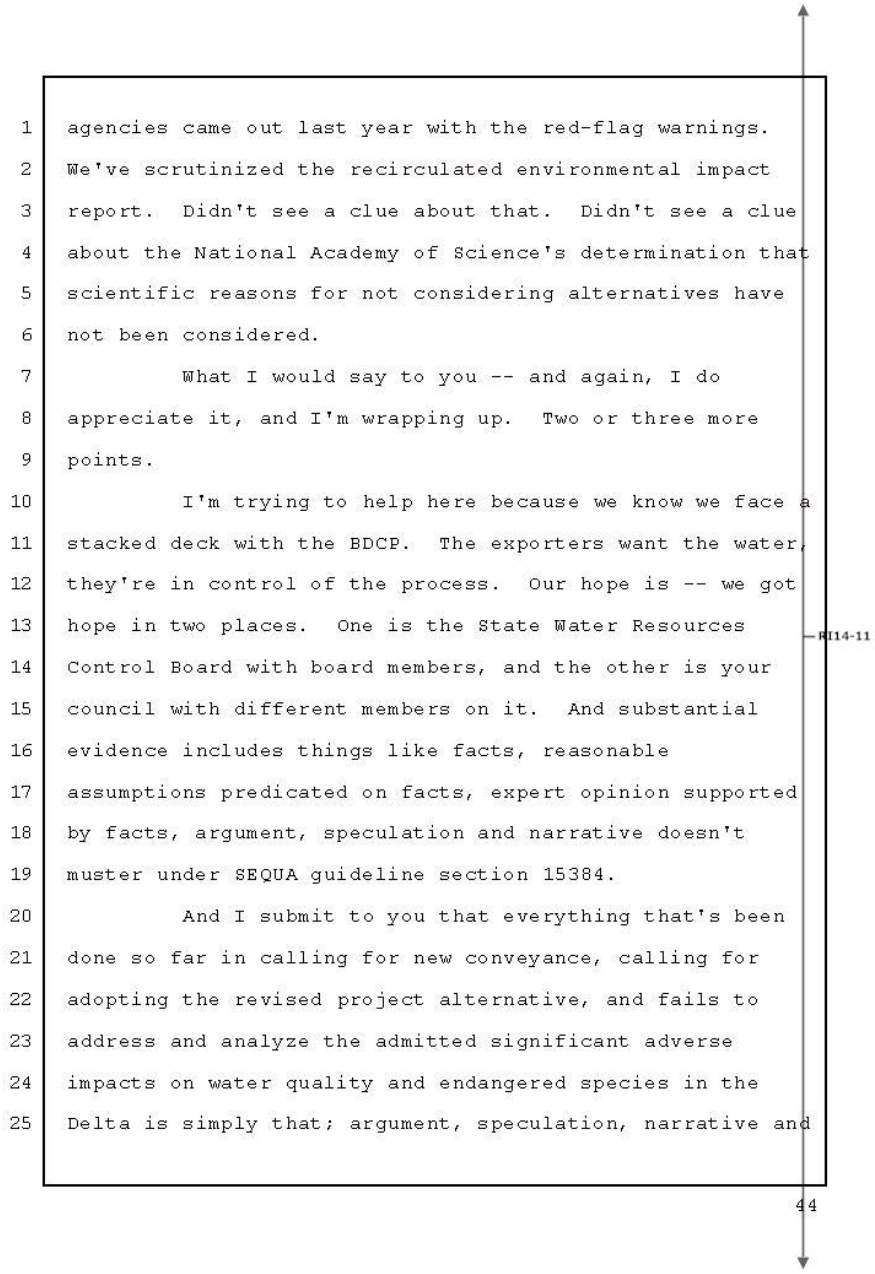
agencies came out last year with the red-flag warnings. We've scrutinized the recirculated environmental impact report. Didn't see a clue about that. Didn't see a clue about the National Academy of Science's determination that scientific reasons for not considering alternatives have not been considered.

What I would say to you -- and again, I do appreciate it, and I'm wrapping up. Two or three more points.

I'm trying to help here because we know we face a stacked deck with the BDCP. The exporters want the water, they're in control of the process. Our hope is -- we got hope in two places. One is the State Water Resources Control Board with board members, and the other is your council with different members on it. And substantial evidence includes things like facts, reasonable assumptions predicated on facts, expert opinion supported by facts, argument, speculation and narrative doesn't muster under SEQUA guideline section 15384.

And I submit to you that everything that's been done so far in calling for new conveyance, calling for adopting the revised project alternative, and fails to address and analyze the admitted significant adverse impacts on water quality and endangered species in the Delta is simply that; argument, speculation, narrative and

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RI14-11

No comments

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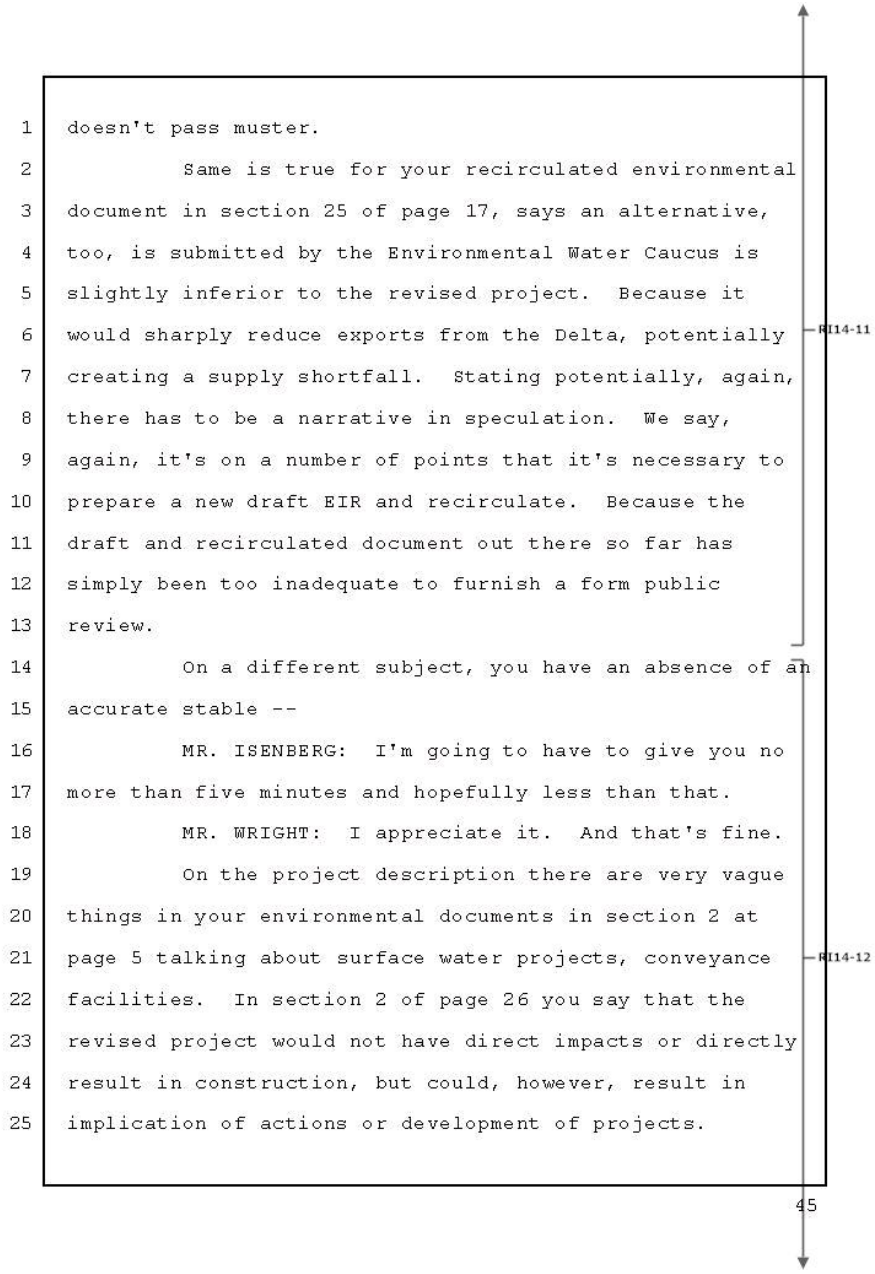
doesn't pass muster.

Same is true for your recirculated environmental document in section 25 of page 17, says an alternative, too, is submitted by the Environmental Water Caucus is slightly inferior to the revised project. Because it would sharply reduce exports from the Delta, potentially creating a supply shortfall. Stating potentially, again, there has to be a narrative in speculation. We say, again, it's on a number of points that it's necessary to prepare a new draft EIR and recirculate. Because the draft and recirculated document out there so far has simply been too inadequate to furnish a form public review.

RI14-11

On a different subject, you have an absence of an accurate stable --

MR. ISENBERG: I'm going to have to give you no more than five minutes and hopefully less than that.

MR. WRIGHT: I appreciate it. And that's fine.

On the project description there are very vague things in your environmental documents in section 2 at page 5 talking about surface water projects, conveyance facilities. In section 2 of page 26 you say that the revised project would not have direct impacts or directly result in construction, but could, however, result in implication of actions or development of projects.

RI14-12

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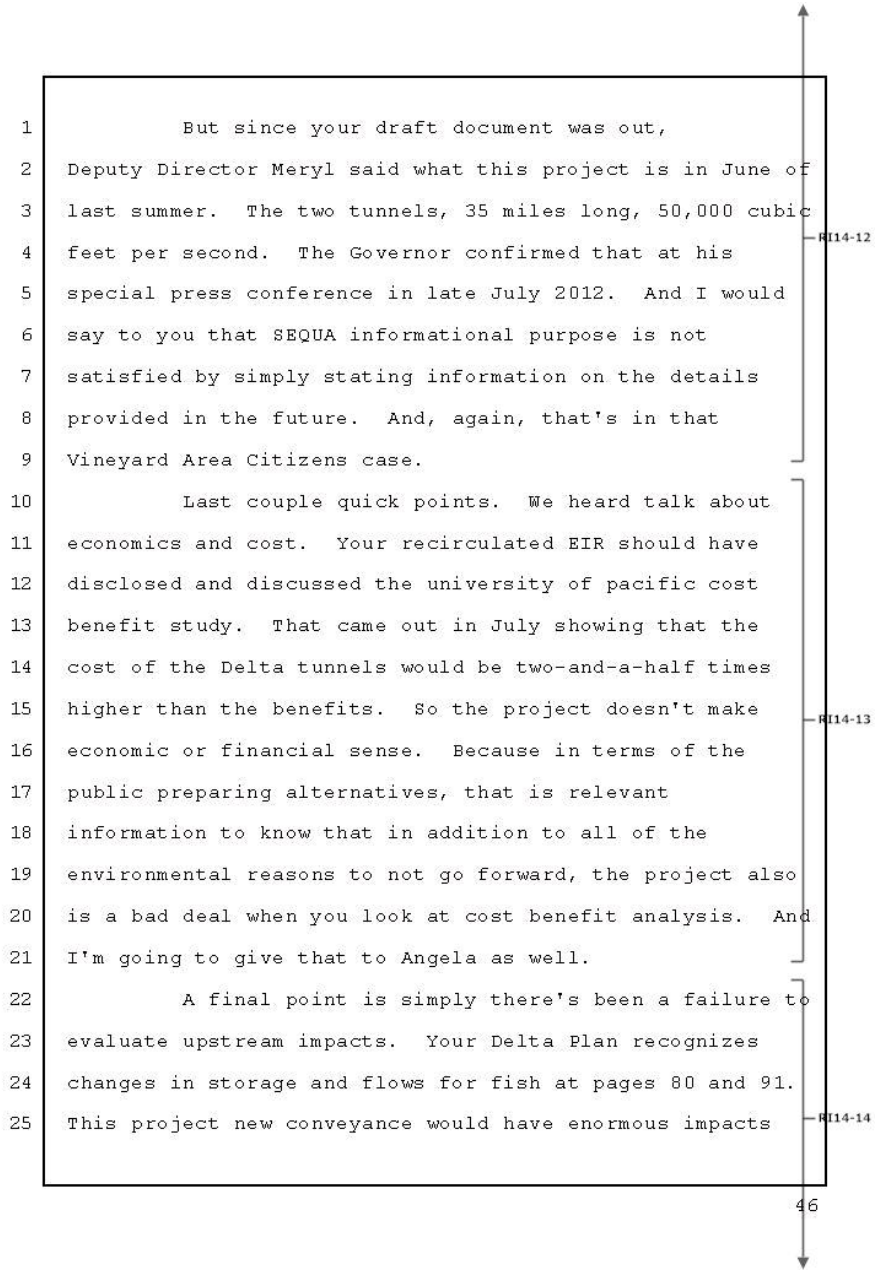
Response to comment RI14-12

Please see the response to comment RI14-3 and Master Response 1.



But since your draft document was out, Deputy Director Meryl said what this project is in June of last summer. The two tunnels, 35 miles long, 50,000 cubic feet per second. The Governor confirmed that at his special press conference in late July 2012. And I would say to you that SEQUA informational purpose is not satisfied by simply stating information on the details provided in the future. And, again, that's in that Vineyard Area Citizens case.

Last couple quick points. We heard talk about economics and cost. Your recirculated EIR should have disclosed and discussed the university of pacific cost benefit study. That came out in July showing that the cost of the Delta tunnels would be two-and-a-half times higher than the benefits. So the project doesn't make economic or financial sense. Because in terms of the public preparing alternatives, that is relevant information to know that in addition to all of the environmental reasons to not go forward, the project also is a bad deal when you look at cost benefit analysis. And I'm going to give that to Angela as well.

A final point is simply there's been a failure to evaluate upstream impacts. Your Delta Plan recognizes changes in storage and flows for fish at pages 80 and 91. This project new conveyance would have enormous impacts

RI14-12

RI14-13

RI14-14

46

Response to comment RI14-13

The BDCP is a separate project, for which the Department of Water Resources is the lead agency. It is not a part of the Delta Plan and was therefore addressed in Sections 22 and 23 of the EIR, as further explained in Master Response 1. Furthermore, CEQA does not require a cost-benefit analysis. See Master Response 2.

Response to comment RI14-14

The proposed BDCP is a reasonably foreseeable future project that is not part of the Delta Plan. It is being evaluated by the Department of Water Resources as the CEQA lead agency. The cumulative impacts of the proposed Delta Plan, in combination with the impact of the proposed BDCP, are described in EIR Sections 22 and 23. Please refer to Master Response 1. Please refer to Master Response 5 regarding upstream impacts of the Delta Plan, including on fisheries.

requiring changes in reservoir operations upstream, affecting minimum flows, storage so forth for fish presentation purposes.

I would simply wrap up and conclude by saying that the first step in this whole deal is whether to call for new conveyance. That's a huge deal. That's on your plate. What we do is we object to approval of the plan and regulations in so far as they call for new conveyance, optimizing diversions, improve conveyance, and say that it's necessary to do the work, do the analysis before calling for that. RI14-14

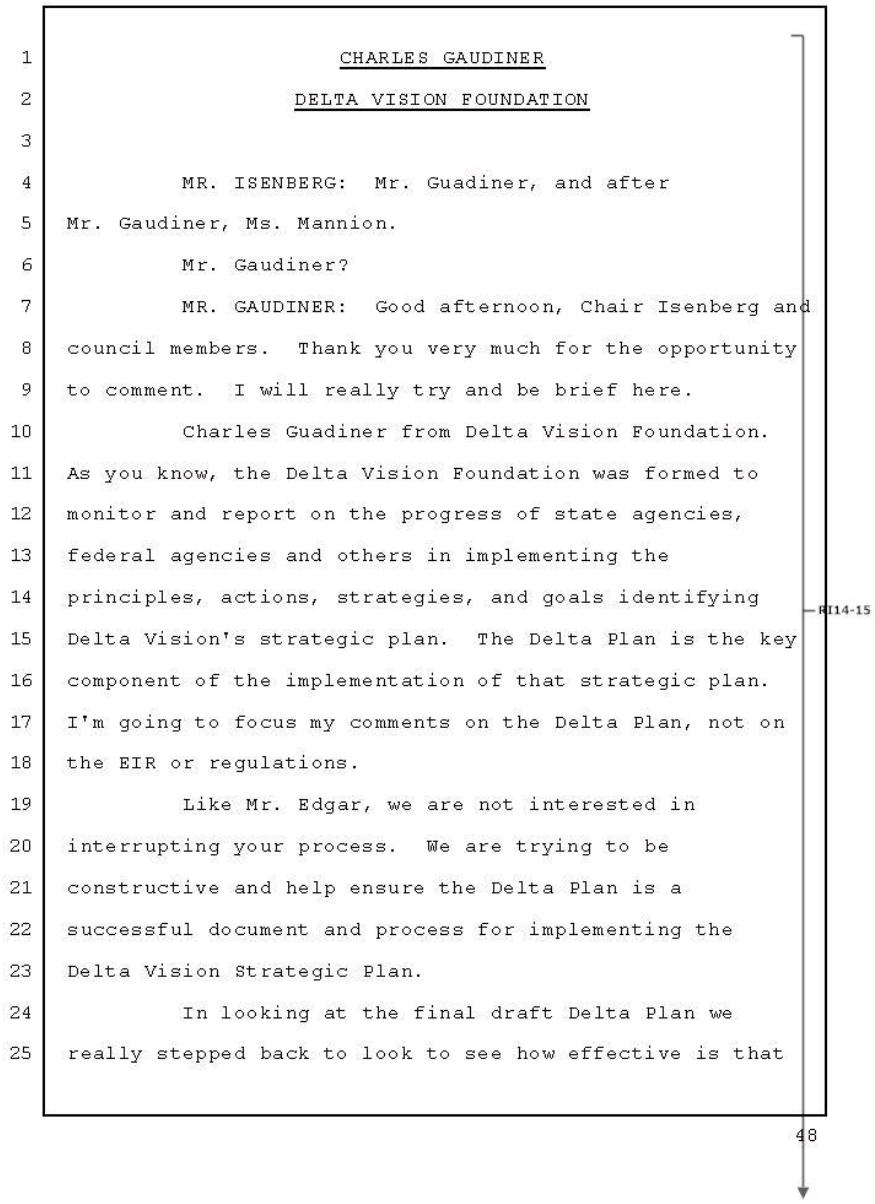
We do think that calling for new conveyance would start the journey that we believe would strike the last nail into a coffin for the Delta. That's why we're fighting so hard in trying to get that from happening.

Thank you. I'll leave my contact information to your staff and submit the exhibits to Angela. And the written comments of the Environmental Water Caucus, you'll receive those on Monday.

MR. ISENBERG: Thank you very much.

No comments

- n/a -



CHARLES GAUDINER

DELTA VISION FOUNDATION

MR. ISENBERG: Mr. Guadiner, and after Mr. Gaudiner, Ms. Mannion.

Mr. Gaudiner?

MR. GAUDINER: Good afternoon, Chair Isenberg and council members. Thank you very much for the opportunity to comment. I will really try and be brief here.

Charles Guadiner from Delta Vision Foundation. As you know, the Delta Vision Foundation was formed to monitor and report on the progress of state agencies, federal agencies and others in implementing the principles, actions, strategies, and goals identifying Delta Vision's strategic plan. The Delta Plan is the key component of the implementation of that strategic plan. I'm going to focus my comments on the Delta Plan, not on the EIR or regulations.

RI14-15

Like Mr. Edgar, we are not interested in interrupting your process. We are trying to be constructive and help ensure the Delta Plan is a successful document and process for implementing the Delta Vision Strategic Plan.

In looking at the final draft Delta Plan we really stepped back to look to see how effective is that

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Response to comment RI14-15

This is a comment on the project, not on the EIR.

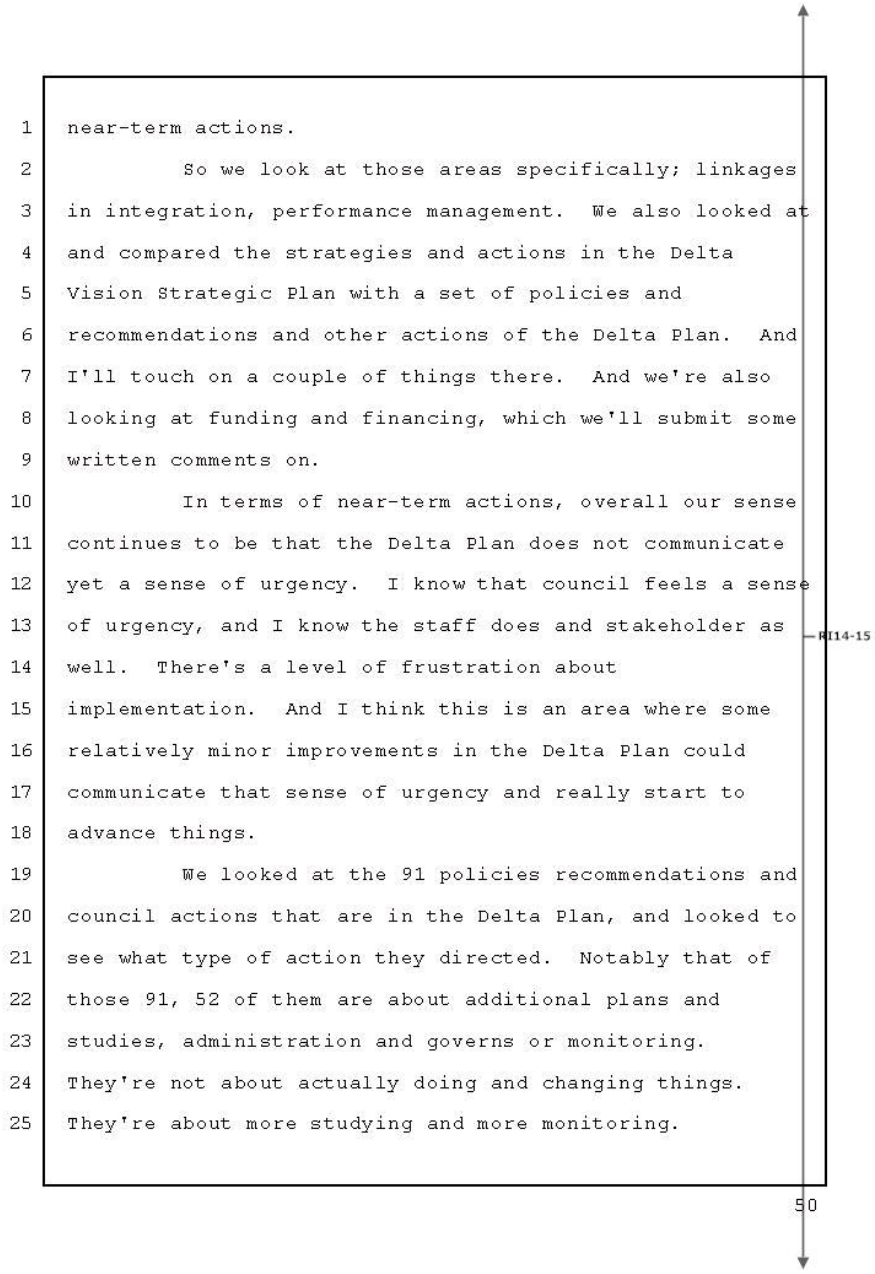
as a policy and plan document for achieving the goals and implementing Delta Vision Strategic Plan. And does that affectively describe this wicked problem in the Delta and the challenges and conflicts associated with that? And I think in that area it does a very good job. I actually still -- every time I read it I learn something new about the problems in the Delta or how current management works. So I think it's very affective at that. And it's relatively concise, which is hard to do.

The second question really doesn't set the state on a path to success. That is fundamentally different from prior plans. We've been around this loop several times of developing plans and trying to implement them and going back and developing more plans. So let me provide some overall comments and I'll drill down briefly. RI14-15

I think, as I mentioned, I think it's very effective at describing the problem, the history of the conditions, current management and the challenges. I think it does a decent job of identifying strategies that are needed in each resource area to address the problems. However, I think there's more work that can be done to describe a fundamentally different management strategy that would lead to more effective implementation. And I think that specifically in some areas related to performance management, the linkages and integration and

No comments

- n/a -


near-term actions.

So we look at those areas specifically; linkages in integration, performance management. We also looked at and compared the strategies and actions in the Delta Vision Strategic Plan with a set of policies and recommendations and other actions of the Delta Plan. And I'll touch on a couple of things there. And we're also looking at funding and financing, which we'll submit some written comments on.

In terms of near-term actions, overall our sense continues to be that the Delta Plan does not communicate yet a sense of urgency. I know that council feels a sense of urgency, and I know the staff does and stakeholder as well. There's a level of frustration about implementation. And I think this is an area where some relatively minor improvements in the Delta Plan could communicate that sense of urgency and really start to advance things.

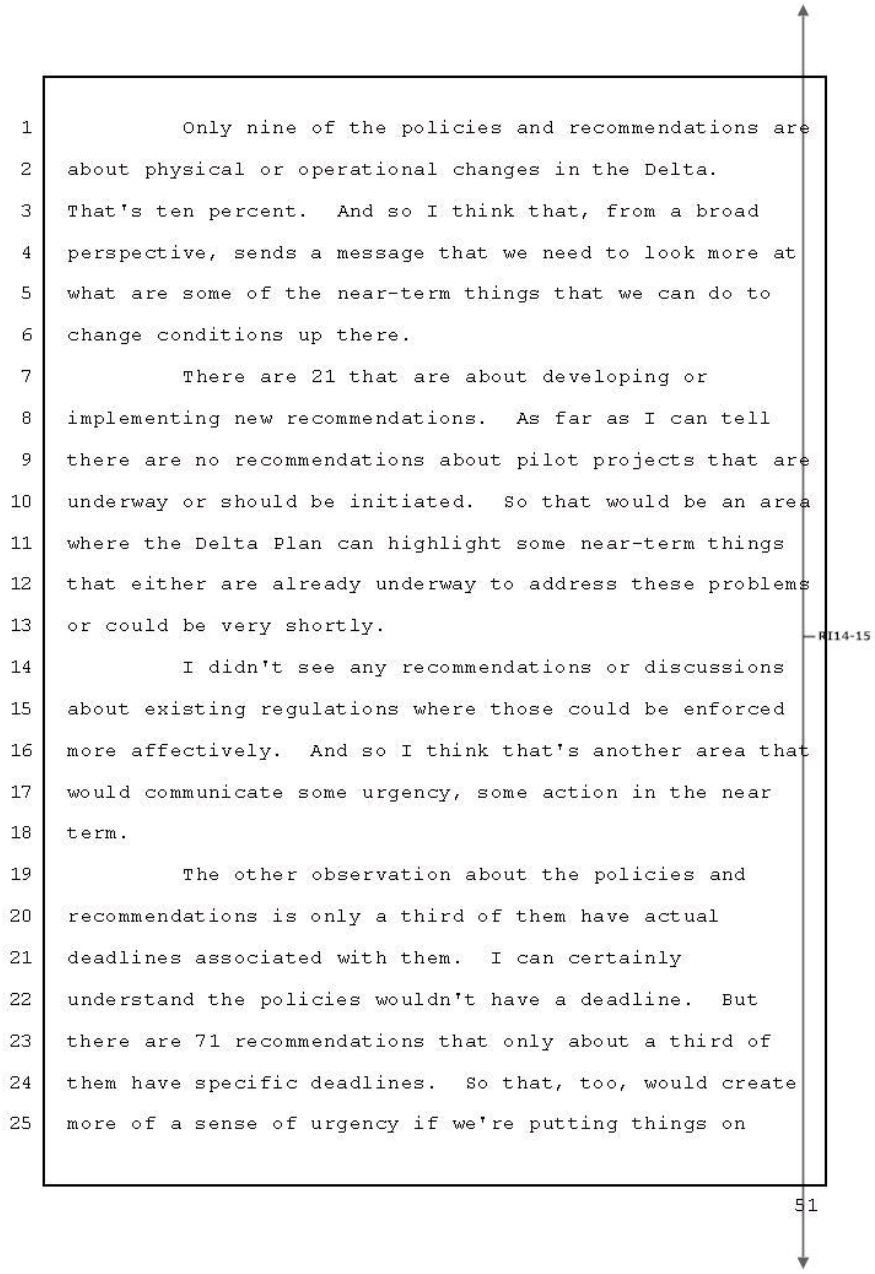
We looked at the 91 policies recommendations and council actions that are in the Delta Plan, and looked to see what type of action they directed. Notably that of those 91, 52 of them are about additional plans and studies, administration and governs or monitoring. They're not about actually doing and changing things. They're about more studying and more monitoring.

RI14-15

50

No comments

- n/a -



Only nine of the policies and recommendations are about physical or operational changes in the Delta. That's ten percent. And so I think that, from a broad perspective, sends a message that we need to look more at what are some of the near-term things that we can do to change conditions up there.

There are 21 that are about developing or implementing new recommendations. As far as I can tell there are no recommendations about pilot projects that are underway or should be initiated. So that would be an area where the Delta Plan can highlight some near-term things that either are already underway to address these problems or could be very shortly.

I didn't see any recommendations or discussions about existing regulations where those could be enforced more affectively. And so I think that's another area that would communicate some urgency, some action in the near term.

The other observation about the policies and recommendations is only a third of them have actual deadlines associated with them. I can certainly understand the policies wouldn't have a deadline. But there are 71 recommendations that only about a third of them have specific deadlines. So that, too, would create more of a sense of urgency if we're putting things on

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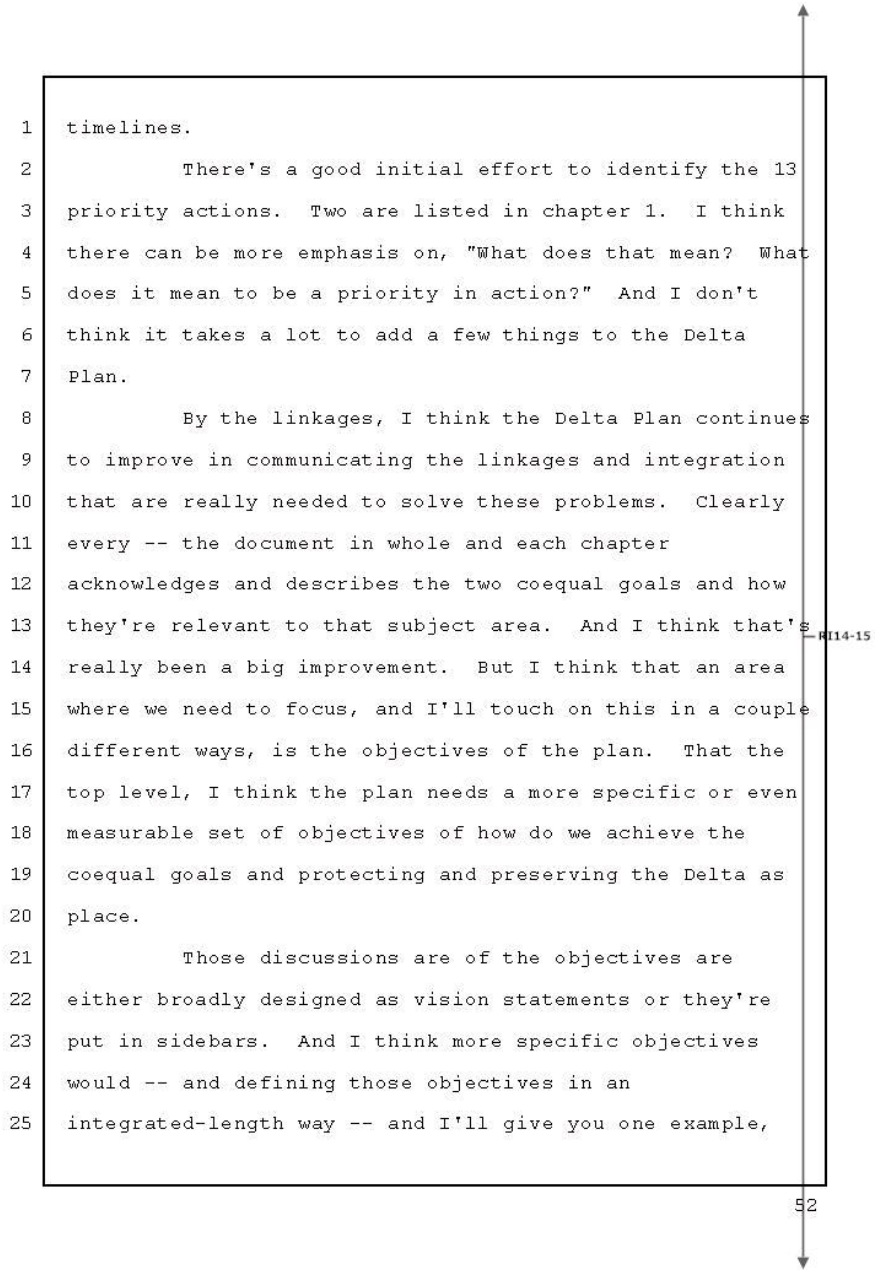
RI14-15

No comments

- n/a -


timelines.

There's a good initial effort to identify the 13 priority actions. Two are listed in chapter 1. I think there can be more emphasis on, "What does that mean? What does it mean to be a priority in action?" And I don't think it takes a lot to add a few things to the Delta Plan.

By the linkages, I think the Delta Plan continues to improve in communicating the linkages and integration that are really needed to solve these problems. Clearly every -- the document in whole and each chapter acknowledges and describes the two coequal goals and how they're relevant to that subject area. And I think that's really been a big improvement. But I think that an area where we need to focus, and I'll touch on this in a couple different ways, is the objectives of the plan. That the top level, I think the plan needs a more specific or even measurable set of objectives of how do we achieve the coequal goals and protecting and preserving the Delta as place.

Those discussions are of the objectives are either broadly designed as vision statements or they're put in sidebars. And I think more specific objectives would -- and defining those objectives in an integrated-length way -- and I'll give you one example,

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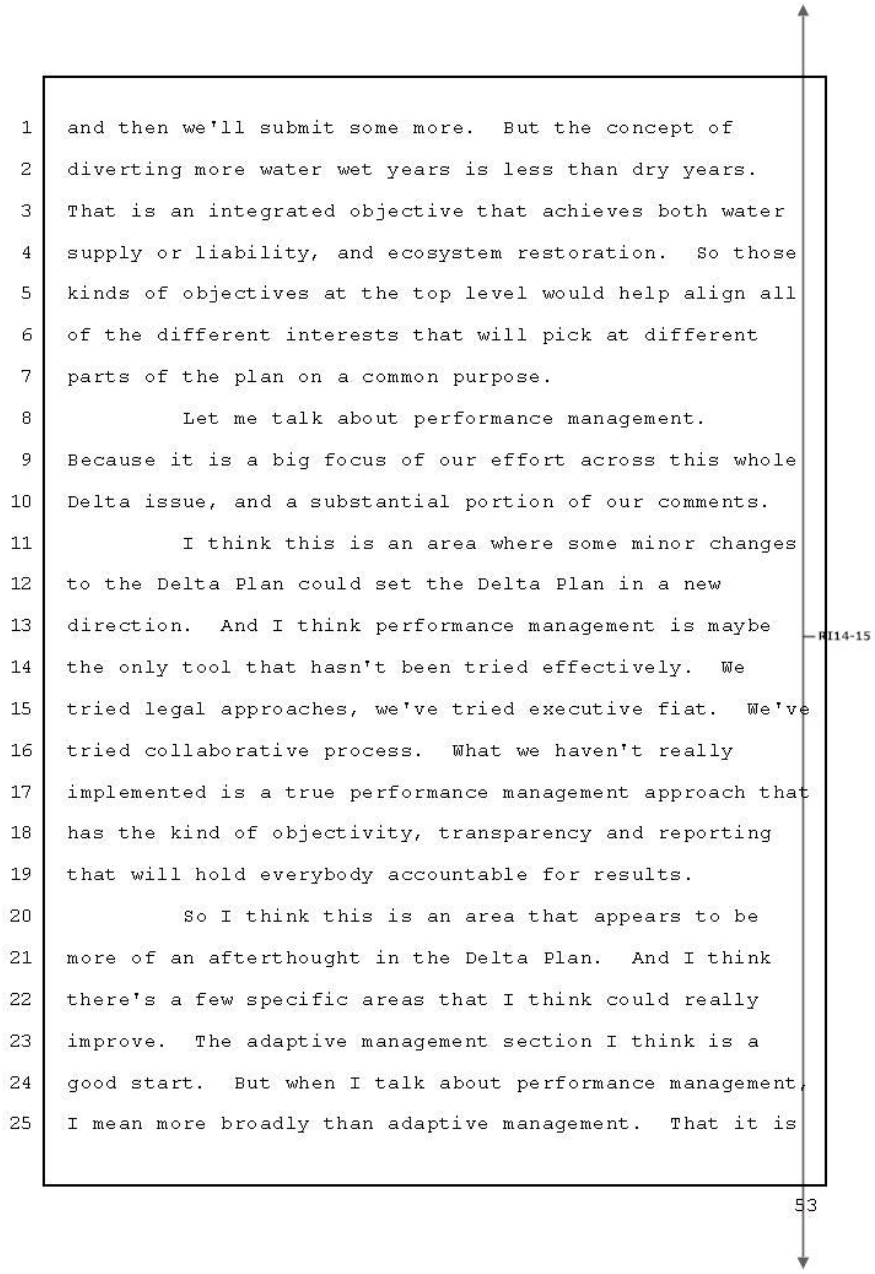
RI14-15

No comments

- n/a -


and then we'll submit some more. But the concept of diverting more water wet years is less than dry years. That is an integrated objective that achieves both water supply or liability, and ecosystem restoration. So those kinds of objectives at the top level would help align all of the different interests that will pick at different parts of the plan on a common purpose.

Let me talk about performance management. Because it is a big focus of our effort across this whole Delta issue, and a substantial portion of our comments.

I think this is an area where some minor changes to the Delta Plan could set the Delta Plan in a new direction. And I think performance management is maybe the only tool that hasn't been tried effectively. We tried legal approaches, we've tried executive fiat. We've tried collaborative process. What we haven't really implemented is a true performance management approach that has the kind of objectivity, transparency and reporting that will hold everybody accountable for results.

So I think this is an area that appears to be more of an afterthought in the Delta Plan. And I think there's a few specific areas that I think could really improve. The adaptive management section I think is a good start. But when I talk about performance management, I mean more broadly than adaptive management. That it is

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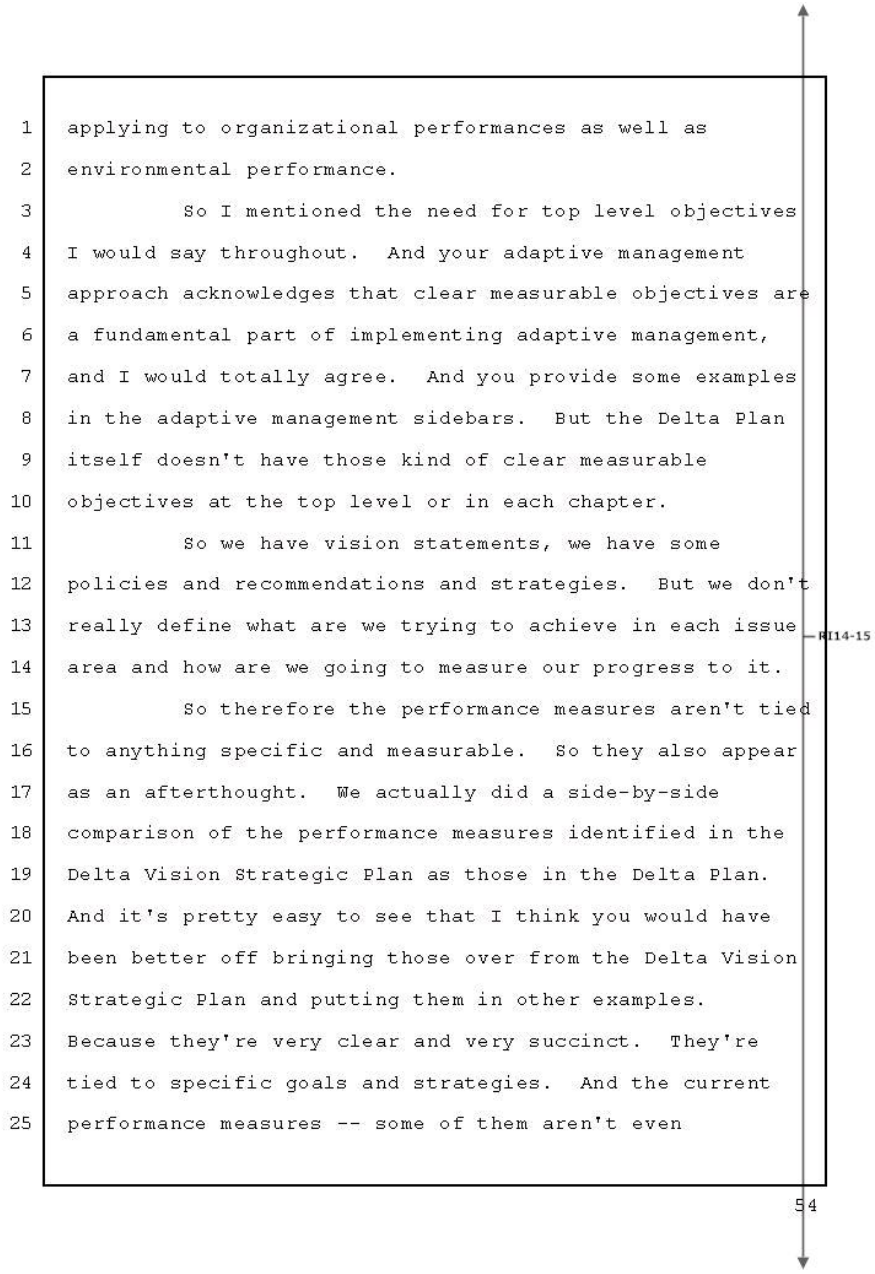
RI14-15

No comments

- n/a -



applying to organizational performances as well as environmental performance.

So I mentioned the need for top level objectives I would say throughout. And your adaptive management approach acknowledges that clear measurable objectives are a fundamental part of implementing adaptive management, and I would totally agree. And you provide some examples in the adaptive management sidebars. But the Delta Plan itself doesn't have those kind of clear measurable objectives at the top level or in each chapter.

So we have vision statements, we have some policies and recommendations and strategies. But we don't really define what are we trying to achieve in each issue area and how are we going to measure our progress to it.

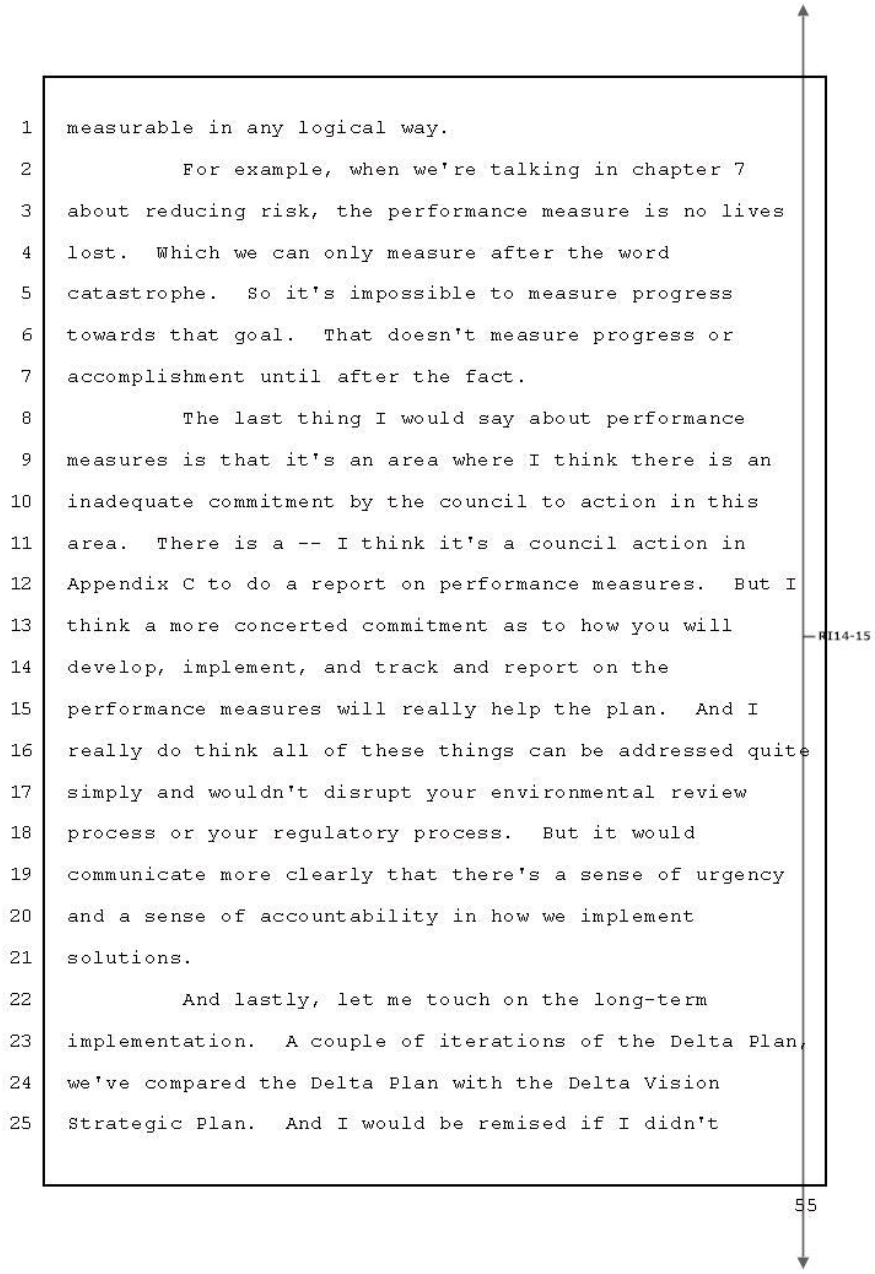
So therefore the performance measures aren't tied to anything specific and measurable. So they also appear as an afterthought. We actually did a side-by-side comparison of the performance measures identified in the Delta Vision Strategic Plan as those in the Delta Plan. And it's pretty easy to see that I think you would have been better off bringing those over from the Delta Vision Strategic Plan and putting them in other examples. Because they're very clear and very succinct. They're tied to specific goals and strategies. And the current performance measures -- some of them aren't even

54

RI14-15

No comments

- n/a -


measurable in any logical way.

For example, when we're talking in chapter 7 about reducing risk, the performance measure is no lives lost. Which we can only measure after the word catastrophe. So it's impossible to measure progress towards that goal. That doesn't measure progress or accomplishment until after the fact.

The last thing I would say about performance measures is that it's an area where I think there is an inadequate commitment by the council to action in this area. There is a -- I think it's a council action in Appendix C to do a report on performance measures. But I think a more concerted commitment as to how you will develop, implement, and track and report on the performance measures will really help the plan. And I really do think all of these things can be addressed quite simply and wouldn't disrupt your environmental review process or your regulatory process. But it would communicate more clearly that there's a sense of urgency and a sense of accountability in how we implement solutions.

And lastly, let me touch on the long-term implementation. A couple of iterations of the Delta Plan, we've compared the Delta Plan with the Delta Vision Strategic Plan. And I would be remised if I didn't

RI14-15

55

No comments

- n/a -

highlight a couple of things that I think are still missing in the Delta Plan. Although they may be a little harder to fix on the timeframe you're on.

First, there appear to be no policies or recommendations relating reducing fish losses. Either by improving fish migration cards or reducing in trainman losses or other actions. There is one recommendation related to perdition. Sort of indirectly related to perdition. But I think this is an area -- and maybe the strategy is deferring to BDCP -- they're going to fix the fish problems, but I don't think that's the appropriate strategy with the Delta Plan. I think there could be more attention and focus on even their term with the pilot studies and programs or various things that could more specifically address fish losses. RI14-15

And then second, I think the area of water quality and salinity management is another one where the policies and recommendations -- actually, there are no policies on the recommendations. If the recommendations focus on regulatory action, which is certainly an important part of the mix of action of state or regional boards is certainly important. But there have, until very recently, been a number of studies or investigations of either operational or physical changes in the Delta that could improve salinity management, barriers, I think

No comments

- n/a -

there's a whole host of things we can be looking at in that area. And those physical operations just don't appear in the note plan.

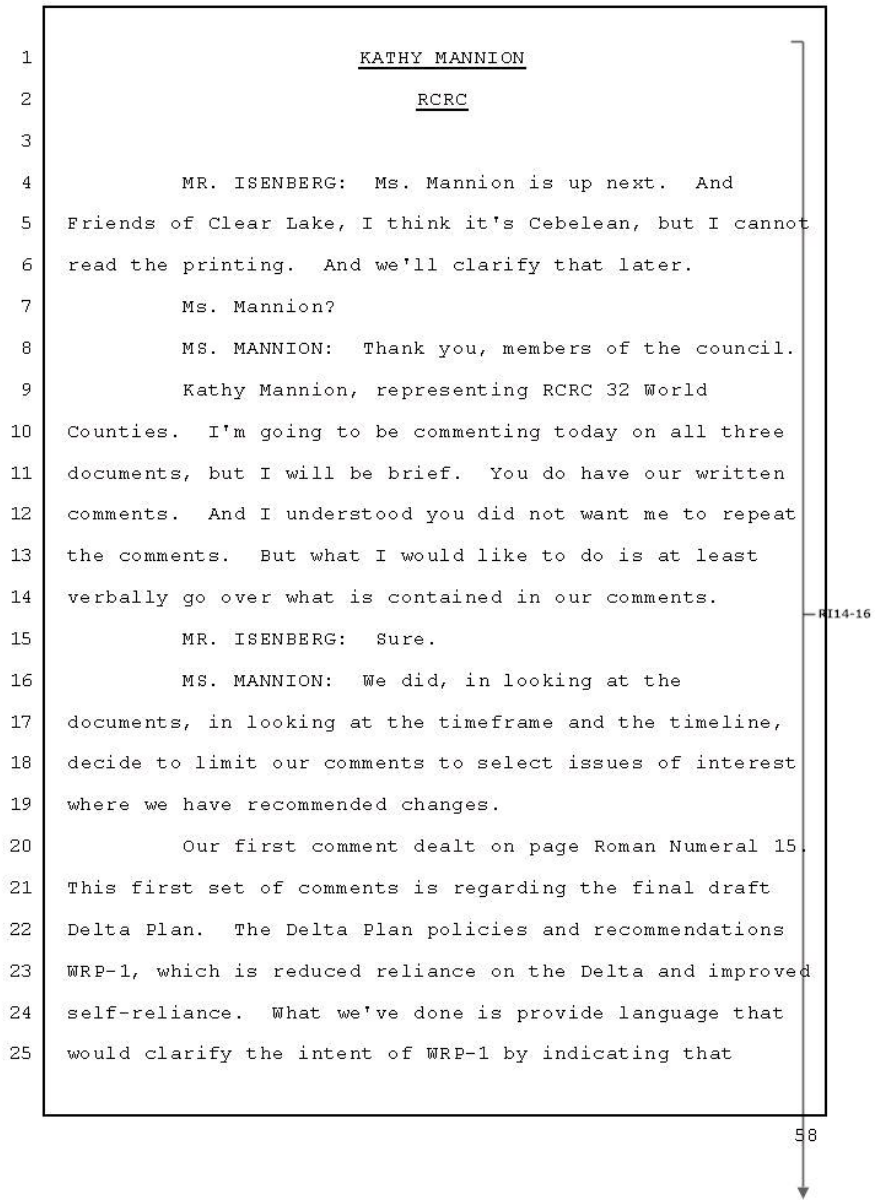
So with that I will conclude and send you more detailed comments on Monday.

MS. ISENBERG: Thank you very much.

RI14-15

No comments

- n/a -



KATHY MANNION

RCRC

MR. ISENBERG: Ms. Mannion is up next. And Friends of Clear Lake, I think it's Cebelean, but I cannot read the printing. And we'll clarify that later.

Ms. Mannion?

MS. MANNION: Thank you, members of the council.

Kathy Mannion, representing RCRC 32 World Counties. I'm going to be commenting today on all three documents, but I will be brief. You do have our written comments. And I understood you did not want me to repeat the comments. But what I would like to do is at least verbally go over what is contained in our comments.

RI14-16

MR. ISENBERG: Sure.

MS. MANNION: We did, in looking at the documents, in looking at the timeframe and the timeline, decide to limit our comments to select issues of interest where we have recommended changes.

Our first comment dealt on page Roman Numeral 15. This first set of comments is regarding the final draft Delta Plan. The Delta Plan policies and recommendations WRP-1, which is reduced reliance on the Delta and improved self-reliance. What we've done is provide language that would clarify the intent of WRP-1 by indicating that

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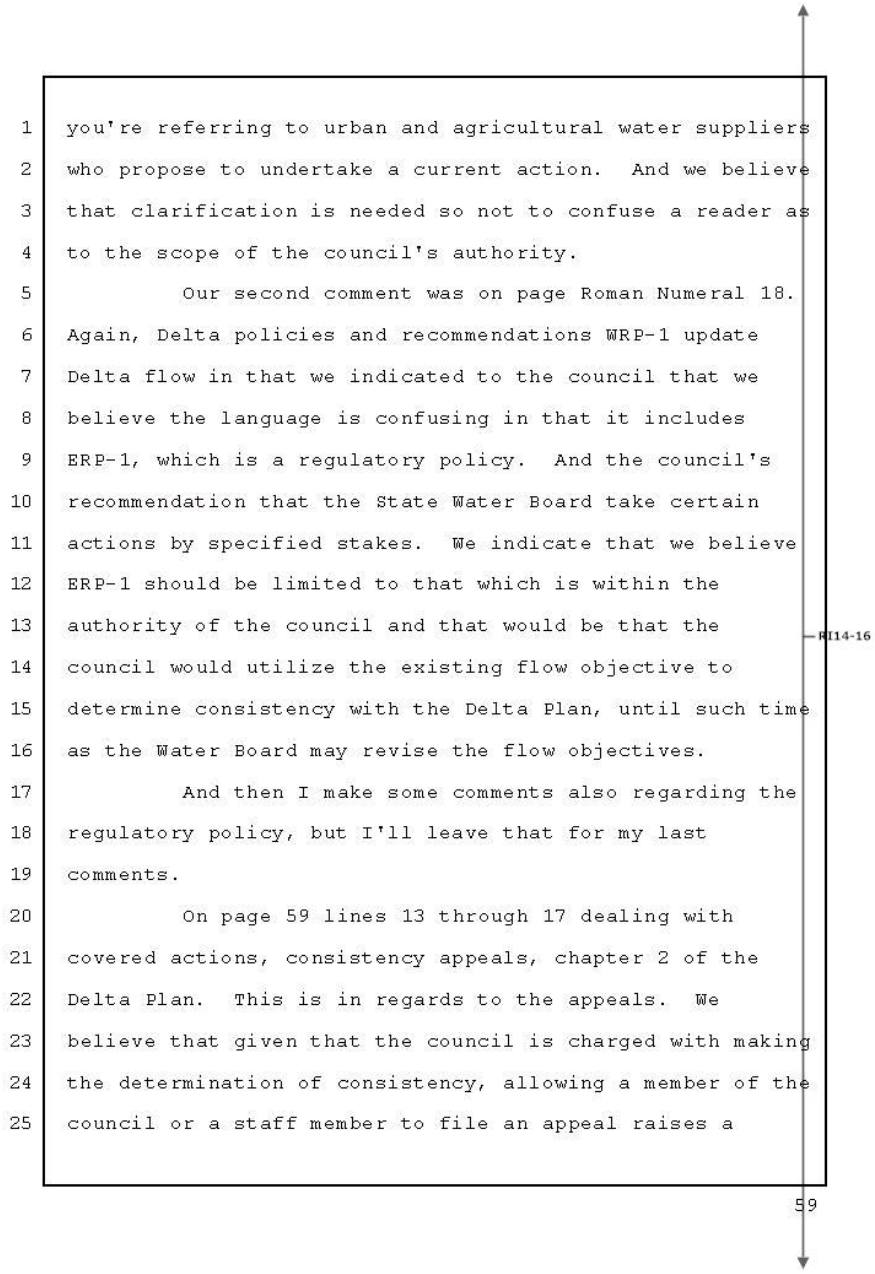
Response to comment RI14-16

This is a comment on the project, not on the EIR.


you're referring to urban and agricultural water suppliers who propose to undertake a current action. And we believe that clarification is needed so not to confuse a reader as to the scope of the council's authority.

Our second comment was on page Roman Numeral 18. Again, Delta policies and recommendations WRP-1 update Delta flow in that we indicated to the council that we believe the language is confusing in that it includes ERP-1, which is a regulatory policy. And the council's recommendation that the State Water Board take certain actions by specified stakes. We indicate that we believe ERP-1 should be limited to that which is within the authority of the council and that would be that the council would utilize the existing flow objective to determine consistency with the Delta Plan, until such time as the Water Board may revise the flow objectives.

And then I make some comments also regarding the regulatory policy, but I'll leave that for my last comments.

On page 59 lines 13 through 17 dealing with covered actions, consistency appeals, chapter 2 of the Delta Plan. This is in regards to the appeals. We believe that given that the council is charged with making the determination of consistency, allowing a member of the council or a staff member to file an appeal raises a

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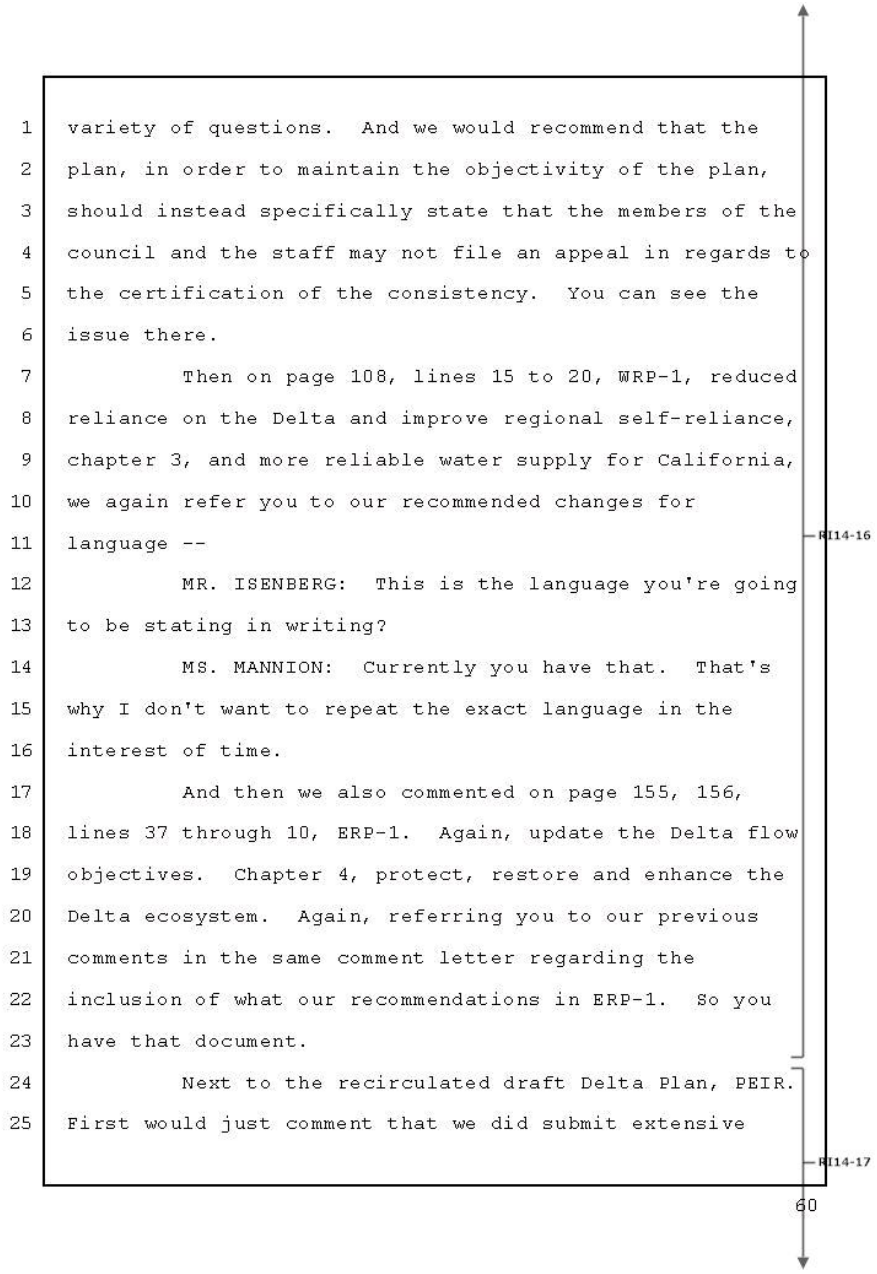
RI14-16

No comments

- n/a -



variety of questions. And we would recommend that the plan, in order to maintain the objectivity of the plan, should instead specifically state that the members of the council and the staff may not file an appeal in regards to the certification of the consistency. You can see the issue there.

Then on page 108, lines 15 to 20, WRP-1, reduced reliance on the Delta and improve regional self-reliance, chapter 3, and more reliable water supply for California, we again refer you to our recommended changes for language --

RI14-16

MR. ISENBERG: This is the language you're going to be stating in writing?

MS. MANNION: Currently you have that. That's why I don't want to repeat the exact language in the interest of time.

And then we also commented on page 155, 156, lines 37 through 10, ERP-1. Again, update the Delta flow objectives. Chapter 4, protect, restore and enhance the Delta ecosystem. Again, referring you to our previous comments in the same comment letter regarding the inclusion of what our recommendations in ERP-1. So you have that document.

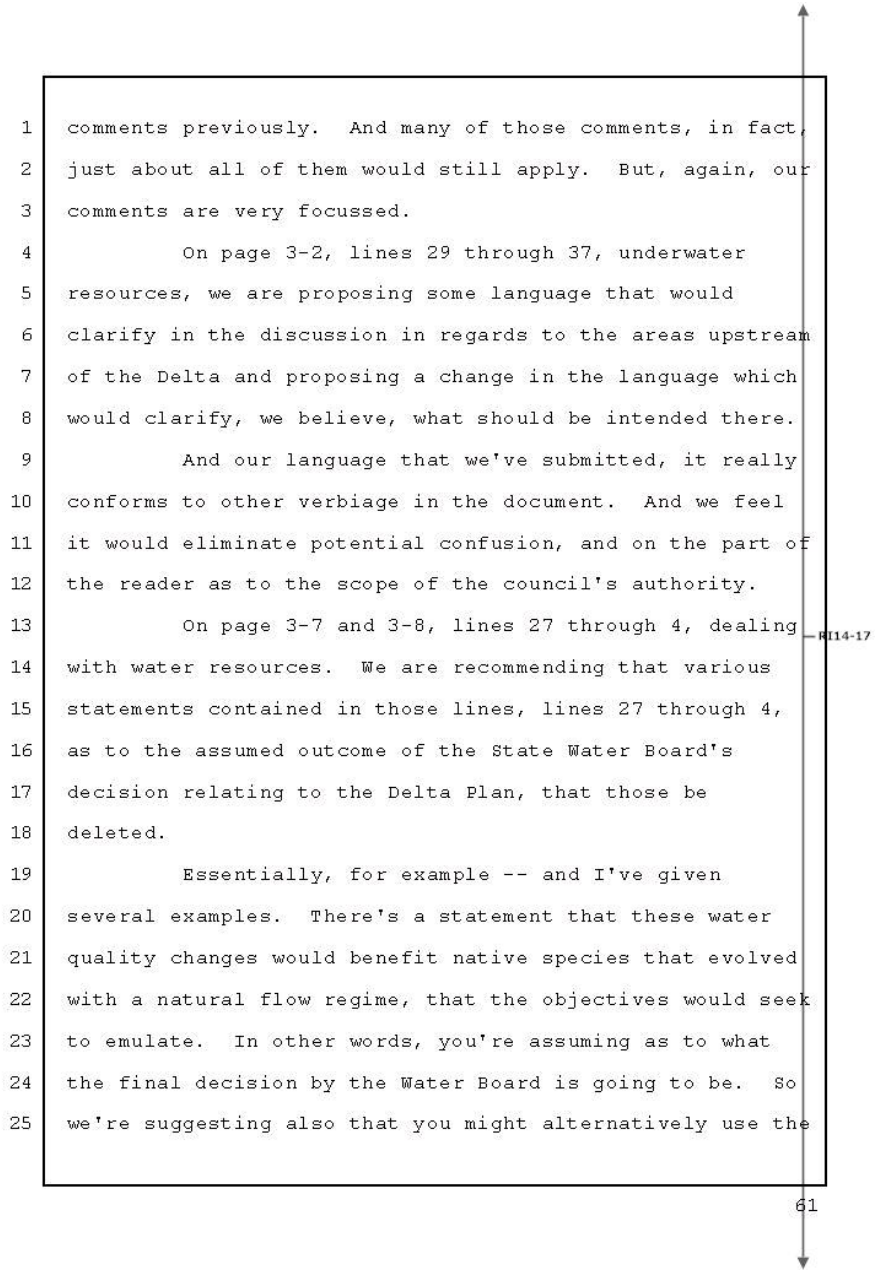
Next to the recirculated draft Delta Plan, PEIR. First would just comment that we did submit extensive

RI14-17

60

Response to comment RI14-17

Please refer to the response to the speaker's comment letter, ROR017.


comments previously. And many of those comments, in fact, just about all of them would still apply. But, again, our comments are very focussed.

On page 3-2, lines 29 through 37, underwater resources, we are proposing some language that would clarify in the discussion in regards to the areas upstream of the Delta and proposing a change in the language which would clarify, we believe, what should be intended there.

And our language that we've submitted, it really conforms to other verbiage in the document. And we feel it would eliminate potential confusion, and on the part of the reader as to the scope of the council's authority.

On page 3-7 and 3-8, lines 27 through 4, dealing with water resources. We are recommending that various statements contained in those lines, lines 27 through 4, as to the assumed outcome of the State Water Board's decision relating to the Delta Plan, that those be deleted.

Essentially, for example -- and I've given several examples. There's a statement that these water quality changes would benefit native species that evolved with a natural flow regime, that the objectives would seek to emulate. In other words, you're assuming as to what the final decision by the Water Board is going to be. So we're suggesting also that you might alternatively use the

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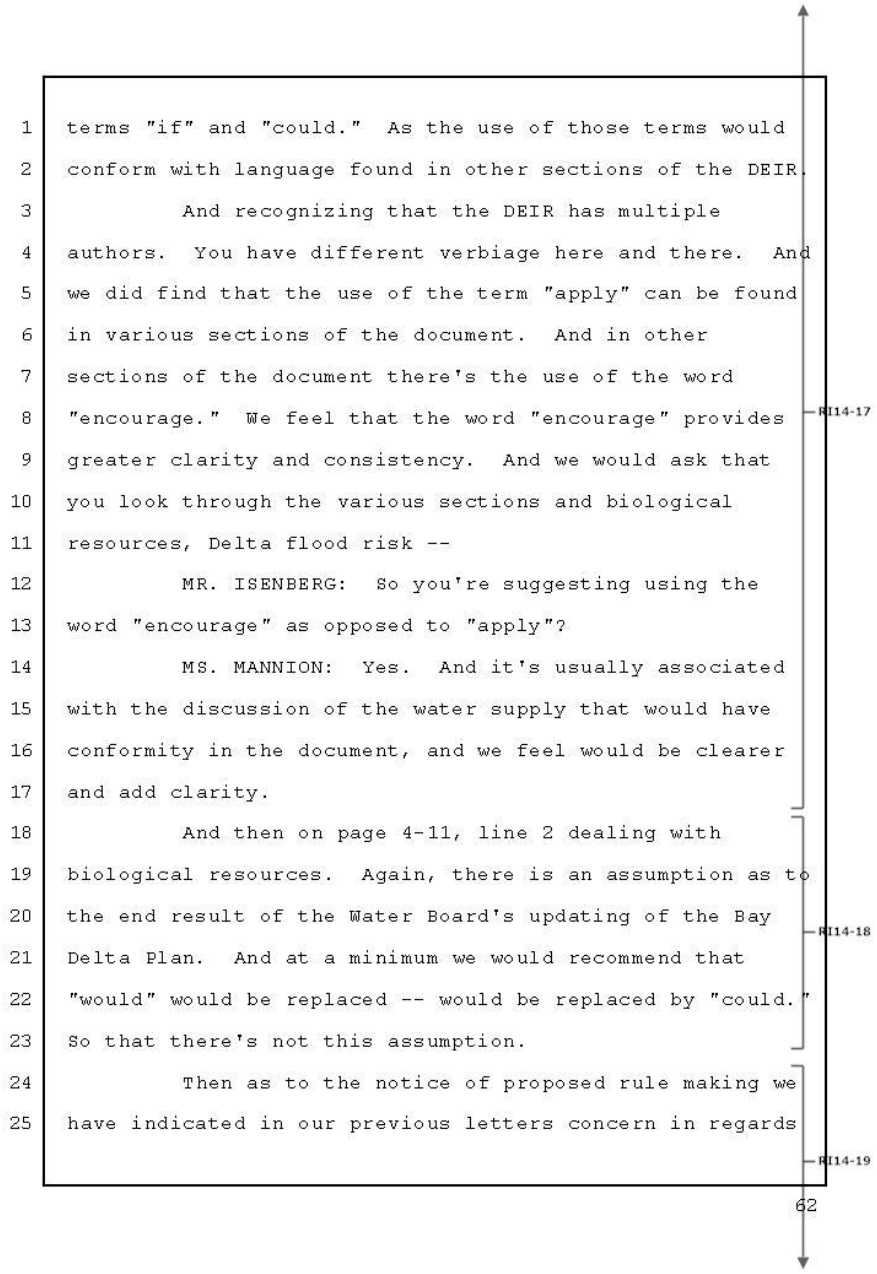
RI14-17

No comments

- n/a -



terms "if" and "could." As the use of those terms would conform with language found in other sections of the DEIR.

And recognizing that the DEIR has multiple authors. You have different verbiage here and there. And we did find that the use of the term "apply" can be found in various sections of the document. And in other sections of the document there's the use of the word "encourage." We feel that the word "encourage" provides greater clarity and consistency. And we would ask that you look through the various sections and biological resources, Delta flood risk --

MR. ISENBERG: So you're suggesting using the word "encourage" as opposed to "apply"?

MS. MANNION: Yes. And it's usually associated with the discussion of the water supply that would have conformity in the document, and we feel would be clearer and add clarity.

And then on page 4-11, line 2 dealing with biological resources. Again, there is an assumption as to the end result of the Water Board's updating of the Bay Delta Plan. And at a minimum we would recommend that "would" would be replaced -- would be replaced by "could." So that there's not this assumption.

Then as to the notice of proposed rule making we have indicated in our previous letters concern in regards

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RI14-17

RI14-18

RI14-19

Response to comment RI14-18

The EIR includes reasonable assumptions about future outcomes throughout its analysis. As described in Master Response 2, CEQA provides for such assumptions (Public Resources Code §§ 21080, 21080.2; CEQA Guidelines §§ 15144 [preparing an EIR requires some degree of forecasting], 15126.2(a) [direct and indirect significant effects of the project must be clearly identified and described]). Accordingly, the referenced use of "would" is appropriate.

Response to comment RI14-19

This is a comment on the project, not on the EIR.

to the lack of clarity in the Delta Plan, and that that could have been flow over to the regulations. And I believe that we have seen that as a result of the Delta Plan language itself. And the crux of the problem we've identified is the co-mingling of the Delta Plan regulatory policy with Delta Plan recommendations. In the proposed regulations. And we've provided several examples.

The first example is the co-mingling that can be found in the definition of achieving the coequal goals of providing a more reliable water supply in California. And then just as an example, we find the definition of WRP-1, which is a regulatory policy, and WRR-1 and WRR-4, both of which are contained in the Delta Plan as recommendations. RI14-19

Another example is section 5005, which is to reduce reliance on the Delta through approved regional water self-reliance. We've looked at that, we're recommending that sections 505 A and B of the proposed regulations be deleted. We found that 505 C, D and E and section 505-2 are germane from within the scope of the council's regulatory authority. So we propose the changes there.

Our last example is in 5007, update Delta flow objectives. Section 5007 A and B are recommendations contained in the Delta Plan. We therefore feel that

No comments

- n/a -

they're inappropriately included in the regulations and we're proposing that they should be deleted. And we've also provided revised language to section 5007 C. And that, again, provides some clarity as to the authority of the Water Board and what point in time the Stewardship Council would utilize the flow objectives. RI14-19

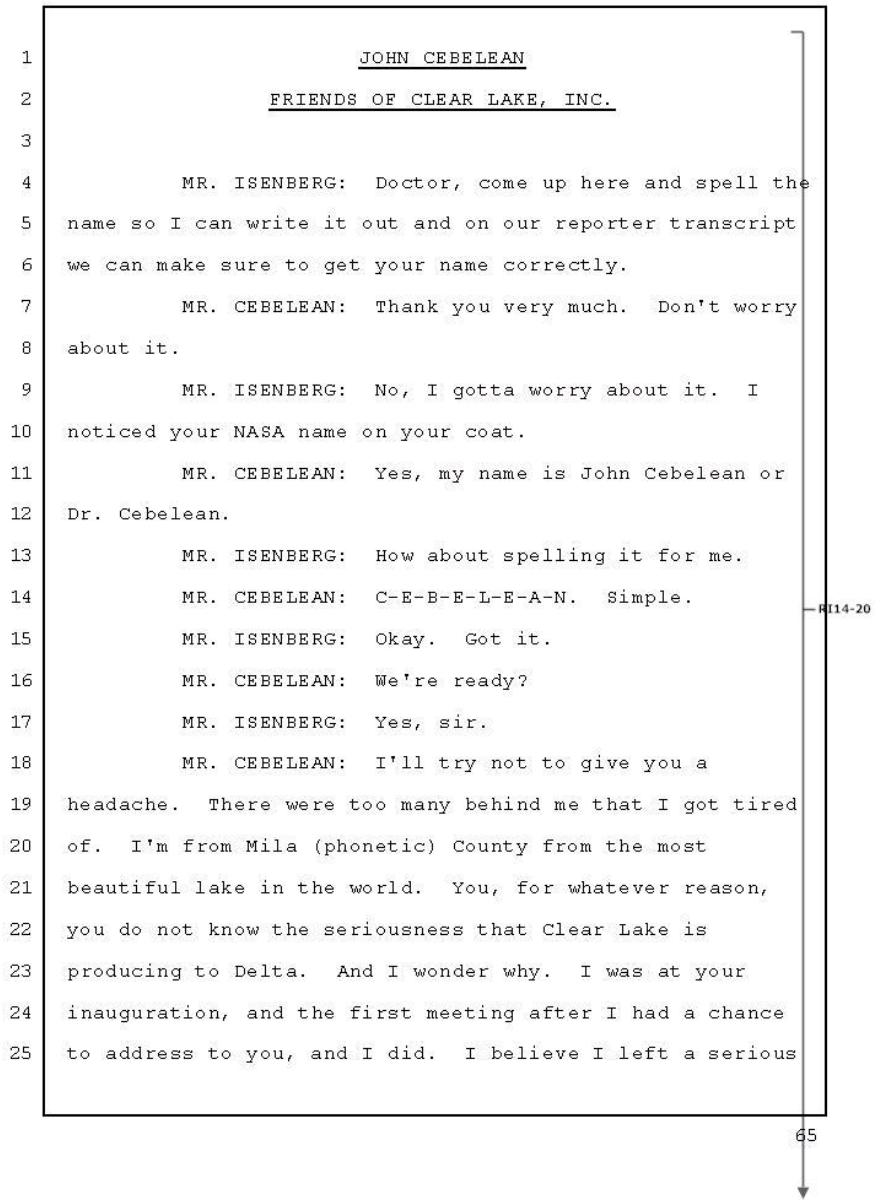
And so that's our comments.

MS. ISENBERG: Thank you, Ms. Mannion. And thank you for putting a lot of the stuff in writing in advance in other documents. It's the only way we can be sure of trying to keep track of the points you're making. We appreciate it.

Thank you.

No comments

- n/a -



JOHN CEBELEAN

FRIENDS OF CLEAR LAKE, INC.

MR. ISENBERG: Doctor, come up here and spell the name so I can write it out and on our reporter transcript we can make sure to get your name correctly.

MR. CEBELEAN: Thank you very much. Don't worry about it.

MR. ISENBERG: No, I gotta worry about it. I noticed your NASA name on your coat.

MR. CEBELEAN: Yes, my name is John Cebelean or Dr. Cebelean.

MR. ISENBERG: How about spelling it for me.

MR. CEBELEAN: C-E-B-E-L-E-A-N. Simple.

MR. ISENBERG: Okay. Got it.

MR. CEBELEAN: We're ready?

MR. ISENBERG: Yes, sir.

MR. CEBELEAN: I'll try not to give you a headache. There were too many behind me that I got tired of. I'm from Mila (phonetic) County from the most beautiful lake in the world. You, for whatever reason, you do not know the seriousness that Clear Lake is producing to Delta. And I wonder why. I was at your inauguration, and the first meeting after I had a chance to address to you, and I did. I believe I left a serious

RI14-20

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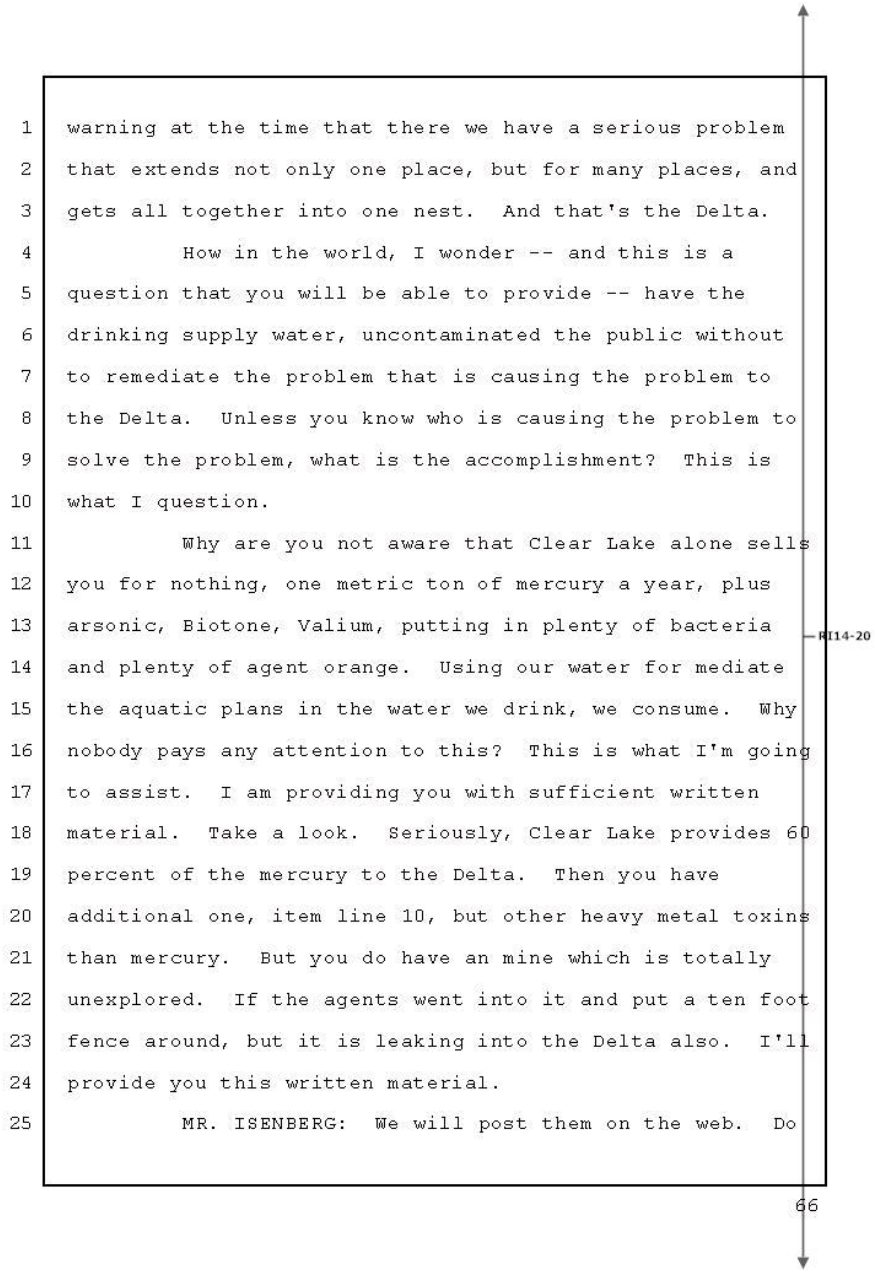
Response to comment RI14-20

Comment noted.



warning at the time that there we have a serious problem that extends not only one place, but for many places, and gets all together into one nest. And that's the Delta.

How in the world, I wonder -- and this is a question that you will be able to provide -- have the drinking supply water, uncontaminated the public without to remediate the problem that is causing the problem to the Delta. Unless you know who is causing the problem to solve the problem, what is the accomplishment? This is what I question.

Why are you not aware that Clear Lake alone sells you for nothing, one metric ton of mercury a year, plus arsonic, Biotone, Valium, putting in plenty of bacteria and plenty of agent orange. Using our water for mediate the aquatic plans in the water we drink, we consume. Why nobody pays any attention to this? This is what I'm going to assist. I am providing you with sufficient written material. Take a look. Seriously, Clear Lake provides 60 percent of the mercury to the Delta. Then you have additional one, item line 10, but other heavy metal toxins than mercury. But you do have an mine which is totally unexplored. If the agents went into it and put a ten foot fence around, but it is leaking into the Delta also. I'll provide you this written material.

MR. ISENBERG: We will post them on the web. Do

RI14-20

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No comments

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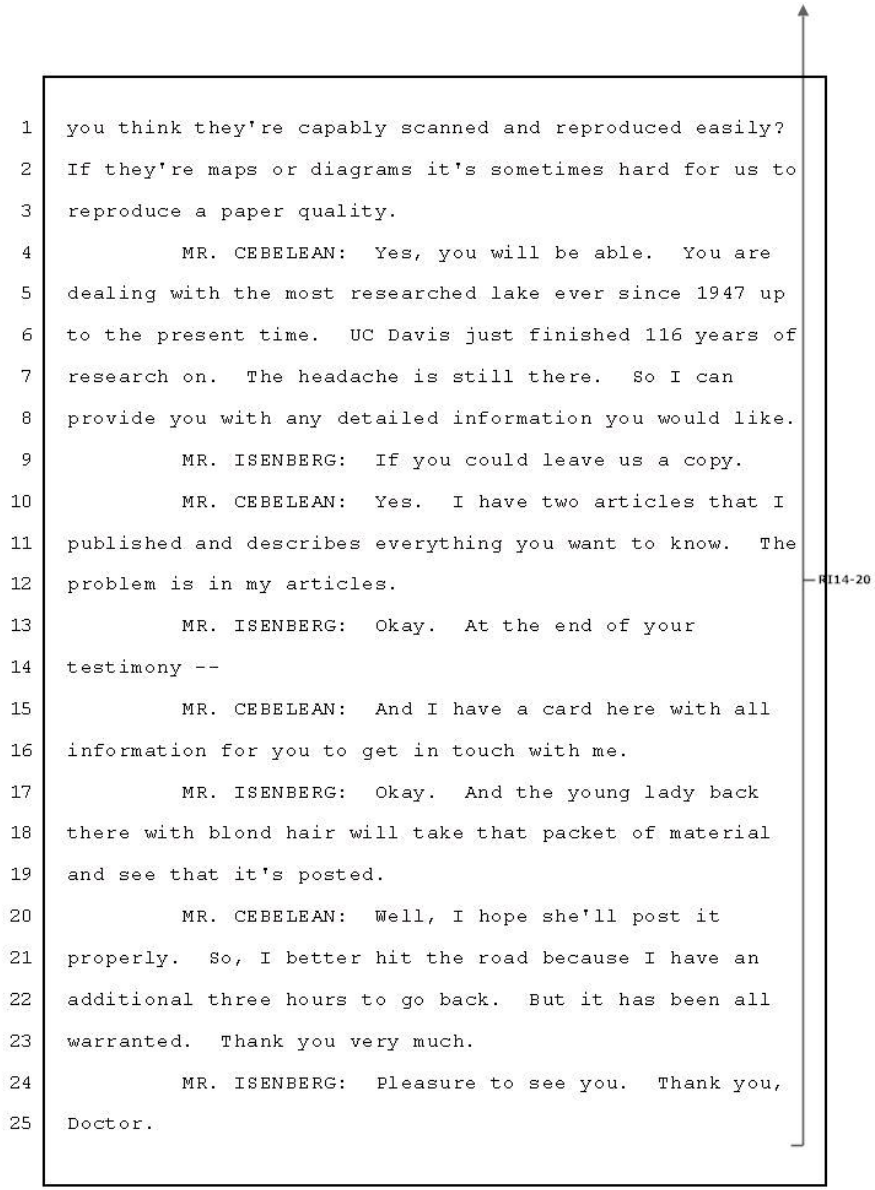


you think they're capably scanned and reproduced easily? If they're maps or diagrams it's sometimes hard for us to reproduce a paper quality.

MR. CEBELEAN: Yes, you will be able. You are dealing with the most researched lake ever since 1947 up to the present time. UC Davis just finished 116 years of research on. The headache is still there. So I can provide you with any detailed information you would like.

MR. ISENBERG: If you could leave us a copy.

MR. CEBELEAN: Yes. I have two articles that I published and describes everything you want to know. The problem is in my articles.

RI14-20

MR. ISENBERG: Okay. At the end of your testimony --

MR. CEBELEAN: And I have a card here with all information for you to get in touch with me.

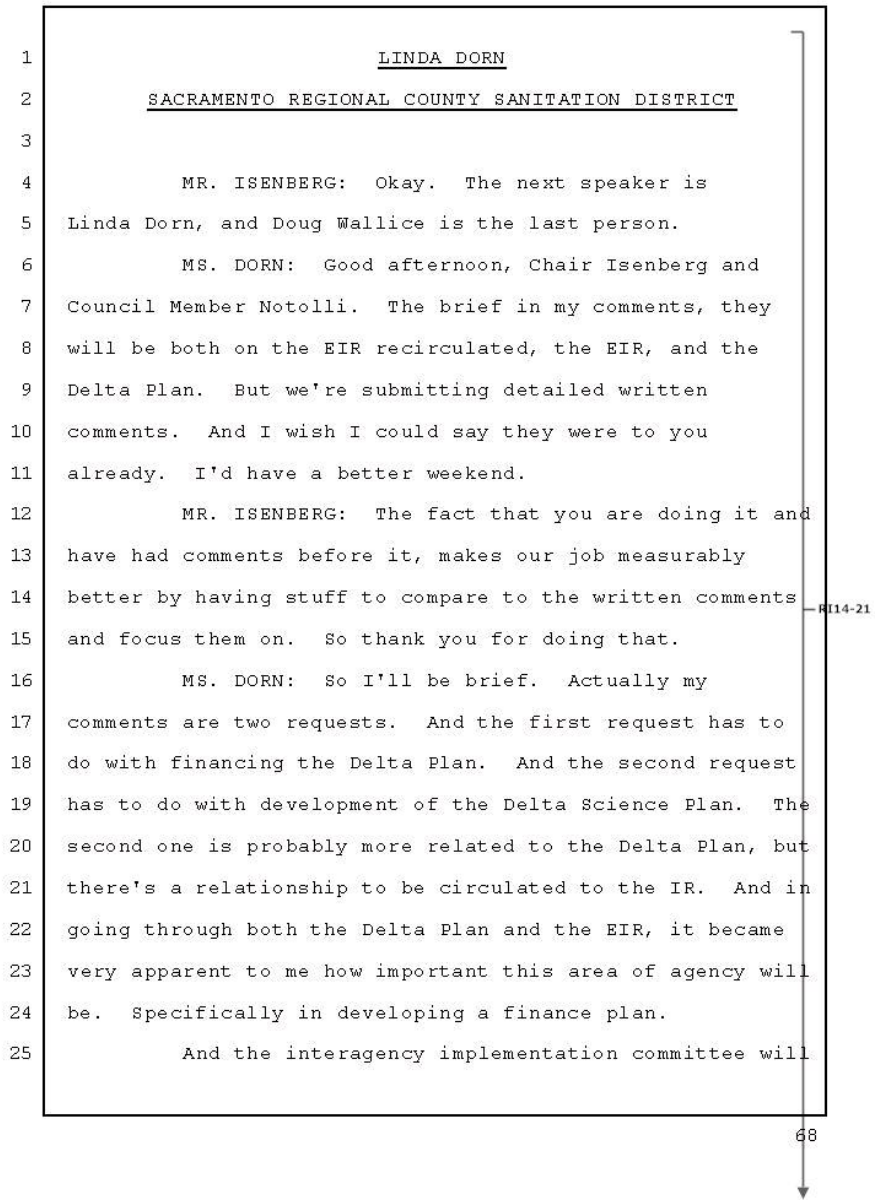
MR. ISENBERG: Okay. And the young lady back there with blond hair will take that packet of material and see that it's posted.

MR. CEBELEAN: Well, I hope she'll post it properly. So, I better hit the road because I have an additional three hours to go back. But it has been all warranted. Thank you very much.

MR. ISENBERG: Pleasure to see you. Thank you, Doctor.

No comments

- n/a -



LINDA DORN

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT

MR. ISENBERG: Okay. The next speaker is Linda Dorn, and Doug Wallice is the last person.

MS. DORN: Good afternoon, Chair Isenberg and Council Member Notolli. The brief in my comments, they will be both on the EIR recirculated, the EIR, and the Delta Plan. But we're submitting detailed written comments. And I wish I could say they were to you already. I'd have a better weekend.

MR. ISENBERG: The fact that you are doing it and have had comments before it, makes our job measurably better by having stuff to compare to the written comments and focus them on. So thank you for doing that.

MS. DORN: So I'll be brief. Actually my comments are two requests. And the first request has to do with financing the Delta Plan. And the second request has to do with development of the Delta Science Plan. The second one is probably more related to the Delta Plan, but there's a relationship to be circulated to the IR. And in going through both the Delta Plan and the EIR, it became very apparent to me how important this area of agency will be. Specifically in developing a finance plan.

And the interagency implementation committee will

RI14-21

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Response to comment RI14-21

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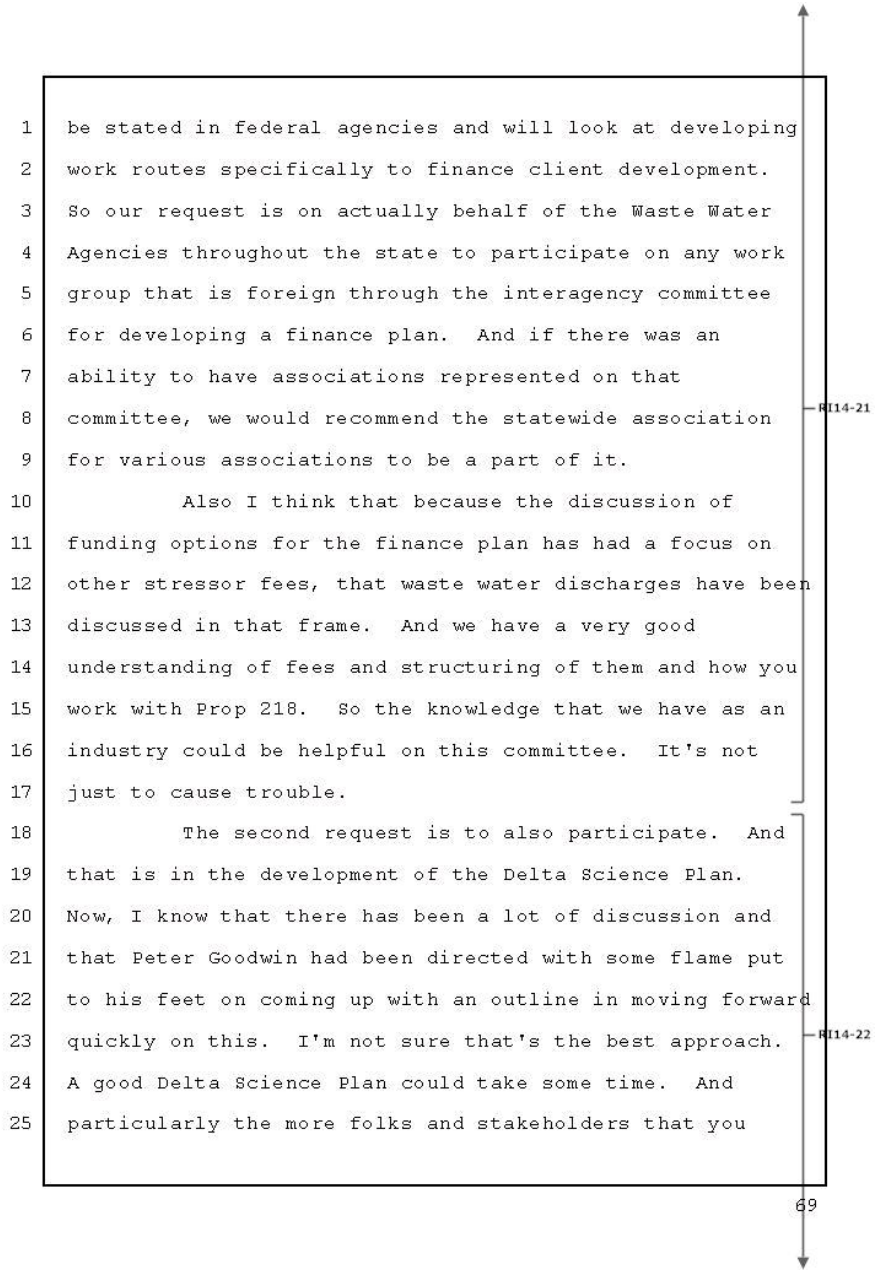


be stated in federal agencies and will look at developing work routes specifically to finance client development. So our request is on actually behalf of the Waste Water Agencies throughout the state to participate on any work group that is foreign through the interagency committee for developing a finance plan. And if there was an ability to have associations represented on that committee, we would recommend the statewide association for various associations to be a part of it. RI14-21

Also I think that because the discussion of funding options for the finance plan has had a focus on other stressor fees, that waste water discharges have been discussed in that frame. And we have a very good understanding of fees and structuring of them and how you work with Prop 218. So the knowledge that we have as an industry could be helpful on this committee. It's not just to cause trouble.

The second request is to also participate. And that is in the development of the Delta Science Plan. Now, I know that there has been a lot of discussion and that Peter Goodwin had been directed with some flame put to his feet on coming up with an outline in moving forward quickly on this. I'm not sure that's the best approach. RI14-22 A good Delta Science Plan could take some time. And particularly the more folks and stakeholders that you

69

Response to comment RI14-22

This is a comment on the project, not on the EIR.

would involve in it would make you take more time, but you would end up with better plan in the end.

We've been speaking with Peter Goodwin, so it's not like this request is coming out of the blue. I also participated in the Delta Science Conference.

MR. ISENBERG: Where they have the luncheons town home meetings?

MS. DORN: Yes. We participated in that and filled out the form. So I'm making sure the request is made here in relationship to the Delta claim and EIR.

We also made presentation at the State Water Board's flow meeting that happened this past fall where we focused on the importance of integrated science to coordination and collaboration. And that's another reason why we're requested to participate in the Delta Science Plan. RI14-22

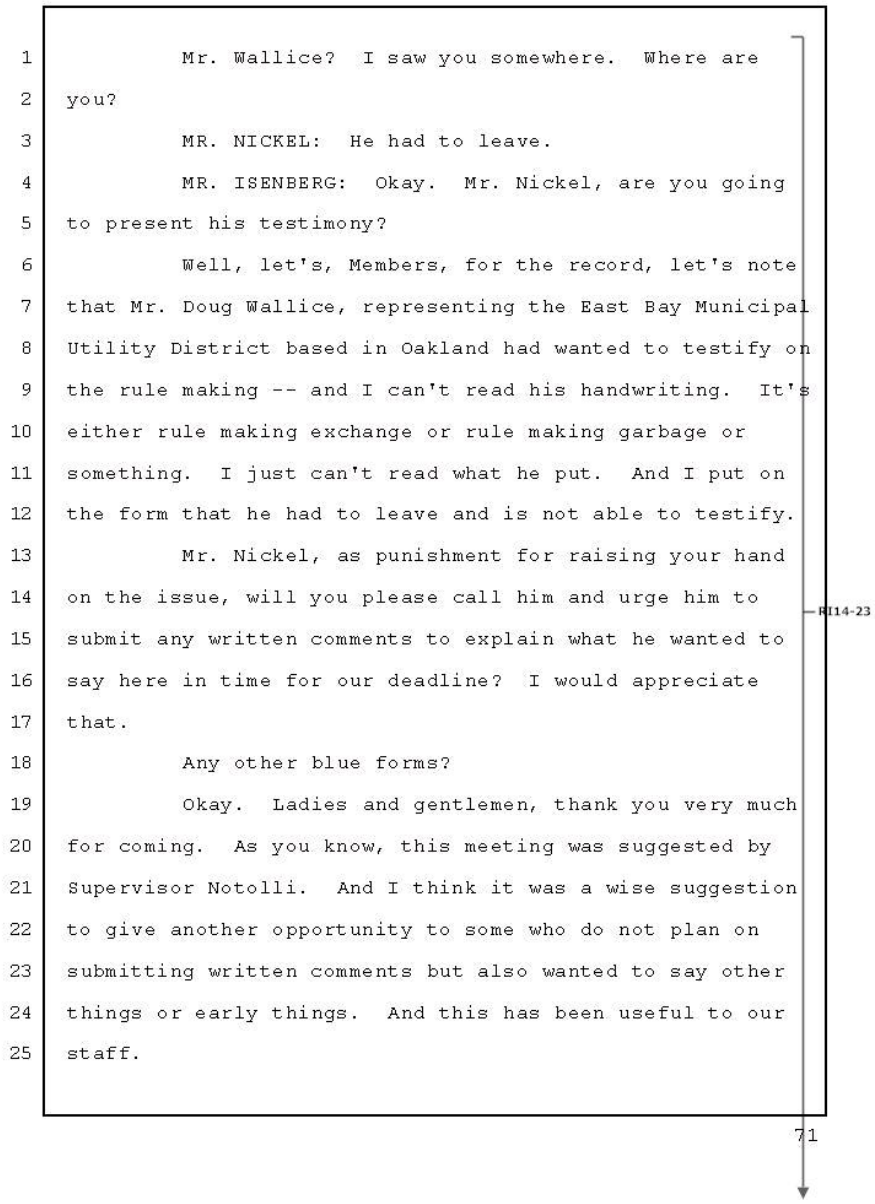
We're also currently participating as a stakeholder on the steering committee for developing a Delta Regional Monitoring Program in relationship to water quality, but could be more. So I think that's another good reason for having a Sacramento Regional County participate in the development of Delta Science Plan.

And that's really all I have for comments to request.

MR. ISENBERG: Thank you very much.

No comments

- n/a -



Mr. Wallice? I saw you somewhere. Where are you?

MR. NICKEL: He had to leave.

MR. ISENBERG: Okay. Mr. Nickel, are you going to present his testimony?

Well, let's, Members, for the record, let's note that Mr. Doug Wallice, representing the East Bay Municipal Utility District based in Oakland had wanted to testify on the rule making -- and I can't read his handwriting. It's either rule making exchange or rule making garbage or something. I just can't read what he put. And I put on the form that he had to leave and is not able to testify.

Mr. Nickel, as punishment for raising your hand on the issue, will you please call him and urge him to submit any written comments to explain what he wanted to say here in time for our deadline? I would appreciate that. RI14-23

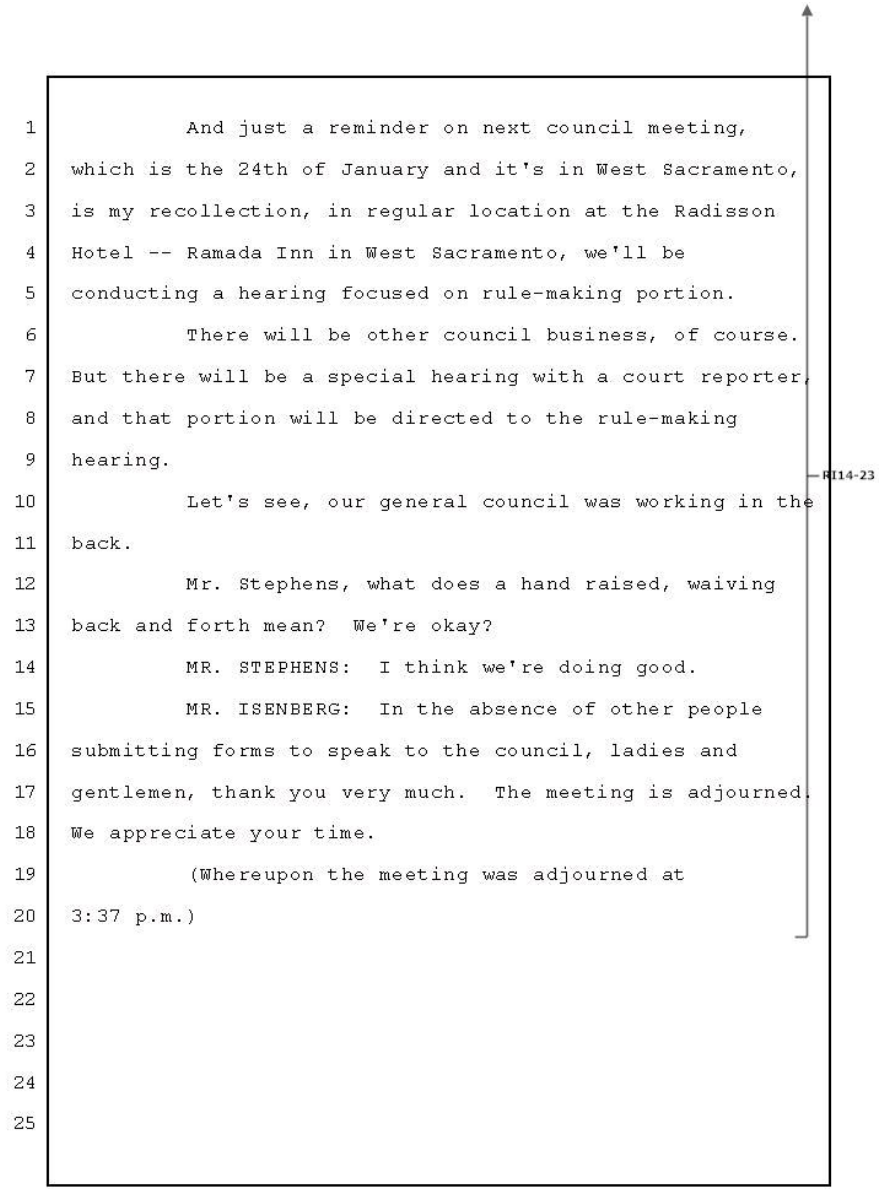
Any other blue forms?

Okay. Ladies and gentlemen, thank you very much for coming. As you know, this meeting was suggested by Supervisor Notolli. And I think it was a wise suggestion to give another opportunity to some who do not plan on submitting written comments but also wanted to say other things or early things. And this has been useful to our staff.

71

Response to comment RI14-23

Comment noted.



And just a reminder on next council meeting, which is the 24th of January and it's in West Sacramento, is my recollection, in regular location at the Radisson Hotel -- Ramada Inn in West Sacramento, we'll be conducting a hearing focused on rule-making portion.

There will be other council business, of course. But there will be a special hearing with a court reporter, and that portion will be directed to the rule-making hearing.

Let's see, our general council was working in the back.

Mr. Stephens, what does a hand raised, waiving back and forth mean? We're okay?

MR. STEPHENS: I think we're doing good.

MR. ISENBERG: In the absence of other people submitting forms to speak to the council, ladies and gentlemen, thank you very much. The meeting is adjourned. We appreciate your time.

(Whereupon the meeting was adjourned at 3:37 p.m.)

No comments

- n/a -

REPORTER'S CERTIFICATE

STATE OF CALIFORNIA)
) ss
COUNTY OF SACRAMENTO)

I, JILLIAN M. BASSETT, a Certified Shorthand Reporter, licensed by the state of California and empowered to administer oaths and affirmations pursuant to Section 2093 (b) of the Code of Civil Procedure, do hereby certify:

The said proceedings were recorded stenographically by me and were thereafter transcribed under my direction via computer-assisted transcription;

That the foregoing transcript is a true record of the proceedings which then and there took place;

That I am a disinterested person to said action.

IN WITNESS WHEREOF, I have subscribed my name on January 28, 2013.

_____
JILLIAN M. BASSETT
Certified Shorthand Reporter No. 13619

No comments

- n/a -

Delta Flow Criteria Informational Proceeding

Before the

State Water Resources Control Board

Scheduled to Commence
March 22, 2010

Exhibit CCWD-6

Historical Fresh Water and Salinity Conditions
in the Western Sacramento-San Joaquin Delta and Suisun Bay

Technical Memorandum WR10-001
Contra Costa Water District
Water Resources Department
February 2010

Submitted on behalf of

Contra Costa Water District
P.O. Box H2O
Concord, CA 94524

No comments

- n/a -

Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay

A summary of historical reviews, reports, analyses and measurements

Water Resources Department

Contra Costa Water District

Concord, California

February 2010

Technical Memorandum WR10-001

Exhibit CCWD-6

No comments

- n/a -

Acknowledgements

CCWD would like to thank the City of Antioch for their contribution towards funding a technical review of CCWD's draft report "Trends in Hydrology and Salinity in Suisun Bay and the Western Delta" (June 2007); their review substantially improved the work and led to the final report "Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay". CCWD is grateful to the many reviewers including Richard Denton, Matthew Emrick, Gopi Goteti, Phil Harrington, E. John List, Susan Paulsen, David Pene, Mat Rogers, and Peter Vorster. We also thank the following for sharing their data and analyses: Roger Byrne, Chris Enright, Spreck Rosekrans, and Scott Starratt, and we thank Ann Spaulding for her contributions.

No comments

- n/a -

Foreword - Establishing the Historical Baseline

The watershed of the Sacramento–San Joaquin Delta (Delta) provides drinking water to more than 23 million Californians as well as irrigation water for millions of acres of agriculture in the Central Valley. The Delta itself is a complex estuarine ecosystem, with populations of many native species now in serious decline. The Delta estuary as we know it began to form about 6,000 years ago, following the end of the last ice age. Because the estuary is connected to the Pacific Ocean through San Francisco Bay, seawater intrusion causes the salinity of Suisun Bay and the Delta to vary depending on hydrological conditions. This seawater intrusion into the Delta affects estuarine species as well as drinking water and irrigation water supplies.

Successful restoration of the Delta ecosystem requires an understanding of the conditions under which native species evolved. Contra Costa Water District's report on "Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay" presents a detailed review of more than 100 years of studies, monitoring data, scientific reports, and modeling analyses that establish an historical record of the salinity conditions in the Western Delta and Suisun Bay.

No comments

- n/a -

No comments

- n/a -

Executive Summary

The historical record and published studies consistently show the Delta is now managed at a salinity level much higher than would have occurred under natural conditions. Human activities, including channelization of the Delta, elimination of tidal marsh, and water diversions, have resulted in increased salinity levels in the Delta during the past 150 years.

Eighty years ago, Thomas H. Means wrote ("*Salt Water Problem, San Francisco Bay and Delta of Sacramento and San Joaquin Rivers*," April 1928, pp 9-10):

> "Under natural conditions, Carquinez Straits marked, approximately, the boundary between salt and fresh water in the upper San Francisco Bay and delta region of the two tributary rivers—the Sacramento and San Joaquin. Ordinarily salt water was present below the straits and fresh water was present above. Native vegetation in the tide marshes was predominately of salt water types around San Pablo Bay and of fresh water types around Suisun Bay....
>
> The definite statement that salt water under natural conditions did not penetrate higher upstream than the mouth of the river, except in the driest years and then only for a few days at a time, is warranted....
>
> At present [1928] salt water reaches Antioch every year, in two-thirds of the years running further [sic] upstream. It is to be expected that it will continue to do so in the future, even in the years of greatest runoff. In other words, the penetration of salt water has become a permanent phenomenon in the lower river region.
>
> The cause of this change in salt water condition is due almost entirely to the works of man."

In 1928, Thomas Means had limited data over a short historical period from which to draw these conclusions. Nonetheless, his conclusions remain accurate and have been confirmed by numerous subsequent studies, including paleosalinity records that reveal salinity conditions in the western Delta as far back as 2,500 years ago. The paleosalinity studies indicate that the last 100 years are among the most saline of periods in the past 2,500 years. Paleoclimatology and paleosalinity studies indicate that the prior 1,500 years (going back to about 4,000 years ago) were even wetter and less saline in San Francisco Bay and the Delta. The recent increase in salinity began after the Delta freshwater marshes had been drained, after the Delta was channelized and after large-scale upstream diversions of water, largely for agricultural purposes, had significantly reduced flows from the tributaries into the Delta. It has continued, even after the construction of reservoirs that have been used in part to manage salinity intrusion.

No comments

- n/a -

Increased Salinity Intrusion into the Delta

Studies and salinity measurements confirm that despite salinity management efforts, Delta salinity is now at or above the highest salinity levels found in the past 2,500 to 4,000 years. Under equivalent hydrological conditions, the boundary between salt and fresh water is now 3 to 15 miles farther into the Delta than it would have been without the increased diversions of fresh water that have taken place in the past 150 years.

Reservoir operations artificially manage salinity intrusion to conditions that are saltier than had been experienced prior to the early 1900's. While these managed conditions are certainly fresher than would occur in today's altered system if operated without any salinity management, they are still saltier than what the Delta experienced under similar hydrological conditions in the past. While the Delta is being managed to a somewhat acceptable saline condition to meet many beneficial uses, it is still managed at a more saline condition than would have occurred prior to the anthropogenic changes of the past 150 years.

For example, the 1928-1934 drought was one of the driest periods in the past 1,000 years (Meko *et al.*, 2001a), and occurred after tidal marshes within the Delta had been reclaimed and water diversions began removing substantial amounts of fresh water from the Bay-Delta system. Nonetheless, the Delta freshened during the winter in those drought years. This winter freshening of the Delta has not occurred during recent droughts. While salinity intrusion into the Delta was previously only seen in the driest years, significant salinity intrusion now occurs in nearly every year – exceptions are only found in the wettest conditions.

Changed Variation in Salinity

The variability of fresh and saline conditions in the Delta has considerably changed because of upstream and in-Delta water diversions and water exports (Enright and Culberson, 2009). This change in variability results largely from the lack of fresh conditions in Suisun Bay and the western Delta, especially in the winter and spring. Restoring a variable salinity regime that more closely approximates conditions prior to the early 1900's would require much higher flows and much fresher conditions than current management practices provide, with larger outflows in the fall in most years and much larger outflows in the late winter and spring in all years.

Key Conclusions

The major conclusions of this study are:

1. Salinity intrusion during the last 100 years has been among the highest levels over the past 2,500 years. The Delta has been predominantly a freshwater tidal marsh for the last 2,500 years.
2. Human activities during the last 150 years, including channelization of the Delta, elimination of tidal marsh, construction of deep ship channels, and diversion of water, have resulted in the increased salinity levels in the Delta.

No comments

- n/a -

3. Conditions in the Delta during the early 1900's were much fresher than current conditions for hydrologically similar periods. Salinity typically intrudes 3 to 15 miles farther into the Delta today.
4. The historical record and published studies uniformly demonstrate and conclude the Delta is now managed at a salinity level that is much higher than would have occurred under pre-1900 conditions. Operation of new reservoirs and water diversion facilities for salinity management reduces salinity intrusion somewhat, but the levels still exceed pre-1900 salinities.
5. Seasonal and inter-annual variation in salinity has also been changed; however, this change is largely the result of reduced freshwater flows into the Delta. At any given location in the western Delta and Suisun Bay, the percentage of time during the year when fresh water is present has been greatly reduced or, in some cases, largely eliminated.

Background

Flows and water quality in the Sacramento-San Joaquin Delta (Delta) are strongly influenced by freshwater inflow from the rivers, by the tides in San Francisco Bay and by salinity from Bay waters. Prior to human influence, the historical distribution of salinity in the Delta was controlled primarily by the seasonal and inter-annual distribution of precipitation, the geomorphology of the Bay and Delta, daily tides, the spring-neap[1] tidal cycle, and the mean sea level at Golden Gate. Extended wet and dry periods are both evident in the historical record. Since about 1860, a number of morphological changes to the Delta landscape and operational changes of reservoirs and water diversions have affected flows and the distribution of salinity within the Delta.

Between 1860 and 1920, there was significant modification of the Delta by humans:
(i) marsh land was reclaimed,
(ii) hydraulic mining caused extensive deposition and then erosion of sediment, and,
(iii) Delta channels were widened, interconnected and deepened.

Large-scale reservoir construction began in about 1920 and continued through the 1970's, changing the timing and magnitude of flows to the Delta. Large volumes of water began to be diverted for agricultural use upstream of and within the Delta in the same time period. In more recent times, California's Delta water resources have been extensively managed to meet the water supply needs of the State's municipal, industrial, and agricultural water users, with attempts made to also provide flow and water quality conditions to meet fishery needs.

Proposals for significant additional alteration of the Delta and of flows within the Delta are currently being developed as part of the Bay-Delta Conservation Plan process[2]. To

[1] During a spring tide, the gravitational forces from the sun and moon are largely the same direction and the high-low tidal range is greatest. During a neap tide, the gravitational forces sun and moon are largely not aligned and the tidal range is the lowest. The spring-neap tidal cycle, from strong spring tides through weak neap tides and back to spring tides, in San Francisco Bay has a period of about 14 days.
[2] www.baydeltaconservationplan.com

No comments

- n/a -

understand the effect of those proposals, it is important to accurately establish historical conditions. For example, for ecological restoration to be successful, it is necessary to establish and understand the conditions to which native species have previously adapted and survived in order to predict their response to future changes in climate or water management. This report uses available data and modeling to examine the consequences of structural changes in the Delta (channelization, channel dredging), increased diversions of water upstream of the Delta, reservoir operations, climate and sea level effects, and other factors on Delta salinity.

Objective

The objective of this report is to answer two major questions regarding the historical extent of fresh water and salinity in the western Delta and Suisun Bay:

I. What was the extent of fresh water and what were the salinity conditions prior to large-scale reservoir operations and water diversions (i.e., prior to early 1900's) and prior to structural changes in the Delta (i.e., prior to the 1860's)?

II. What are the effects of large-scale water management practices (reservoir operations and diversions) on salinity conditions in the western Delta and Suisun Bay?

Approach

Available data were used to characterize historical and present-day fresh water extent and salinity intrusion into the Delta. The data examined in this report include paleohistorical records (over geologic time scales) of river flow and salinity (Section 2), instrumental observations of hydrology and salinity (Section 3), and literature reports on the extent of fresh water in the Delta (Section 4). Additional details and supplemental information are presented in the Appendices to this report.

No comments

- n/a -

Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay

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No comments

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No comments

- n/a -

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No comments

- n/a -

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No comments

- n/a -

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Acronyms

C&H	California and Hawaiian Sugar Refining Corporation
CCWD	Contra Costa Water District
CDEC	California Data Exchange Center
Cl	Chloride concentration
CVP	Central Valley Project
DPW	Department of Public Works
DSM2	Delta Simulation Model 2
DWR	California Department of Water Resources
DWSC	Deep water ship channel
EC	Electrical conductivity
ENSO	El Niño/Southern Oscillation
ESA	Endangered Species Act
IEP	Interagency Ecological Program
M&I	Municipal and Indutrial
NDO	Net Delta Outflow
PDO	Pacific Decadal Oscillation
PPIC	Public Policy Institute of California
SWRCB	State Water Resource Control Board
SRI	Sacramento River Index
STORET	Storage and Retrieval
SWP	State Water Project
TBI	The Bay Institute
TDS	Total Dissolved Solids

Units

AF	Acre-feet
MAF	Million acre-feet
TAF	Thousand acre-ft
µS/cm	MicroSiemens per centimeter, a measure of EC
cfs	Cubic feet per second
mg/L	Milligrams per liter
ppm	Parts per million
ppt	Parts per thousand

No comments

- n/a -

No comments

- n/a -

1. Introduction

1.1. Background

The Sacramento-San Joaquin River Delta (Delta) is fed by fresh water from the Sacramento River and the San Joaquin River basins (Figure 1-1). The Delta is connected to the San Francisco Bay through Suisun and San Pablo Bays, and the movement of water back and forth between the Delta and the Bay results in mixing between saline water from the Pacific Ocean and fresh water from the rivers flowing into the Delta. The extent to which salty ocean water intrudes into the Delta is a function of natural processes such as ocean tides and precipitation and runoff from the upstream watersheds. It has also been greatly influenced by anthropogenic activities (e.g. construction of artificial river channels, removal of tidal marsh, removal of floodplain connections to channels, deepening of channels for navigation purposes, reservoir storage and release operations, and water diversions).

Proposals for significant additional alteration of Delta channels and marshland, of flows within the Delta, and of reoperation of upstream reservoirs are currently being developed as part of the Bay-Delta Conservation Plan, which builds upon earlier work by the Delta Vision Blue Ribbon Task Force[3], and others (e.g., see Lund *et al.*, 2007). To understand the context and effect of those proposals, it is important to accurately understand the historical conditions previously experienced by Delta species.

An analysis of the salinity trends and variability in northern San Francisco Bay since the 1920's and the factors controlling those salinity trends has recently been published (Enright and Culberson, 2009), with a focus on a comparison of pre-1968 salinity and flows with post-1968 conditions. This report includes analysis and review of reports, data and information from the period prior to Enright and Culberson's analysis, and includes the review of salinity trends using paleohistorical data.

Historically, reproduction of most species in the Bay-Delta (biotic production phase) occurred during the high-flow periods (winter and spring) and biotic reduction occurred in the low-flow periods (summer and fall) (Baxter *et al.*, 2008). Multi-year wet periods most likely resulted in population increases, whereas drought periods likely resulted in reduced reproduction and increased predation. The recent report on Pelagic Organism Decline (POD, Baxter *et al.*, 2008) indicated that reduced flow variability under the current water management conditions may have exacerbated the effects of predation on the population abundance of pelagic fish species in the Bay-Delta estuary. Native species of the Bay-Delta system adapted to the historical salinity conditions that occurred prior to large-scale water management practices and physical changes in the Delta. The historical salinity conditions in the Delta provide insight into the response of fish species to proposed ecosystem restoration actions, and the response of species to future changes in climate or water management.

[3] Delta Vision Blue Ribbon Task Force was appointed by California Governor Arnold Schwarzenegger in February 2007 and adopted the Delta Vision Strategic Plan in October 2008.

No comments

- n/a -

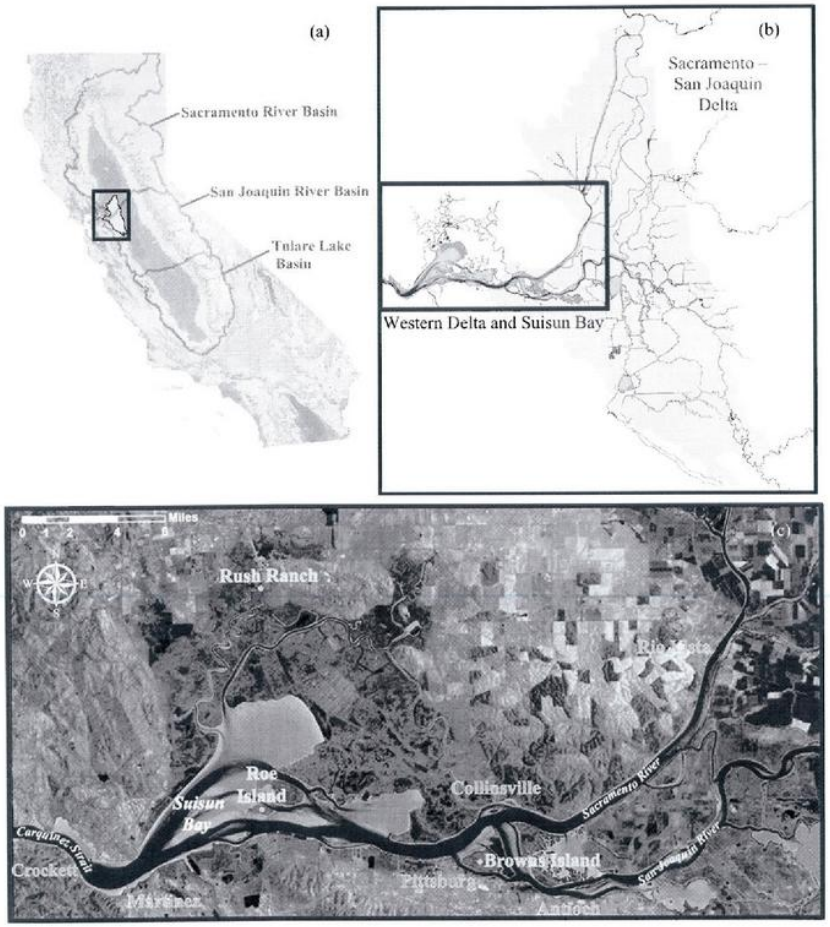

Figure 1-1 – Map

(a) Topographical map of California, with outlines of the Sacramento River, San Joaquin River, and Tulare Lake basins; purple rectangle indicates the extent of the inset in panel (b). (b) Sacramento – San Joaquin Delta and Suisun Bay region; green rectangle indicates the extent of the Western Delta and Suisun Bay enlarged in panel (c). (c) Extent of salinity evaluations considered within this study, including names of locations referenced throughout this report.

No comments

- n/a -

The salinity concentrations in San Francisco Bay and the Delta are the result of tides that move seawater into the system and are controlled in large part by the amount of fresh water passing through the system (Denton, 1993; Uncles and Peterson, 1996; Knowles *et al.*, 1998). The salinity distribution is driven by the motion of the tides, which convey ocean water into the system on the flood tide and draw a mixture of ocean and river water back out again on the ebb tide. These tides act on natural diurnal (repeating twice per day) and spring-neap (repeating every 14 days) cycles driven by the gravitational forces of the sun and moon (Oltmann and Simpson, 1997; Burau *et al.*, 1999).

Other factors affecting Bay-Delta salinity (discussed in Appendix A) may be smaller but are not insignificant. When comparing historical salinity conditions in the Bay-Delta watershed, it is often helpful to compare periods with similar hydrological conditions so that the changes due to other factors can be discerned. This will reveal if there is an anomalous change in salinity, even if the specific cause of that change in salinity is not known.

Major anthropogenic modifications to the Delta that affect salinity intrusion began with the European settlement of the region and can be classified into two categories: physical modifications of the landscape (e.g., removal of tidal marsh, separation of natural floodplains from valley rivers, construction of permanent artificial river channels, and land-use changes) and water management activities (e.g. diversion of water for direct agriculture, municipal, or industrial use, and reservoir storage and release operations).

As shown in Figure 1-2, tidal marsh acreage in the Delta decreased significantly from nearly 346,000 acres in the 1870's to less than 25,000 acres in the 1920's and has since continued to decrease. Even after hydraulic mining for gold was banned in California in 1884, large quantities of mining debris continued to be carried by runoff into the Delta, where it was deposited as sediment, filling channels in the Delta and Suisun Bay. Between 1887 and 1920, Suisun Bay became an erosional environment and continued to lose sediment through 1990. Enright and Culberson (2009) discuss the effects of the changes in Suisun Bay bathymetry on salinity intrusion. Major dredging projects on the main Delta channels to create the Stockton and Sacramento Deep Water Ship Channels (DWSC) have also changed how flows and, therefore, salinity are distributed throughout the Delta.

Each of these factors has changed the salinity regime: loss of tidal marsh lands has allowed increased tidal energy deeper into the Delta, increasing tidal flows and salinity dispersion (Enright and Culberson, 2009), net erosion and increasing depth within Suisun Bay likely increased dispersive transport of salt up the estuary (Enright and Culberson, 2009), and deeper channels allow increased salinity intrusion due to increased baroclinic circulation and increased tidal flow and dispersion..

However, these physical modifications generally have had less effect on salinity intrusion in the Delta than the major water management activities that have resulted in large-scale diversion of water for reservoir storage and agricultural, domestic, and industrial water use (Nichols *et al*, 1986; Knowles, 2002). As will be seen in data presented in this document, early diversions before large-scale storage projects resulted in greatly increased salinity intrusion, especially in the summer irrigation season, peaking in September. Later, reservoir operations reduced salinity intrusion in the summer and fall, but increased it in the winter and

No comments

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spring, up until the mid-1980's. Subsequent water operations have resulted in increased salinity intrusion year round.

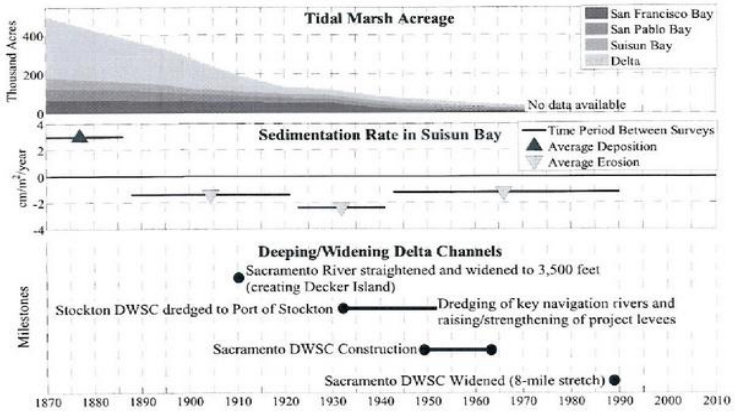

Figure 1-2 – Chronology of anthropogenic modifications to the Bay-Delta landscape

Bay-Delta landscape has undergone significant changes since the mid-1800's. Tidal marsh acreage (top panel) has been significantly reduced (data from Atwater, et al., 1979). Suisun Bay received a pulse of sediment from hydraulic mining in the late 1800's (middle panel), but lost sediment from 1887 to 1990 (data from Cappiella et al., 1999). Numerous efforts to widen and deepen the main channels within the Delta have occurred throughout the 20th Century (bottom panel).

The largest reservoir of the federal Central Valley Project (CVP), Lake Shasta, was completed in 1945, and the largest reservoir of the State Water Project (SWP), Lake Oroville, was completed in 1968. Total upstream reservoir storage capacity increased from 1 MAF in 1920 to more than 30 MAF by 1979. The CVP began exporting water from the southern Delta through Jones Pumping Plant (formerly known as the Tracy Pumping Plant) in 1951, and the SWP began exports through Banks Pumping Plant in 1968. By 1990, the combined export of water from the southern Delta through the Banks and Jones Pumping Plants was about 6 MAF per year.

Figure 1-3 shows that the greatest increase in upstream reservoir storage occurred from the 1920's through the 1960's. Prior to the construction of major water management reservoirs, irrigated acreage grew to about 4 MAF. The construction of the reservoirs allowed irrigated acreage to increase to about 9 MAF. Since 1951, when the first south Delta export facility was completed, annual diversions from the Delta have increased to a maximum of about 8 MAF; total annual diversions from the system are estimated at up to 15 MAF.

No comments

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No comments

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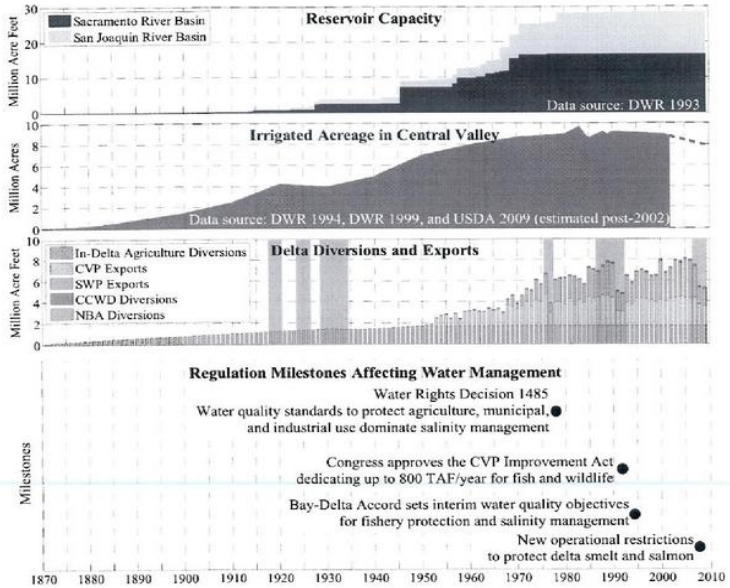

Figure 1-3 – Chronology of anthropogenic activities that affect water management

Reservoirs (top panel) and irrigated crops in the Central Valley (second panel) alter the timing and magnitude of water flow to reach the Delta. Diversions and exports within the Delta (third panel) further reduce the amount of water to flow through the Delta to Suisun Bay. Regulations (bottom panel) require modifications to water management activities to meet specific flow and water quality objectives.

Figure 1-3 also presents the timeline for recent regulatory milestones that have affected Delta water quality. Salinity management was dominated by water quality standards to protect Delta agriculture and municipal and industrial (M&I) uses in the 1978 Water Quality Control Plan and State Water Resources Control Board (SWRCB) Decision 1485. The Bay-Delta Accord of 1994 and subsequent SWRCB Water Rights Decision 1641 made fishery protection the dominant factor for salinity management with new estuarine habitat or "X2 Standards"[4] from February through June, with minimum outflows for the remainder of the

[4] X2 is the distance, in kilometers from the Golden Gate, to the location of the 2 part per thousand salinity line. A larger X2 means salinity has intruded farther into the Delta.

year. The relationship between X2 and estuarine habitat is discussed in detail in Jassby *et al.* (1995).

These regulations apply throughout the year and have modified how the large-scale water management reservoirs and export facilities are operated. For instance, delta smelt was listed as a threatened species under the federal Endangered Species Act in 1993, and Sacramento River winter-run salmon was listed as endangered in 1994. The subsequent biological opinions, 1994 Bay-Delta Accord, and the adoption of a new water quality control plan by the State Water Resources Control Board in 1995, required increased reservoir releases in some months for temperature control in the Sacramento River below Shasta and for salinity control in Suisun Bay. They also applied additional limits on pumping at the export facilities in the south Delta.

Changes in water diversions and reservoir operations have altered the magnitude and timing of river flows to the Delta, and anthropogenic modifications to the Delta landscape have altered the interaction of fresh water from the rivers with salt water from the ocean, thus changing patterns of salinity intrusion into the Delta.

1.2. Comparing Historical Conditions

Flow and salinity conditions prior to human interference varied according to seasonal and annual hydrological conditions, short-term and long-term drought cycles and other natural changes, so "natural" conditions include variability that must be considered in any analysis. Hydroclimatic variability is described by "unimpaired" runoff, which represents the natural water production of a river basin, unaltered by water diversions, reservoir storage and operation, and export of water to or import of water from other basins.

As discussed above, large-scale water management operations during the last 100 years superimposed on the anthropogenic modifications to the Delta landscape have significantly changed Delta conditions. It is possible to remove the effect that water management operations have had on flows and generate a corresponding set of unimpaired flows. However, it is not possible, without complex assumptions and modeling, to also remove the additional effect of the land use, channel and tidal marsh modifications to the Delta.

The historical conditions presented in this report have been determined from records in paleoclimatic fossils and measured directly with various scientific instruments. The paleoclimatic data start well before human influence, but continue through the 20th Century when anthropogenic modifications became significant.

Because of the natural hydroclimatic variability, no past historical period may fully represent "natural" conditions. Therefore, this report summarizes the available historical salinity information with reference to the time period of the observations, and then compares each period to the salinity regime during present day periods with similar upstream unimpaired hydrology. Where there are significant changes in salinity, despite similar upstream unimpaired hydrology, other factors such as landscape modifications and water management operations must be contributing factors.

No comments

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1.3. Objective

The objective of this report is to answer two major questions regarding the historical extent of fresh water and salinity in the western Delta and Suisun Bay:

I. What was the extent of fresh water and what were the salinity conditions prior to large-scale reservoir operations and water diversions (i.e., prior to early 1900's) and prior to structural changes in the Delta (i.e., prior to the 1860's)?

II. What are the effects of large-scale water management practices (reservoir operations and diversions) on salinity conditions in the western Delta and Suisun Bay?

1.4. Report Structure

The remainder of this report is organized as follows:

Section 2: Paleoclimatic Evidence of the Last 10,000 Years

Estimated river flow data and salinity records for the past several thousand years have been obtained from paleoclimatic records, such as tree rings and sediment cores. These records capture the hydroclimatic variations over decadal and centennial time scales and are useful tools in understanding the freshwater flow and salinity regimes before modern instrumentation.

Section 3: Instrumental Observations of the Last 140 Years

Long-term precipitation and river runoff records from the 1870's to the present provide context for the salinity observations. Climatic variability of precipitation and runoff in the upper watershed has a significant influence on salinity intrusion, with greater salinity during dry periods and lower salinity during wet periods. If, for example, the salinity is greater or less than what would be expected based on the natural climatic variability, as measured by unimpaired runoff, other factors must be influencing salinity intrusion.

Reservoir operations, diversions and consumptive use (collectively termed "water management") alter the amount of runoff from the upper watershed that actually flows out of the Delta. Observations and common computer models are used to assess the effects of this water management on Net Delta Outflow (the net quantity of water flowing from the Delta to the Suisun Bay) and on salinity in the western Delta and Suisun Bay. Observations include measurements of salinity indicators by the California & Hawaiian Sugar Refining Corporation (C&H) from the early 1900's and long-term monitoring data from the Interagency Ecological Program (IEP). Modeling tools include the DAYFLOW program from IEP, the DSM2 model from the California Department of Water Resources, the X2[5]

[5] X2 is defined as the distance from the Golden Gate to the 2 part-per-thousand isohaline (equivalent to a salinity of 2 grams of salt per kilogram of water), measured along the axis of the San Francisco Estuary. X2 is often used as an indicator of freshwater availability and fish habitat conditions in the Delta (Jassby *et al.*, 1995; Monismith, 1998).

No comments

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equation (Kimmerer and Monismith, 1992) and Contra Costa Water District's salinity outflow model (also referred to as the G-model) (Denton, 1993; Denton and Sullivan, 1993).

Section 4: Qualitative Observations of Historical Freshwater Flow and Salinity Conditions

Qualitative observations on salinity conditions in the western Delta and Suisun Bay from an early water rights lawsuit and from various literature reports are discussed to provide a perspective of the salinity conditions prevailing in the late 1800's and early 1900's. The 1920 lawsuit filed by the Town of Antioch against upstream irrigation districts alleged that the upstream water diversions were causing increased salinity intrusion at Antioch (Town of Antioch v. Williams Irrigation District, 1922). Briefings and testimony from the legal proceedings are indicative of the salinity conditions prevailing in the early 1900's, as are literature reports of conditions in the western Delta and Suisun Bay. These reports contain both qualitative observations and anecdotal information regarding historical salinity conditions. Because the proceedings were adversarial in nature, this report focuses on the testimony of the upstream interests, who were trying to demonstrate the extent of salinity intrusion in the Delta prior to their diverting water. Note that the Supreme Court did not base its final decision on the evidence of whether or not Antioch had continuous access to fresh water. The Court's decision was based on the State policy to irrigate as much land as possible for agriculture; the Court did not pass judgment on the accuracy of the testimony of either side.

Section 5: Conclusions

This section synthesizes the findings from Sections 2 through 4 and presents the overall conclusions regarding trends in the historical Delta salinity.

No comments

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2. Paleoclimatic Evidence of the Last 10,000 Years

Paleoclimatic evidence from the watershed of San Francisco Bay (Bay) and Sacramento-San Joaquin Delta (Delta), obtained from proxy information such as tree rings and sediment deposits, provides a history of conditions before modern direct instrumental observations. Evidence of major regional climatic events that represent long-term wet period and drought cycles will be discussed, followed by discussions of Delta watershed runoff and Delta salinity, as measured by flow and electrical conductivity instrumentation.

2.1. Major Regional Climatic Events

The modern Bay-Delta is relatively young in terms of geologic timescales. The estuary started forming around 8,000 to 10,000 years ago (Atwater *et al.* 1979), when rapid sea level rise allowed the ocean to enter the Golden Gate. At this time, there was no Bay or Delta, but simply river valleys. Rapid sea level rise continued, such that approximately 6,000 years ago, the outline of San Francisco Bay, including San Pablo Bay and Suisun Bay, resembled the modern extent. At about the same time, sea level rise slowed to a more moderate pace, allowing tidal marshes to begin to form.

Malamud-Roam *et al.* (2007) review paleoclimate studies in the Bay-Delta watershed, summarizing evidence of climate variability through the development of the present day Bay-Delta system (Table 2-1).

Table 2-1 – Climate during the evolution of the Bay-Delta estuary

Overview of precipitation, temperature, and sea level conditions during the last 10,000 years based on data from Malamud-Roam et al. (2007) and Meko et al. (2001). Time periods are given in terms of number of years ago (represented as age, a; or ka for 1,000 year ago) and the Common Era (BCE/CE) calendar system. The shading indicates relatively dry periods.

Approximate Time Period	*Prevailing Climate and Geomorphology*
10 ka to 8 ka 8000 BCE to 6000 BCE	▪ Rapid sea level rise ▪ Ocean enters Golden Gate ▪ San Francisco Bay is just a river valley ▪ Cooler than 20th Century, but becoming warmer and drier
6 ka to 5 ka 4000 BCE to 3000 BCE	▪ Sea level rise slows to more moderate pace ▪ Outline of San Francisco Bay resembles modern extent ▪ Tidal marsh begins to form in the Delta ▪ Temperature reaches a maximum of the last 10,000 years ▪ Relatively dry conditions ▪ Central Valley floodplain system began to develop

No comments

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Approximate Time Period	*Prevailing Climate and Geomorphology*
4 ka to 2 ka 2000 BCE to 1 CE	▪ Cooling trend with increased precipitation ▪ Large flood occurred ~ 3,600 years ago (1600 BCE)

2 ka to 0.6 ka
1 CE to 1400 CE
	▪ Trend to more arid, dry conditions
	▪ Severe droughts:
	  ▪ 1,100 to 850 years ago (900 CE to 1150 CE)
	  ▪ 800 to 650 years ago (1200 CE to 1350 CE)

0.6 ka to 0.2 ka 1400 CE to 1800 CE	▪ Relatively cool and wet conditions ▪ Numerous episodes of extreme flooding ▪ Includes "Little Ice Age" (1400 CE to 1700 CE)

90 a to 50 a
1910 CE to 1950 CE
	▪ Dry period in the Sacramento River Basin.
	  ▪ Longest dry period in the last 420 years (34 years centered on the 1930's)
	  ▪ Driest 20-year period in the last 370 years (1917 CE to 1936 CE)

A number of scientific studies have used paleo-reconstruction techniques to obtain long-term (decadal, centennial and millennial time scale) records of river flow (e.g., Earle, 1993; Meko *et al.*, 2001) and salinity of the Bay and Delta (e.g., Ingram and DePaolo, 1993; Wells and Goman, 1995; Ingram *et al.*, 1996; May, 1999; Byrne *et al.*, 2001; Goman and Wells, 2000; Starratt, 2001; Malamud-Roam and Ingram, 2004; Malamud-Roam *et al.*, 2006; Malamud-Roam *et al.*, 2007; and Goman *et al.*, 2008). The reconstructions described in the following sections focus on the 2,000 years before present. As indicated in Table 2-1, this period was relatively dry with two extreme regional droughts, followed by relatively cool and wet conditions during the "Little Ice Age," then by a return of dry conditions at the early part of the 20th Century.

2.2. Reconstructed Unimpaired Sacramento River Flow

Meko *et al.* (2001a,b) used tree-ring chronologies in statistical regression models to reconstruct time series of annual unimpaired Sacramento River flow[6] for approximately the past 1,100 years (for the period 869 CE – 1977 CE). As discussed in Section 1.2, unimpaired flow is an estimate of the flow that would occur in the basin without the effects of water management activities.

The 1,100-year record shows strong variability between individual water years (Figure 2-1), with annual flow ranging from approximately 8% of average to 265% of average, where average is defined here for practical purposes as the average observed unimpaired flow from

[6] Meko *et al.* (2001a) used the annual unimpaired flow record for the Sacramento River provided by the Department of Water Resources, which is the sum of the following: flow of the Sacramento River at Bend Bridge, inflow of the Feather River to Lake Oroville, flow of the Yuba River at Smartville, and the flow of the American River to Folsom Lake. This definition is consistent with the definition typically used in hydro-climatic studies of this region (e.g., http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)

No comments

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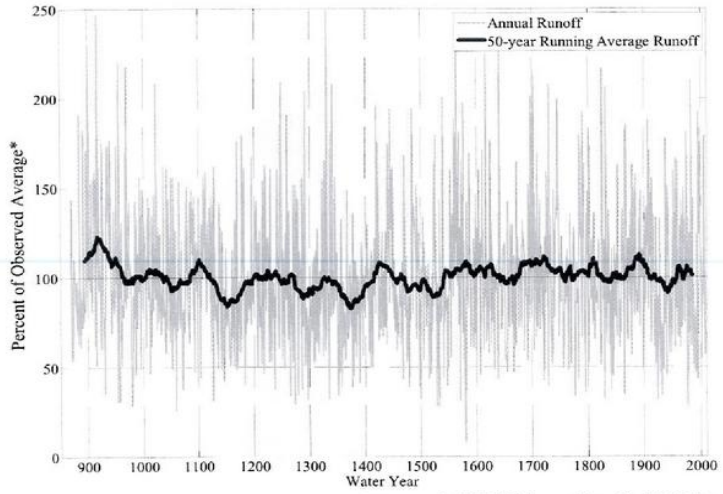
1906 to 2009 of 18 million acre-feet per year (MAF/yr). The reconstructed record shows alternating periods of wet and dry conditions and is consistent with historical droughts (such as the drought in the Mono Lake region of California in the medieval period, around 1150 CE) reported by other paleoclimate studies (Malamud-Roam *et al.*, 2006).

As indicated by the shading in Figure 2-1, the driest long-term drought in the Sacramento River basin in the last 1,100 years occurred from approximately 1130 CE to 1415 CE when the 50-year average flow was seldom above normal for nearly 300 years. Following this drought, conditions were relatively wet (from approximately 1550 CE to 1900 CE). The timing of these droughts and wet periods will be compared to paleosalinity records in the following section.



* Average of 1906-2009 Observed Runoff is 18 MAF/yr.

Figure 2-1 – Reconstructed annual unimpaired Sacramento River flow 869 CE to 2009 CE

Annual reconstructed unimpaired Sacramento River flow (grey line) as a percentage of the average annual observed runoff from 1906 to 2009 shows strong variability between years. The 50-year running average (thick black line) illustrates there were extended periods of above-normal and below-normal runoff conditions. The orange shading highlights an extended dry period in the reconstructed unimpaired Sacramento River data when the 50-year average flow is seldom above normal for nearly 300 years. Data for 869 CE to 1905 CE were reconstructed by Meko et al. (2001b); data for 1906 CE to 2009 CE are observed records from the California DWR (2009).

No comments

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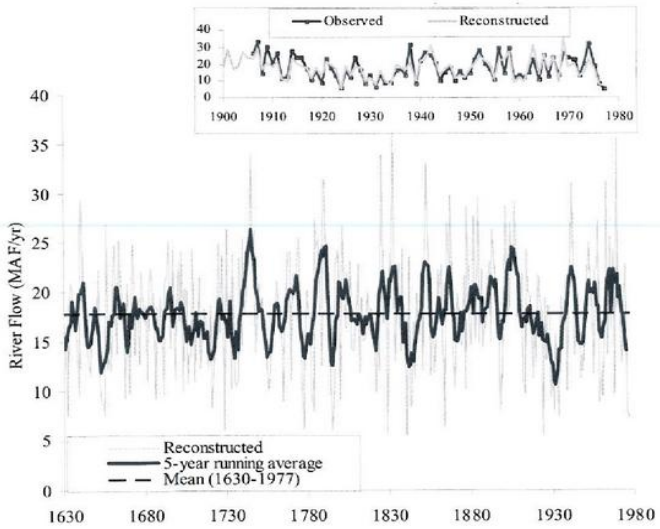
Meko *et al.* (2001a) indicated that for their 1,100-year reconstructed period, the 1630-1977 data are more reliable than the earlier time period, because of better availability of tree-ring information and superior regression model statistics. Figure 2-2 shows the reconstructed time series of annual unimpaired Sacramento River flow from 1630 to 1977 from Meko *et al.* (2001b). The inset in Figure 2-2 shows there is a good match between the reconstructed flows (grey line) and the observed annual flows (red line) during the period of overlap between the reconstructed and observed records (from 1906 to 1977).

Multi-decadal periods of alternating wet and dry conditions are pervasive throughout the reconstructed record. The wet conditions of the late 1800's and early 1900's, which were followed by severe dry conditions in the 1920's and 1930's, are consistent both with observed precipitation and estimated Sacramento River runoff for these time periods (see Section 3) and with literature reports of historical conditions (see Section 4).



No comments

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Figure 2-2 – Reconstructed annual unimpaired Sacramento River flow from 1630-1977.

Annual reconstructed unimpaired Sacramento River flow (grey line in main panel and inset) for the 1630 to 1977 time period was identified by Meko et al. (2001a) as the most accurate period of reconstruction. Inset panel illustrates the comparison between observed (red) and reconstructed (grey) unimpaired flows during the overlap period. The mean of the reconstructed unimpaired flow for 1630-1977 is 17.7 MAF/yr (dashed horizontal line in main panel). The 5-year centered running average (thick solid blue line in main panel) illustrates the decadal trends.

Meko *et al.* (2001a) identified the severe drought periods in the reconstructed Sacramento River flow record (1630-1977) by computing the lowest *n*-year moving average. For instance, to determine the most severe 6-year drought, Meko *et al.* calculated the moving average using a 6-year window for the entire data set and then identified the lowest 6-year average. Meko *et al.* found that the period from the early 1920's to late 1930's experienced the lowest 6-year, 10-year, 20-year, and 50-year averages (or droughts), both in the reconstructed and observed records. The observed droughts in Table 2-2 have been updated through present (1906-2009) using the same analysis; this update did not change the drought time periods identified by Meko *et al.* The reconstructed record of unimpaired Sacramento River flow shows the period from early 1920's to late 1930's experienced some of the worst drought conditions since 1630. Additional data are presented in Appendix B.

Table 2-2 – Periods of drought from the reconstructed and observed records of unimpaired Sacramento River flow

Severe drought periods in the reconstructed Sacramento River flow record (1630-1977) were determined by Meko et al. (2001a) by computing the lowest n-year moving average of the reconstructed annual unimpaired Sacramento River flow. The same method was used to determine the most severe droughts of the observed record (1906-2009).

	Period of lowest *n*-Year moving average Sacramento River flow					
	1-Year	3-Year	6-Year	10-Year	20-Year	50-Year
Reconstruction (1630-1977)	1924	1775 to 1778	1929 to 1934	1924 to 1933	1917 to 1936	1912 to 1961
Observations (1906-2009)	1977	1990 to 1992	1929 to 1934	1924 to 1933	1918 to 1937	1917 to 1966

Conclusions

Reconstruction of unimpaired Sacramento River flow indicates:

- Annual precipitation is highly variable. Even during long dry periods, individual years can be very wet.
- The Sacramento River basin experienced a multi-century dry period from about 1100 C.E. to 1400 C.E.
- The drought period in the 1920's and 1930's represents some of the worst drought conditions in the last 400 years.

No comments

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2.3. Reconstructed Salinity in the Bay-Delta Estuary

Tree Ring Data

The interaction between saline ocean water from the Pacific Ocean and fresh water from the rivers flowing into the Delta determines the ambient salinity conditions in the Delta and the Bay. Estimates of historical precipitation derived from tree ring data can therefore be used to estimate the corresponding salinity conditions in the Delta.

Stahle *et al.* (2001) used tree ring chronologies from blue oak trees located in the drainage basin to San Francisco Bay to reconstruct salinity at the mouth of San Francisco Bay. Recognizing that a number of factors influence salinity other than precipitation (estimated from tree rings), the authors chose a time period prior to substantial water development when the salinity data were fairly constant in mean and variance. During the calibration period (1922-1952), annual tree ring growth correlates well with average salinity near the Golden Gate Bridge (r^2=0.81). Using this transfer function, Stahle *et al.* (2001) reconstructed annual average January to July salinity for all years 1604 to 1997.

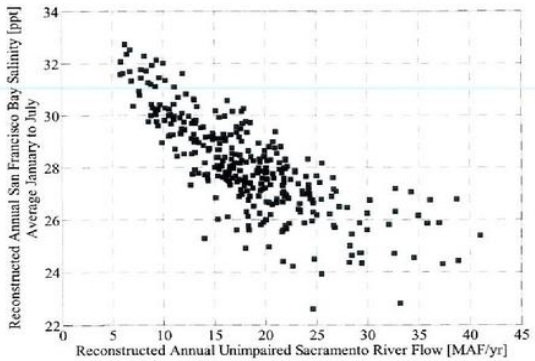

Figure 2-3 – Reconstructed salinity near the mouth of San Francisco Bay compares well with reconstructed unimpaired Sacramento River flow in the upper watershed
For each year from 1630 to 1952, the annual unimpaired Sacramento River flow (from Meko et al., 2001b) is plotted against the annual average salinity at Fort Point (from Stahle et al., 2001).

As shown in Figure 2-3, the salinity reconstruction by Stahle *et al.* (2001) compares well with the unimpaired flow reconstruction by Meko *et al.* (2001b). The data follow the expected inverse exponential relationship between flow and salinity. Over the period from

No comments

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1630 to 1952, reconstructed salinity increases as reconstructed unimpaired Sacramento River flow decreases. The agreement is strongest in dry years. The increased scatter in wet years may reflect the limitations in the tree ring methods.

Stahle *et al.* (2001) identified an increasing divergence of observed salinity relative to predicted (reconstructed) salinity after 1952 (Figure 2-4) and suggested that the majority of differences are due to increased water diversions. During the calibration period (1922-1952), the observed salinity is typically within +/- 5% of the reconstructed salinity. However, from 1953-1994, the data show an increasing trend for observed salinity to be greater than predicted, exceeding reconstructed salinity by over 15% in 1978, 1979, 1991, and 1993. Since 1969, observed salinity has exceeded reconstructed salinity in all years except the extremely wet years of 1982 and 1983.

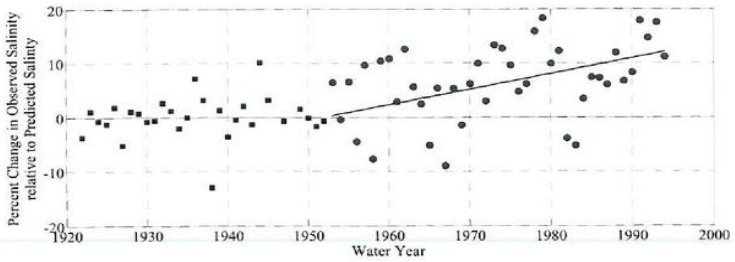

Figure 2-4 – Percent change in observed salinity relative to predicted (reconstructed) salinity for the period 1922 to 1994

The reconstructed salinity record by Stahle et al. (2001) overlaps with the observed salinity record from 1922 to 1994. During this period, the percent change of observed salinity relative to predicted salinity is determined as (observed salinity – reconstructed salinity) divided by reconstructed salinity, with positive values indicating when observed salinity exceeded the reconstructed salinity prediction. The calibration period is indicated with black squares, with the period outside the calibration window indicated by red circles. The straight red line is the linear trend in the post-calibration period, indicating observed salinity is increasingly diverging from predicted (reconstructed) salinity.

These data suggest that since the 1950's, water management operations have increased salinity, with an escalating effect over the period of record. In addition, it is worth noting that significant anthropogenic modifications to the landscape and water usage had already occurred prior to the 1922-1953 calibration period (see Figure 1-2 and Figure 1-3). Although this study is unable to evaluate the effect of anthropogenic modifications prior to 1953, the following section examines salinity prior to human interference at multiple sites in the Bay-Delta.

Tree ring reconstructions such as Meko *et al.* (2001a) and Stahle *et al.* (2001) have the advantage of providing high temporal resolution (i.e. annual) over approximately the last 1,000 years. However, a possible disadvantage of this method is the age of trees, limiting

No comments

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high accuracy estimates to approximately the last 400 years. A second possible disadvantage of using tree ring reconstructions for paleosalinity is the remote location of the trees relative to the estuary. Paleosalinity estimates from tree rings in the upper basin necessarily assume that the precipitation patterns archived in the tree rings are representative of the quantity of water that reaches the estuary. However, as observed by Stahle *et al.*, anthropogenic water management affects the amount of water that flows through the estuary.

Sediment Core and Fossil Data

Because of uncertainties in estimates of precipitation and salinity derived from tree ring data, other paleosalinity methods that rely on local fossils to determine local salinity have also been explored. Organic deposits accumulated in the sediments contain signatures of the ambient conditions that can be used to infer the variations in salinity over geologic time scales. Although reconstructions from sediment cores have a coarser temporal resolution than tree rings, the variations in climate and landscape responses to change are better defined geographically because the evidence of localized climate change is preserved as a time series *in situ*, at the site of interest.

The San Francisco Bay-Delta has been the focus of several paleoclimatic reconstructions from sediment cores. Changes in wetland plant and algae communities are the dominant response in the Bay and Delta to climate change and associated fluctuations in temperature and precipitation. Proxies of plant and algae response to environmental conditions are preserved in the sediment cores and determined by:

- quantification and taxonomic identification of
  - (i) diatom frustules (Byrne *et al.*, 2001; Starratt, 2001; Starratt, 2004),
  - (ii) plant seeds and roots (Goman *et al.*, 2008),
  - (iii) plant pollen (May, 1999; Byrne *et al.*, 2001; Malamud-Roam and Ingram, 2004), and,
- measurement of peat carbon isotope ratios (Byrne *et al.*, 2001; Malamud-Roam and Ingram, 2004).

Results from plant pollen identification for three sites in the western Delta and Suisun Bay and Marsh are summarized below in Figure 2-5. The data indicate that Browns Island tidal marsh, near the confluence of the Sacramento and San Joaquin Rivers in the western Delta (Figure 2-5) was predominately a freshwater system for 2,500 years, even during century-long droughts. This condition prevailed until the early 1900's. The shading in Figure 2-5 corresponds to the nearly 300-year dry period identified in the reconstructions of annual unimpaired Sacramento River flow (Figure 2-1). Although salinity intrusion occurred during this period in Suisun Bay at Roe Island, and during earlier long drought periods, salinity did not affect the western Delta to the same degree. This suggests a change in spatial salinity gradient characteristics, and is possibly due to the effect on salinity intrusion of the vast tidal marshes that existed in the Delta until the early 20th Century.

No comments

- n/a -

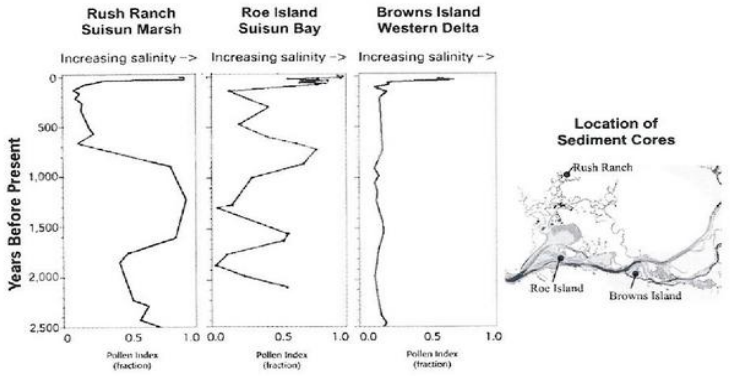

Figure 2-5 – Paleosalinity evidence derived from pollen data

Salinity variability over the last 2,500 years at Rush Ranch in Suisun Marsh (left panel), Roe Island in Suisun Bay (center panel), and Browns Island in the Western Delta (right panel). Data are reproduced from Malamud-Roam and Ingram (2004). Orange shading across each panel corresponds to the nearly 300-year dry period identified in the annual unimpaired Sacramento River flow reconstruction (see Section 2.2) Locations of each of the sediment cores are illustrated in the map on the right.

Malamud-Roam *et al.* (2006) attributed the differences between sites to a combination of methodological issues (such as sampling frequency and core chronology) and site-specific ecological differences (such as site elevation, location relative to channel and sedimentation rates over time). However, all of the paleosalinity reconstructions based on pollen, diatoms and carbon isotopes are in general agreement and suggest that salinity increased abruptly about 100 years ago, reaching or exceeding salinity levels at any other time in the 2,500 years of reconstructed records.

This increase in salinity may correspond to the reduction in unimpaired Sacramento River flow evidenced in the tree ring reconstructions by Meko *et al.* (2001a), which determined that the 1920's and 1930's experienced the worst droughts in the last 400 years. However, the droughts in the 1920's and 1930's do not appear to be as severe as the droughts between 1100 CE to 1400 CE (600 to 900 years ago), as categorized by unimpaired Sacramento River flow. Yet salinity in Suisun Bay and the western Delta appears to meet or exceed the level of the medieval droughts, indicating factors besides natural precipitation and runoff patterns have affected salinity in the last 100 years.

No comments

- n/a -

Conclusions

Reconstructions of salinity in the Bay and Delta indicate:

- Precipitation in the drainage basin for San Francisco Bay (as recorded in tree rings) is a good indicator of salinity near the mouth of the Bay for the period 1922-1953; however, since 1953, increased water diversions have increased observed salinity above the level predicted from precipitation estimates.
- The Delta was a predominately freshwater system for 2,500 years, until the early 1900's, even during century-long droughts.
- The multi-century dry period identified in unimpaired Sacramento River flow reconstruction is evident in Suisun Bay sediments but not in Delta sediments, indicating that salinity did not intrude as far into the Delta during past droughts as it has during the last 100 years.
- The evidence from most sites suggests that current salinity levels are as saline as, or more saline than, previous historical conditions.

No comments

- n/a -

3. Instrumental Observations of the Last 140 Years

Field measurements of rain and snow have far greater accuracy and resolution than the paleoclimate records of precipitation; similarly, field measurements of salinity have far greater accuracy and resolution than the paleosalinity records from sediment cores. These instrumental observations will be used to analyze in more detail the salinity increase identified in the paleoclimate records approximately 100 years ago and determine if the increase in salinity has persisted.

The first sub-section presents observations of precipitation and unimpaired runoff in the upper basin, indicating the natural climatic variability and amount of fresh water available within the Bay-Delta watershed. The second sub-section examines Net Delta Outflow (NDO), which is the amount of water flowing through the Delta into Suisun Bay, directly affecting the level of salinity intrusion into the Delta. NDO is analyzed under both unimpaired (without water diversions and reservoir storage and releases) and historical (actual) conditions; comparison between unimpaired and actual conditions reveals the effect of water management practices. The third sub-section presents field measurements and model-based estimates of salinity at various locations within the Delta and Suisun Bay.

3.1. Precipitation and Unimpaired Flow in the Upper Basin

Precipitation in the Bay-Delta watershed indicates the amount of water available within the system, which could ultimately reach the Bay and affect salinity conditions. However, since precipitation falls as both rain and snow, the timing of runoff to the river channels is often lagged a few months due to snow melt conditions. For this reason, estimates of unimpaired flow (runoff) are generally used to characterize hydrological variability. Unimpaired runoff represents the natural water production of a river basin, unaltered by water diversions, reservoir storage and operation, and export of water to or import of water from other basins.

Figure 3-1 illustrates the total annual precipitation at Quincy[7] in the northeastern Sierra, the total annual unimpaired Sacramento River flow[8] and total unimpaired San Joaquin River flow[9]. Figure 3-2 shows the locations of the eight precipitation stations in northern California used to compute the Sacramento eight-station precipitation index (left panel) and the measurement locations of eight flow gages used to calculate the Sacramento and San Joaquin unimpaired flow data (right panel). Additional information on the annual unimpaired flows is provided in Appendix C.

As discussed in Section 2.2, the total annual unimpaired Sacramento River flow exhibits strong variability between years, both in the reconstructed and observed data. Figure 3-1

[7] Precipitation data are from Menne *et al.* (2009)

[8] "Unimpaired Sacramento River flow" is defined as the sum of the "full natural flows" from the Sacramento River at Bend Bridge, Feather River inflow to Lake Oroville, Yuba River at Smartville, and the American River inflow to Folsom Lake. (http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)

[9] "Unimpaired San Joaquin River flow" is defined as the sum of the full natural flows from the Stanislaus River inflow to New Melones Lake, Tuolumne River inflow to New Don Pedro Reservoir, Merced River inflow to Lake McClure, and San Joaquin River inflow to Millerton Lake (http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)

No comments

- n/a -

indicates that the trends revealed in the total annual unimpaired Sacramento River flow (middle panel) are also evident in the total annual precipitation at Quincy (top panel) and the total annual unimpaired San Joaquin River flow (bottom panel). Alternating periods of wet and dry conditions are evident in both river basins. These data indicate there were wetter than normal conditions in the late 1800's and early 1900's, followed by severe dry conditions in the 1920's and 1930's. These were then followed by generally wetter conditions until the mid-1970's.

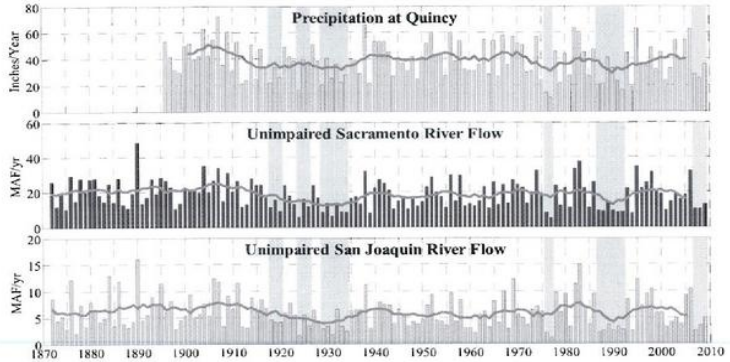

Figure 3-1 – Total annual precipitation and unimpaired flow in the upper Sacramento and San Joaquin River basins (1872-2009)

Total annual precipitation at Quincy in the northeastern Sierra (top panel), total annual unimpaired Sacramento River flow (middle panel), and total annual unimpaired San Joaquin River flow (bottom panel). Bar color on each panel indicates the regional location of the measurements, reflected in the remaining figures of this section (Figure 3-2, Figure 3-3 , and Figure 3-4). Grey line within each panel is the 10-year moving average for each parameter.

No comments

- n/a -

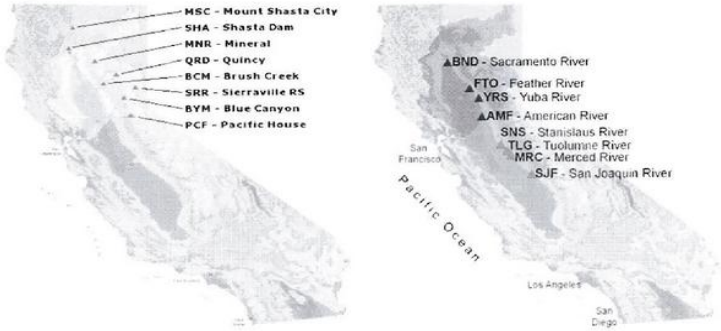

Figure 3-2 – Locations of Precipitation and Runoff Measurements

Location of stations used in the determination of the 8-station precipitation index for northern California (left map), including the location of Quincy (QRD), and the unimpaired Sacramento River flow (red stations, right map) and unimpaired San Joaquin River flow (orange stations, right map).

Knowles (2000) illustrated that the seasonal timing of runoff can significantly alter salinity intrusion without any change to the total annual runoff. For this reason, it is critical to examine the monthly variability in precipitation and unimpaired runoff. Monthly precipitation and unimpaired flow values are available for a shorter time period (generally 1921 to present) than the total annual values (generally 1870's to present).

The monthly distribution of the Sacramento eight-station precipitation index[10] indicates that most of the precipitation in northern California occurs during November through March (Figure 3-3). The variability between years, represented by the vertical bars and '+' marks, shows the distribution is positively skewed, i.e., excessively high precipitation occurs in relatively few years.

Figure 3-4 presents the monthly distribution of unimpaired flow for both the Sacramento and San Joaquin River basins. River flow lags precipitation by about two months because of storage of some precipitation in the form of snow and subsequent snowmelt in the spring. Most of the unimpaired inflow to the Delta originates from the Sacramento Basin, although the contributions from the two basins are approximately the same during the months of late-spring and early-summer snow melt, when unimpaired runoff from the San Joaquin Basin peaks.

[10] Data from 1921 through 2008, downloaded from http://cdec.water.ca.gov/cgi-progs/precip1/8STATIONHIST

No comments

- n/a -

No comments

- n/a -

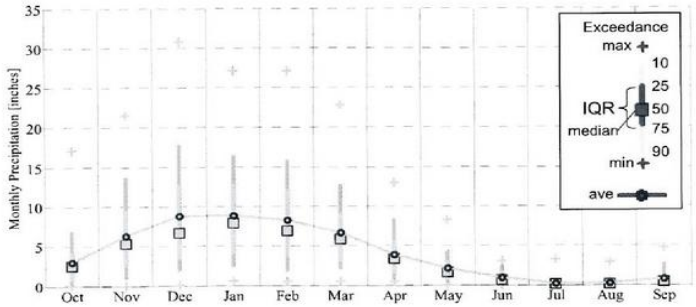

Figure 3-3 – Monthly Distribution of Precipitation in the Sacramento River Basin

Distribution of monthly precipitation for water years 1921 through 2008. Monthly averages are indicated by the blue line with black circles. Monthly median is given by the blue squares, while the interquartile range is indicated by the vertical blue line for each month and the vertical grey line extends to the 10th and 90th percentiles. Maximum and minimum values are indicated by '+' marks.

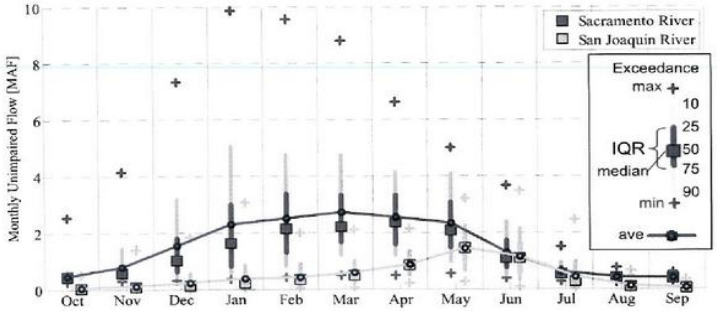

Figure 3-4 – Monthly distribution of unimpaired flow in the Sacramento and San Joaquin River basins

Distribution of monthly unimpaired flows for water years 1921 through 2008. Monthly averages are indicated by the lines with black circles. Monthly median is given by the squares, while the interquartile range is indicated by the vertical line for each month and the vertical grey line extends to the 10th and 90th percentiles. Maximum and minimum values are indicated by '+' marks.

Conclusions

The long-term observations of precipitation and unimpaired flow indicate:

- Relatively wet conditions occurred in the late 1880's to about 1917 in both the Sacramento and San Joaquin River watersheds prior to large-scale water management operations.
- Unusually dry conditions occurred from about 1918 through the late 1930's; these persistent dry conditions are not representative of the average conditions over the last 130 years.
- Precipitation in Sacramento River watershed peaks between December and March; the unimpaired river flow lags by about 1 to 2 months because of snow melt.

No comments

- n/a -

3.2. Net Delta Outflow

The quantity of water flowing from the Delta into Suisun Bay, defined as Net Delta Outflow (NDO), is the primary factor in determining salinity intrusion in Suisun Bay and the western Delta. Unimpaired NDO is calculated using unimpaired flow in the Sacramento and San Joaquin Rivers (Section 3.1) as well as contributions from other minor tributaries.[11] Unimpaired NDO is the hypothetical Delta outflow that would occur in the absence of any upstream diversion or storage, but with the existing Delta channel and upstream channel configuration.

Because the outflow from the Delta at the wide and deep entrance to Suisun Bay cannot be measured accurately, the parameter of historical (actual) NDO is estimated from a daily mass balance of the measured river inflows to the Delta, measurements of water diversions at major pumping plants in the Delta, and estimates of net within-Delta consumptive use (including Delta precipitation and evaporation).

The effect of anthropogenic water management on NDO is illustrated below by comparing monthly estimates of unimpaired NDO[12] and historical (actual) NDO[13] (Figure 3-5). Since unimpaired flow estimates also assume the existing Central Valley and Delta landscape (reclaimed islands, no natural upstream flood storage, current channel configuration, etc.), this comparison reveals the net effect of water management only. This analysis does not address the change due to physical modification to the landscape or sea level rise.

For the period of joint record, when both unimpaired and historical NDO values are available (water year 1930 through 2003), historical NDO decreased even though unimpaired NDO increased slightly. The long-term (74-year) linear trend in monthly unimpaired NDO (the black dashed line in top panel of Figure 3-5) increased on average 0.49 MAF/month; thus, by 2003, the average annual unimpaired NDO had increased 5.9 MAF/year since 1930. In contrast, the long-term linear trend in monthly historical NDO (the black dashed line in middle panel of Figure 3-5) decreased on average -0.29 MAF/month, totaling a decrease in historical (actual) NDO of -3.5 MAF/year. This corresponds to a net increase in diversion of 9.4 MAF/year of water from the Delta upstream watershed relative to the 1930 level[14].

Increased diversion and export of water have decreased historical NDO (middle panel of Figure 3-5), but this has been partially offset by a natural increase in unimpaired NDO (top panel). The difference between historical and unimpaired NDO (bottom panel) is due to the cumulative effects of upstream diversions, reservoir operations, in-Delta diversions, and

[11] Unimpaired NDO does not include water imported from the Trinity River system, which is outside the Delta watershed.

[12] Unimpaired NDO data was obtained from Ejeta (2009), which is an updated version of DWR (1987).

[13] Historical NDO data was obtained from the IEP's DAYFLOW program (http://www.iep.ca.gov/dayflow/index.html).

[14] This is consistent with current estimates of approximately 15 MAF/year total diversion from the system, which includes the 4-5 MAF/year diversions established prior to 1930 and approximately 1 MAF/year additional water supply imported from the Trinity River system.

No comments

- n/a -

south-of-Delta exports. During most months, water management practices have historically resulted in historical (actual) NDO that is less than unimpaired conditions, indicated by a negative value for the quantity (historical NDO – unimpaired NDO).

Because the difference between monthly historical and unimpaired NDO has become more negative over time, the periods of excess conditions (when historical NDO exceeds unimpaired NDO) have become very infrequent. The only occurrences are now following the wettest years, primarily due to releases from reservoirs in the fall to make room for winter flood control storage.

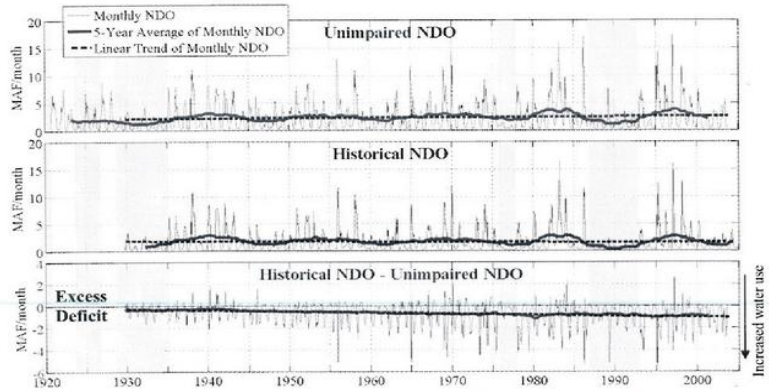

Figure 3-5 – Time series of Monthly Net Delta Outflow under unimpaired conditions and historical (actual) conditions

The thin color line on each panel indicates the monthly NDO, the thick color line indicates a running 5-year average of the monthly NDO, and the dashed black line indicates the linear long-term trend.

The monthly distribution (Figure 3-6) of unimpaired NDO and historical NDO for water years 1930 to 2003 reveals that for all months except September and October (when NDO is low), average unimpaired NDO is greater than average monthly historical NDO. The tendency in the average historical NDO toward greater flow in September and October is influenced strongly by the period prior to about 1975 when reservoir operations resulted in more flow in those months (see Figure 3-7 and related discussion below). On average from 1930-2003, water management practices reduced Delta outflows in the months of November through August (and in all months since about 1975, see Figure 3-7). The greatest reduction in Delta outflow relative to unimpaired conditions occurs in the months of March through June, when spring snow melt is captured in reservoirs and a portion of the river flow is diverted for direct use.

No comments

- n/a -

As also shown in Figure 3-6, water management practices also shift the peak flow periods to earlier in the year. The unimpaired NDO hydrograph peaks in May when snow melt contributes to high river flows, with at least 4.1 MAF in May in 50% of the years (averaging 4.2 MAF in May over all years). The historical NDO peaks in February with at least 2.9 MAF/month in 50% of the years (averaging 3.7 MAF/month over all years). The variability between years, represented by the vertical bars and '+' marks, indicates the distribution is positively skewed, which means a relatively few years have excessively high flows.

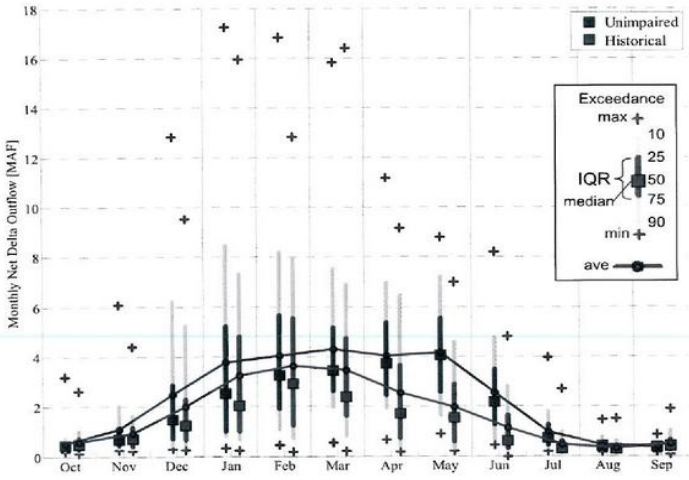

Figure 3-6 – Monthly distribution of Net Delta Outflow

Distribution of monthly NDO for water years 1930 through 2008. Monthly averages are indicated by the lines with black circles. Monthly median is given by the squares, while the interquartile range is indicated by the vertical line for each month and the vertical grey line extends to the 10th and 90th percentiles. Maximum and minimum values are indicated by '+' marks.

Figure 3-7 shows the long-term trends in the difference between historical (actual) monthly NDO and unimpaired monthly NDO. Increased water usage and increased diversion of water to storage has reduced historical NDO relative to unimpaired NDO in most months of the year. In July (and August, not shown in Figure 3-7), the deficit is reduced, likely due to reservoir releases which provide a portion of the water diverted by upstream users prior to reservoir construction. The 1994 Bay-Delta Accord called for higher minimum Delta outflows in July and August to protect Delta fish species, which should also serve to reduce the deficit. However, historical (actual) NDO still remains less than unimpaired NDO.

No comments

- n/a -

In September (and October, not shown in Figure 3-7), historical (actual) NDO exceeded unimpaired NDO from about 1945 to 1975, with an increasing trend in the percent change. Since 1975, the percent change has shown a downward trend with a deficit (historical NDO less than unimpaired NDO) during most years since 1975.

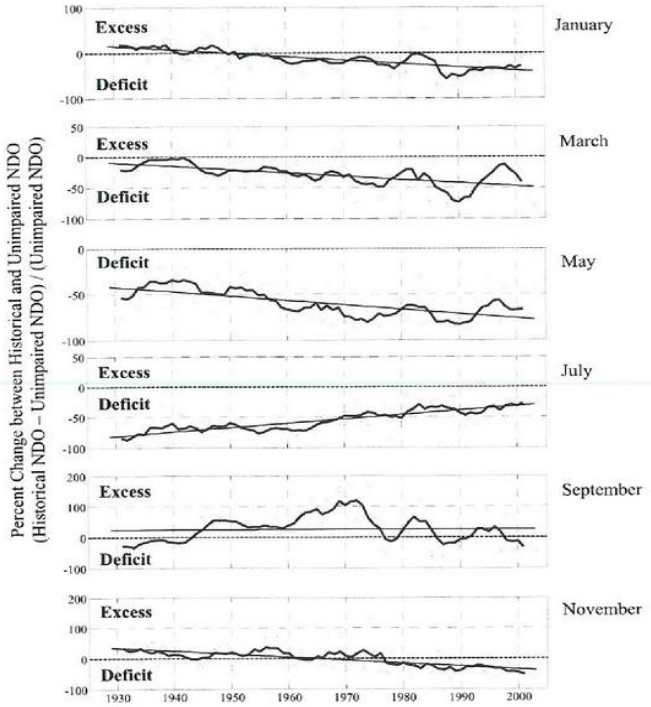

Figure 3-7 – Long-term trends in monthly NDO

Percent change of NDO relative to unimpaired conditions. Circles indicate the percent change for each month of the period of record. The red line indicates a moving 5-year average of the percent change, while the black line indicates the long-term linear trend over the entire period of record.

No comments

- n/a -

Conclusions

Anthropogenic water management practices have altered NDO in the following ways:

- Long-term data demonstrate that the difference between historical (actual) NDO and unimpaired NDO is increasing over time, indicating that water management actions have reduced Delta outflow significantly.
- During most months, water management practices have reduced Delta outflow relative to unimpaired conditions. From the mid-1940's to the mid-1980's, reservoir operations resulted in historical (actual) NDO slightly greater than unimpaired NDO slightly in a number of months, largely in the fall. However, since 1985, reservoir operations have resulted in increased NDO only in the wettest years, and NDO has declined in all other months.
- On average, water management practices have resulted in reduced Delta outflows in all months except September and October. The greatest reduction in Delta outflow relative to unimpaired conditions occurs in the months of March through June, when spring snow melt is captured in reservoirs and some of the remaining river flows are diverted for direct use.

No comments

- n/a -

3.3. Salinity in the Western Delta and Suisun Bay

Observations and model-based estimates can be used to examine historical variations in salinity in the western Delta and Suisun Bay. The observations examined in this section include records from the early 1900's from the California & Hawaiian Sugar Refining Corporation in Crockett (C&H) and long-term monitoring data published online by the Interagency Ecological Program (IEP). Estimates of salinity intrusion were obtained using the Kimmerer-Monismith equation describing X2 (Kimmerer and Monismith, 1992).

Section 3.3.1 addresses the importance of consistency among salinity comparisons. The spatial variability of a specific salinity level is examined in Section 3.3.2 and Section 3.3.3, while the temporal variability of salinity at specific fixed locations is explored in Section 3.3.4 and Section 3.3.5.

3.3.1. Importance of Consistency among Salinity Comparisons

Water salinity in this report is specified either as electrical conductivity (EC) or as a concentration of chloride in water. EC is a measure of the ability of an aqueous solution to carry an electric current and is expressed in units of microSiemens per centimeter (µS/cm)[15]. Chloride concentration is specified in units of milligrams of chloride per liter of water (mg/L). Conversion between EC and chloride concentration can be accomplished using site-specific empirical relationships such as those developed by Kamyar Guivetchi (DWR, 1986).

Previous studies have evaluated the level of salinity in the Bay and Delta, using a variety of salinity units (e.g. EC, chloride concentration, or concentration of total dissolved solids in water) and various salinity parameters (e.g. annual maximum location 1,000 µS/cm EC, monthly average location of 50 mg/L chloride, or daily average EC at a specific location). Therefore, when comparing studies, it is critical to use consistent salinity units, parameters, and timing, including the phase of tide and time of year. These concepts are discussed further in Appendix D.

3.3.2. Distance to Fresh Water from Crockett

The California & Hawaiian Sugar Refining Corporation (C&H) is located in Crockett, near the western boundary of Suisun Bay (see Figure 3-8). C&H either obtained its freshwater supply in Crockett, or, when fresh water was not available at Crockett, from barges that traveled upstream on the Sacramento and San Joaquin Rivers. The barges generally travelled upstream twice a day beginning in 1908 (DPW, 1931). C&H recorded both the distance traveled by its barges to reach fresh water and the quality of the water they obtained. This provides the most detailed quantitative salinity record available prior to the initiation of salinity monitoring by the State of California in 1920. The distance traveled by the C&H barges serves as a surrogate for the prevailing salinity conditions in the western Delta and

[15] The reported EC values are actually specific conductance, i.e., the electrical conductivity of the water solution at a reference temperature of 25° centigrade, as is standard practice.

No comments

- n/a -

Suisun Bay. Operations by C&H required water with less than 50 mg/L chloride concentration.[16] Additional detail on C&H operations and the detailed barge travel data are included in Appendix D.

Figure 3-8 – Map of Suisun Bay and Western Delta with locations of continuous monitoring stations

C&H barges traveled up estuary from Crockett (yellow star). Locations of IEP continuous monitoring stations are shown in red. Scale in miles is indicated in the upper left corner of the map.

[16] In comparison, the 50 mg/L concentration required for C&H operations is one-third the concentration of the industrial water quality standard under current conditions in the Delta.

No comments

- n/a -

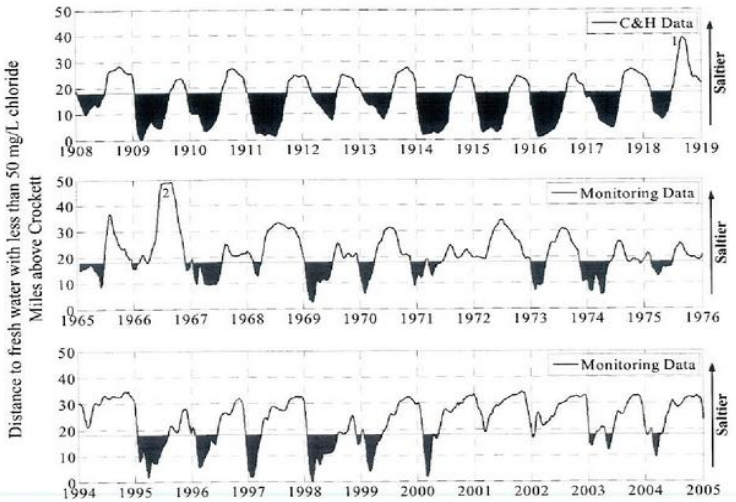

Figure 3-9 – Distance to fresh water from Crockett

"Distance to fresh water" is defined as the distance in miles upstream of Crockett to water with less than 50 mg/L chloride concentration. The horizontal line, at approximately 18 miles, is the distance from Crockett to the Delta. The shading represents the spatial extent and duration of the presence of fresh water within Suisun Bay, downstream of the Delta.

Data notes: (1) During August and September 1918, average water quality obtained by C&H exceeded 110 mg/L chlorides; (2) Salinity during 1966 is likely an overestimate due to relatively sparse spatial coverage of IEP monitoring stations. During 1966, salinity at Emmaton (28 miles from Crockett) exceeded 3,000 µS/cm; the nearest station upstream of Emmaton is near Courtland (58 miles from Crockett) and had a salinity of ~ 300 µS/cm. Location of 350 µS/cm isohaline based on data interpolation between these two stations (which are 30 miles apart) is not likely to be representative of the true location.

Figure 3-9 compares surface[17] salinity data from C&H with estimates derived from a network of continuous surface salinity monitoring stations (Figure 3-8) within Suisun Bay and the western Delta dating back to 1964. The monitoring data are published online by the Interagency Ecological Program (IEP, see http://iep.water.ca.gov/dss). The location of the 350 µS/cm EC isohaline, which approximately coincides with the C&H criterion of 50 mg/L chloride concentration, was estimated from the IEP measurements by linear interpolation between the average daily values at IEP monitoring stations.

[17] Due to the method of collection, C&H water samples are assumed to be from near the water surface.

No comments

- n/a -

As a cautionary note, depending on the source of information, the C&H barges are said to have traveled with the tide, indicating they either took water at high tide (moving up river on the flood and down on the ebb) or at low tide (traveling against the tide, but moving a shorter distance). Thus, the C&H records either represent the daily maximum or daily minimum distance traveled. In contrast, the distances to fresh water calculated from recent monitoring data are based on the average daily values of EC measured at fixed locations. The difference between daily average distance and daily minimum or maximum is approximately 2 to 3 miles. However, since the difference between the data from the early 1900's and the more recent time periods exceed this 2 to 3 mile uncertainty, the conclusions of this section remain unchanged regardless of the specific barge travel timing.

From 1908 through 1918, C&H was able to collect fresh water for a large portion of the year within Suisun Bay, without having to travel all the way from Crockett to the Delta. However, as can be seen in Figure 3-9, that would no longer be possible in many years (e.g., 2001-2004).

Figure 3-10 shows the monthly distribution of distance traveled by C&H barges during water years 1908 through 1917, and the equivalent distance from determined from observed data for water years 1966 through 1975 (top panel) and water years 1995 through 2004 (bottom panel). These two latter periods have similar hydrologic characteristics to the period of the C&H data.[18] The monthly distribution for each dataset illustrates the seasonal fluctuations of the salt field as well as the variability between years for each month.

During the early 1900's, the median distance traveled by C&H barges to procure fresh water was less than 8 miles in the spring (March-June) and about 25 miles (between Collinsville and Emmaton) in the fall (September-October). In contrast, due to water management conditions from 1995 to 2005, the equivalent distances would be 13 to 23 miles in the spring and up to 30 miles in the fall. It is worth noting that from 1966 to 1977, the distance to fresh water in the fall and early winter months (September through January) was generally less than the equivalent distance in the early 1900's, indicating that large-scale water management operations circa 1970 tended to reduce salinity in the fall and early winter. However, this trend has reversed in the more recent water management period (1995-2005), with salinity intrusion significantly increased over levels in the early 1900's during all months.

Figure 3-10 also shows that the range of the average annual distance from Crockett to fresh water from 1995 to 2005 was approximately 15 miles (from about 13 to 30 miles), while the range during the early 1900's was approximately 20 miles (from 6 to 25 miles). This analysis indicates that large-scale water management activities limit the fluctuating nature of the salt field by preventing fresh water from reaching as far downstream as it did in the early 1900's.

Finally, Figure 3-10 indicates that salinity intrusion in the Delta occurred later in the year (beginning in July) in the early 1900's than under more recent time period conditions (beginning in March).

[18] This similarity in hydrological characteristics between the periods was established by approximately matching the distribution of annual Sacramento River flow during these periods (see Appendix E).

No comments

- n/a -

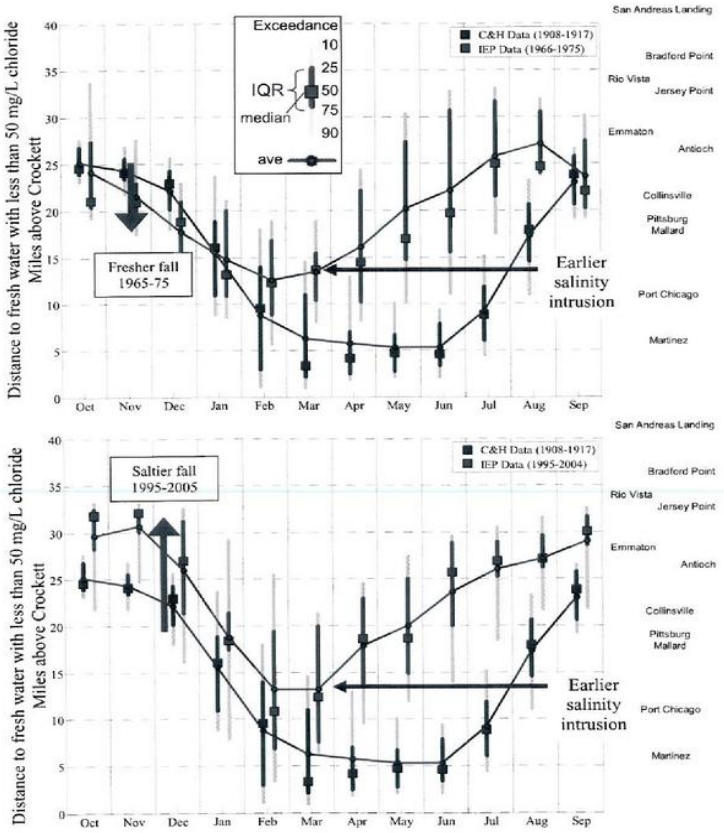

Figure 3-10 – Monthly distribution of distance to fresh water from Crockett

No comments

- n/a -

These comparisons (and other relevant comparisons in Appendix D) show that, on average, C&H barges would have had to travel up to 19 miles farther to procure fresh water under recent large-scale water management conditions than in the early 1900's. These comparisons also indicate that fresh water was present for significantly longer time periods, and over a larger area of the western Delta, in the early 1900's than during similar hydrological periods under current water management conditions. Abrupt changes in salinity just prior to 1920 caused C&H to abandon the Sacramento and San Joaquin Rivers and switch to a water supply contract with Marin County beginning in 1920 (Appendix D).

The distance to fresh water during individual wet years and during individual dry years is presented in Appendix D. The data in Appendix D also show that salinity has been generally higher in recent times than in the early 1900's and that water management has restricted the range in salinity experienced during a water year. The periods when fresh water is present at given locations have been reduced, or, in some cases, eliminated.

Conclusions

The records of the distance traveled upstream from Crockett by C&H barges to procure fresh water and estimates of this distance under large-scale water management conditions (reservoir operations and water diversions) show that:

- Fresh water was present farther downstream and persisted for longer periods of time in the western Delta in the early 1900's than under recent time periods with similar hydrologic conditions;
- Water management practices result in greater salinity intrusion in the western Delta for most months of the year; and,
- Salinity intrusion begins earlier in the year, extends farther upstream, and persists for a longer period each year.

No comments

- n/a -

3.3.3. X2 Variability

An often-used indicator of fresh water availability and fish habitat conditions in the Delta is a metric called X2. X2 is defined as the distance from the Golden Gate to the 2 part-per-thousand isohaline (equivalent to a salinity of 2 grams of salt per kilogram of water), measured near the channel bed along the axis of the San Francisco Estuary. Higher values of X2 indicate greater salinity intrusion. Monthly values of X2 are estimated in this report using the monthly regression equation from Kimmerer and Monismith (1992):

Monthly $X2(t) = 122.2 + 0.3278*X2(t-1) - 17.65*\log_{10}(NDO(t))$

The K-M equation expresses X2 (in units of kilometers) in terms of Net Delta Outflow (NDO, see Section 3.2) during the current month and the X2 value from the previous month. The monthly K-M equation was based on a statistical regression of X2 values (interpolated from EC measurements at fixed locations) and estimates of NDO from IEP's DAYFLOW computer program. Hence, the K-M equation is only valid for the existing Delta channel configuration and existing sea level conditions.

The K-M equation can be used to transform unimpaired and historical NDO data into the corresponding X2 values for unimpaired (without reservoir operations or water diversions) and historical (with historical water management) conditions, respectively.

The seasonal and annual variations of X2 are dependent on the corresponding variations of NDO under both historical and unimpaired flow conditions (Figure 3-11). X2 under historical flow conditions is shifted landward relative to unimpaired conditions by approximately 5 km. During the 1930's, historical NDO was often negative, sometimes averaging approximately -3,000 cfs for several months. This was due to relatively low runoff and significant upstream water diversions. Unfortunately, the K-M equation, which includes the logarithm (base 10) of NDO, is unable to account for negative values of NDO. In the case of historical flow conditions, this results in high variability of X2 in the 1930's. The values of X2 under historical flow conditions during 1930's in Figure 3-11 are likely underestimated.

Figure 3-12 compares X2 under unimpaired and historical conditions for the period from 1945-2003, following initiation of the Central Valley Project (i.e., after the completion of the Shasta Reservoir of the CVP). Figure 3-12 shows that, compared to unimpaired conditions, X2 under historical conditions was higher by about 10 km during April-July and by about 5 km during the rest of the year.

Salinity intrusion under historical water management conditions is, therefore, greater (higher X2) than the intrusion that would occur under unimpaired conditions. Moreover, the switch from declining X2 values during fall and winter months to increasing X2 values (increasing salinity intrusion) occurs in March under historical water management conditions and in June under unimpaired conditions. Thus, recent water management practices have resulted in a saltier Delta with earlier occurrence of salinity intrusion in the year.

No comments

- n/a -

Although current water management practices operate to provide salinity control, both the extent and duration of salinity intrusion are greater under current water management practices than under historical conditions. Likewise, current water management practices have changed the overall annual range in salinity (i.e., the difference between the highest and lowest salinity values during the year).

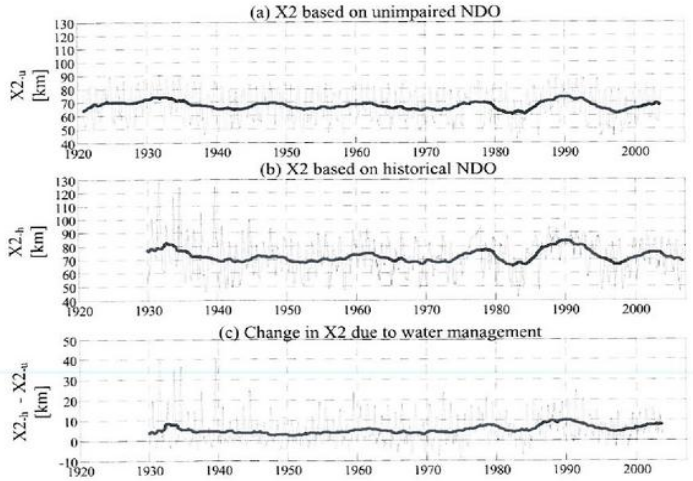

Figure 3-11 – Location of X2 under unimpaired and historical conditions
X2 has a strong seasonal and decadal variability under both unimpaired (top panel) and historical (middle panel) flow conditions reflecting the strong seasonal and decadal variability of NDO. The difference between historical and unimpaired conditions (bottom panel) illustrates the net effect of water management activities.

No comments

- n/a -

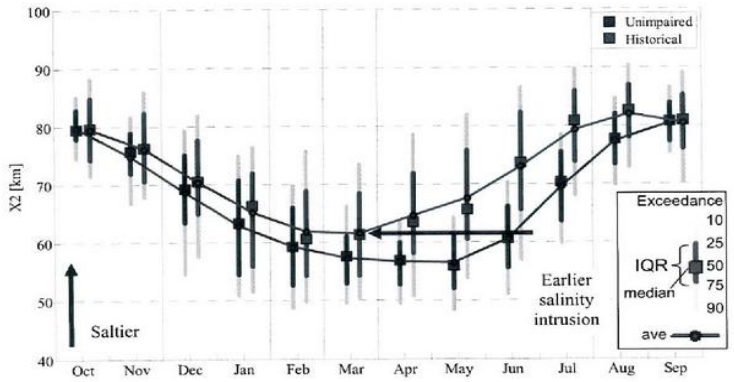

Figure 3-12 – Monthly distribution of X2 from 1945 through 2003

Figure 3-13 presents a comparison of unimpaired X2 and historical X2 during the 10 driest and the 10 wettest years of the CVP period (1945-2006).[19] During dry years (top panel), X2 is substantially greater under historical water management conditions than under unimpaired conditions (i.e., without water management); these effects are less dramatic but still occur during the wet years (bottom panel). Additionally, the annual range in salinity variability is significantly reduced under dry conditions (from approximately 22 km with unimpaired flows to 14 km with historical flows), but not wet conditions. The result of water management practices is a saltier Delta during both wet and dry years, with the greatest amount of salinity intrusion and reduced seasonal variability occurring in dry years.

Conclusions

The analysis of X2 (a measure of salinity intrusion in the Delta) shows that:

- Water management practices (reservoir operations and water diversions) result in a saltier Delta, with earlier salinity intrusion in the year.
- Water management practices result in a saltier Delta during both wet and dry years, but the effect is more pronounced in the dry years when the seasonal variability of salinity is also significantly reduced.

[19] Determination of the ten wettest and driest years is based on the total annual unimpaired Net Delta Outflow. The ten wettest years are 1952, 1956, 1958, 1969, 1974, 1982, 1983, 1986, 1995, and 1998. The ten driest years are 1947, 1976, 1977, 1987, 1988, 1990, 1991, 1992, 1994, and 2001.

No comments

- n/a -

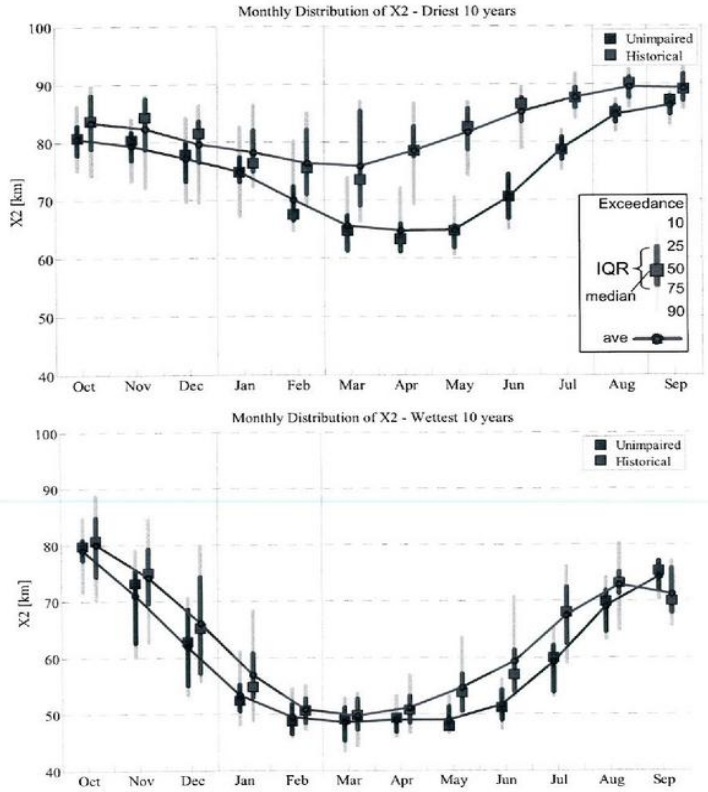

Figure 3-13 – Monthly X2 variability during wet and dry years (1945-2003)
Determination of the ten wettest and driest years is based on the total annual unimpaired Net Delta Outflow. The ten wettest years are 1952, 1956, 1958, 1969, 1974, 1982, 1983, 1986, 1995, and 1998. The ten driest years are 1947, 1976, 1977, 1987, 1988, 1990, 1991, 1992, 1994, and 2001.

No comments

- n/a -

No comments

- n/a -

3.3.4. Salinity at Collinsville

Collinsville, near the confluence of the Sacramento and San Joaquin Rivers, was one of the first long-term sampling locations implemented by the State of California. The Suisun Marsh Branch[20] of the DWR estimated monthly average salinity at Collinsville for the period 1920-2002, using a combination of 4-day TDS (total dissolved solids) grab samples from 1920-1971 and EC measurements from 1966-2002. Data from the overlap period of 5 years between the TDS grab samples and EC measurements were used in a statistical regression model, and the monthly averaged 4-day TDS samples were converted to monthly average EC (Enright, 2004). The result of this regression analysis was a time series of monthly EC values at Collinsville for the period of 1920-2002.

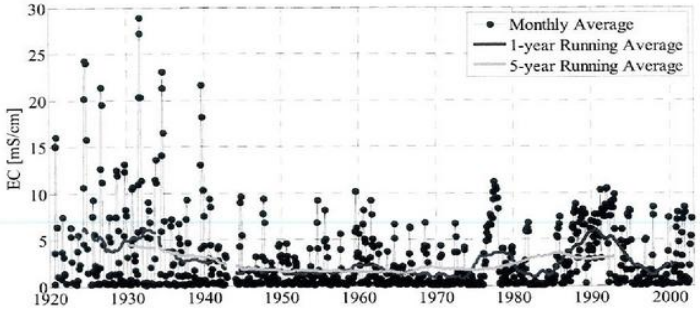

Figure 3-14 – Observed salinity at Collinsville

Monthly average salinity at Collinsville (black dots and black line), with the 12-month running average (red line) and 5-year running average (blue line).

Figure 3-14 shows the monthly average salinity at Collinsville for the period of 1920-2002, and Figure 3-15 shows the long-term trends in monthly salinity at Collinsville. Although the maximum values of salinity in the 1920's and 1930's far exceed subsequent salinity measurements at Collinsville, during the winters and springs of the 1920's and 1930's, the water at Collinsville freshened considerably. During the dry periods of 1920's and 1930's, monthly average salinity was below 350 µS/cm EC (approximately 50 mg/L chloride) for at least one month in every year. The one exception is 1924 which is inconclusive because no data were available from November through March. Monthly average EC data are missing for a portion of the winters and springs prior to 1926, and data for 1943 are missing entirely.

[20] Data provided by Chris Enright (DWR), personal communication, 2007.

No comments

- n/a -

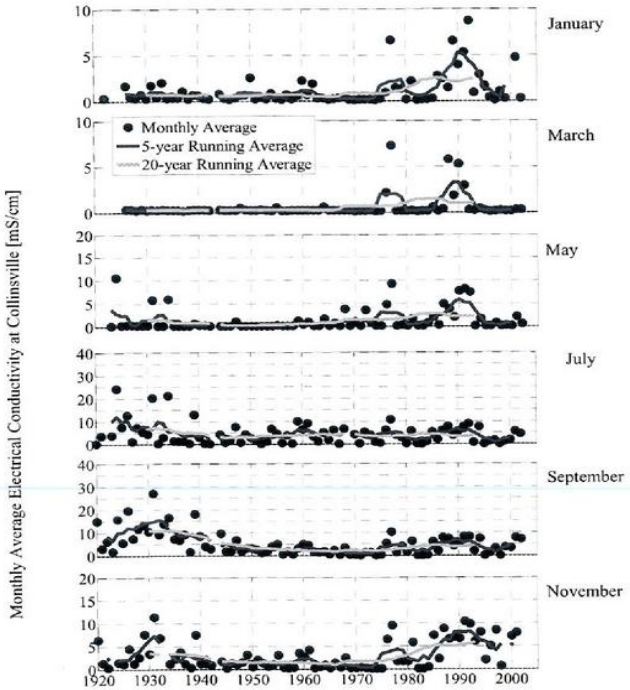

Figure 3-15 – Year-to-year trends in monthly-average salinity at Collinsville, 1920-2002
Monthly average salinity at Collinsville (black dots), with the 12-month running average (red line) and 5-year running average (blue line) for individual months.

Relatively fresh winters and springs during the 1920's are consistent with observations by C&H during that time period. However, monthly EC at Collinsville during the recent droughts (1976-1977 and 1987-1993) was always greater than 350 µS/cm EC, except for one month in both 1989 and 1992. These monthly observations of EC at Collinsville indicate that during the recent dry periods (1976-1977 and 1987-1993), EC at Collinsville was higher than that during similar dry periods in the 1920's and 1930's.

Enright and Culberson (2009) analyzed the trend in salinity variability at Collinsville from 1920-2006. They found increasing salinity variability in eleven of twelve months and

No comments

- n/a -

attributed it to water operations. In seven months (January-May, September-October) the increasing trend was significant ($p<0.05$).

Even in the six-year drought from 1928 to 1934, the Delta still freshened every winter (Figure 3-16). However, as shown in Figure 3-16, the Delta has not freshened during more recent droughts (1976-1977, 1987-1994, and 2007-2009). This indicates that the historical "flushing" of the Delta with fresh water is no longer occurring. This lack of flushing can also allow waste from urban and agricultural developments upstream of and within the Delta to accumulate. Contaminants and toxics have been identified as factors in the decline of the Delta ecosystem (Baxter *et al.* 2007). The data indicate the effect of managing to the X2 standard (implemented in 1995), as the salinity levels attained in the most recent drought are not as high as the 1976-77 and 1987-1992 droughts.

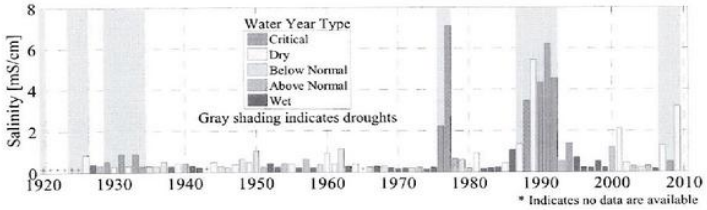

Figure 3-16 – Average Winter salinity at Collinsville

Annual average salinity during the winter (January through March) for water years 1927 to 2009. Bars are colored by water year type as defined by the Sacramento 40-30-30 index. Grey shading indicates multi-year droughts that include at least one critical water year.

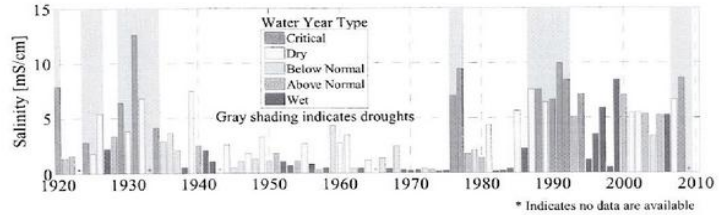

Figure 3-17 – Average Fall salinity at Collinsville

Annual average salinity during the fall months (October through December) for water years 1920 to 2009. Bars are colored by water year type as defined by the Sacramento 40-30-30 index. Grey shading indicates multi-year droughts that include at least one critical water year.

No comments

- n/a -

Figure 3-17 presents the variation in average fall salinity at Collinsville from 1920 to 2008 (October-December). Fall salinity is now high almost every year, while in the past, fall salinity was only high in dry and critical years. High salinity in the fall has been identified as a factor in the decline of the Delta ecosystem. Baxter *et al.* (2008) noted that "fall salinity has been relatively high during the POD years, with X2 positioned further [sic] upstream, despite moderate to high outflow conditions during the previous winter and spring of most years."

Conclusions

- In the 1920's and 1930's, the Delta freshened annually, even during droughts. In recent droughts, the Delta does not always freshen during the winter.
- Prior to 1976, fall salinity was high only in relatively dry years. Recently, fall salinity is high almost every year.

3.3.5. Salinity at Mallard Slough

A 1967 agreement between the Contra Costa Water District (CCWD) and the State of California requires the State to reimburse CCWD for the decrease in availability of usable river water, defined as water with less than 100 mg/L chlorides, at the Mallard Slough intake (CCWD, 1967). The 1967 agreement, and similar agreements between the State and other Delta water users, recognized the State Water Project (SWP) would increase salinity at Mallard Slough. The agreement defined a baseline of 142 days of usable water per year, based on the average number of days of usable water at the Mallard Slough intake from 1926-1967. Since 1967, the average number of days of usable water[21] (for the period 1967-2005) has declined to 122, indicating a 20-day (14%) reduction in the number of days of high quality water at Mallard Slough since the completion of the SWP.

[21] The data are from the USBR-CVO record of EC at Pittsburg, approximately 2 km upstream of Mallard Slough from 1967-2005. Since this station is located upstream of Mallard Slough, the number of days of usable water at Mallard Slough since the SWP was built may be overestimated.

No comments

- n/a -

No comments

- n/a -

4. Qualitative Observations of Historical Freshwater Flow and Salinity Conditions

In this section, qualitative observations of salinity conditions in the western Delta and Suisun Bay from the lawsuit filed by the Town of Antioch in 1920 and from various literature reports are discussed to provide a perspective of the salinity conditions prevailing in the late 1800's and early 1900's. Qualitative observations from early explorers and settlers are discussed in Appendix E.

4.1. Town of Antioch Injunction on Upstream Diverters

In 1920, the Town of Antioch filed a lawsuit (hereinafter referred to as the "Antioch Case") against upstream irrigation districts, alleging that upstream water diversions were causing increased salinity intrusion at Antioch. An overview of the Antioch Case is provided in Appendix E. The court decision, legal briefings, and petitions provide qualitative salinity observations from a number of witnesses. Although testimony in the Antioch Case is generally anecdotal, not quantitative, it provides a perspective of the salinity conditions prevailing in the early 1900's. Because the proceedings were adversarial in nature, this report focuses on the testimony of the upstream interests, who were trying to demonstrate that salinity intrusion was common near Antioch prior to their diverting water (prior to 1920). Consequently, the testimony may be biased in support of this "more saline" argument.

The upstream interests in the Antioch Case provided information on the operation of pumping plants along the San Joaquin River at Antioch for domestic water supply and the quality of water obtained from the pumping plants, summarized in Table 4-1.

Table 4-1 – Testimony regarding pumping plant operations and water quality in the 1920 Antioch Case

Time period of observation	Relevant information from the testimony
1866-1878	Mr. Dodge ran a pumping/delivery operation at Antioch ▪ Dodge pumped water into a small earthen reservoir at Antioch and then hauled the water to residents in a wagon. ▪ Cary Howard testified that while he was living in Antioch (1867-1876), the water became brackish one or two years in the fall, when they had to drive into the country to get water. This likely occurred during the drought of 1870-71.
1878-1880	Mr. Dahnken bought and operated the Dodge operation ▪ Dahnken testified that the water became brackish at high tide every year in the late summer, and remained brackish at high tide until it rained "in the mountains."

Time period of observation	Relevant information from the testimony
1880-1903	Belshaw Company provided water ▪ Dahnken testified that Belshaw Company pumped only at low tide.
1903-1920	Municipal Plant ▪ William E. Meek (resident since 1910) testified the water is brackish at high tide every year, for some months in the year. ▪ James P. Taylor testified that for at least the last 5 years, insufficient storage required the plant to pump nearly 24 hours per day, regardless of tidal phase. ▪ Dr. J. W. DeWitt testified that during October of most years between 1897 and 1918, the water was too brackish to drink. Even when the city only pumped at low tide, the water was occasionally so brackish that it would be harmful to irrigate the lawns.

This testimony suggests that, in the late 1800's, water at Antioch was known to be brackish at high tide during certain time periods, but Antioch was apparently able to pump fresh water at low tide year-round. A possible exception was the fall season during a few dry years. Water at Antioch was apparently fresh at low tide until at least around 1915. At that time, due to increased demand and inadequate storage, the pumping plants started pumping continuously, regardless of tidal stage. The window of time each year when Antioch is able to pump fresh water from the river has been substantially reduced in the last 125 years.

As shown in Appendix A, DWR (1960) estimated that water with a chloride concentration of 350 mg/L or less would be available about 85% of the time if there were no water management effects. DWR (1960) estimated that chloride concentrations at Antioch would be less than 350 mg/L about 80% of the time in 1900 and about 60% of the time by 1940. DWR also projected further deterioration of water quality by 1960 and beyond but did not include the effects of reservoir releases for salinity control.

Observations of salinity at Antioch during recent years indicate that salinity is strongly dependent on ocean tides, and the diurnal range in salinity can be as much as the seasonal and annual ranges in salinity. This is discussed in more detail in Appendices D and E. For instance, salinity at high tide can be more than five times the salinity at low tide (Figures D-1, D-2, and D-3), and the salinity during the course of a single day may vary up to 6,000 µS/cm EC (Figure D-1). Average daily salinity at low tide during the period of 1983-2002 exceeded 1,000 µS/cm[22] EC for about four and a half months of the year (Figure D-3). During the driest 5 years between 1983 and 2002, salinity at low tide was always greater than 1,000 µS/cm EC (i.e., no fresh water was available at any time of day) for about eight months of the year. Fresh water is currently available at Antioch far less frequently than prior to the 1920's.

[22] The current water quality criterion for municipal and industrial use is 250 mg/L, equivalent to about 1,000 µS/cm EC.

No comments

- n/a -

Available data and observations indicate that, prior to about 1918, fresh water was available at least at low tide during almost the entire year, in all but a few dry years. Around 1918, an abrupt change to higher salinity occurred. Although a prolonged and severe drought also began about this time, salinity conditions at Antioch did not return to pre-drought levels when the drought ended, indicating that water management activities (increased upstream diversions and later storage of water in upstream reservoirs) were the primary causes of this increased salinity.

4.2. Reports on Historical Freshwater Extent

Several literature reports discuss the spatial extent and duration of salinity conditions in the western Delta and Suisun Bay during the late 1800's and early 1900's. Salinity conditions at several key Delta locations are summarized below.

Location:	**Western Delta**
Source(s):	DPW (1931)
Quotation:	"*The dry years of 1917 to 1919, combined with increased upstream irrigation diversions, especially for rice culture in the Sacramento Valley, had already given rise to invasions of salinity into the upper bay and lower delta channels of greater extent and magnitude than had ever been known before.*" (DPW, 1931, pg. 22)
Quotation:	"*It is particularly important to note that the period 1917-1929 has been one of unusual dryness and subnormal stream flow and that this condition has been a most important contributing factor to the abnormal extent of saline invasion which has occurred during this same time.*" (DPW, 1931, pg. 66)
Summary:	Salinity intrusion into the Delta during the period 1917-1929 was much larger than experienced prior to that time.
Location:	**Pittsburg, CA**
Source(s):	Tolman and Poland (1935) and DPW (1931)
Quotation:	"*From 1880 to 1920, Pittsburg (formerly Black Diamond) obtained all or most of its domestic and municipal water supply from New York Slough offshore.*" (DPW, 1931, pg. 60)
Quotation:	"*There was an inexhaustible supply of river water available in the New York Slough* [near Pittsburg at the confluence of the Sacramento and San Joaquin Rivers]*, but in the summer of 1924 this river water showed a startling rise in salinity to 1,400 ppm of chlorine, the first time in many years that it had grown very brackish during the dry summer months.*" (Tolman and Poland, 1935, pg. 27)
Summary:	Prior to the 1920's, the water near the City of Pittsburg was sufficiently fresh for the City to obtain all or most of its fresh water directly from the river.
Location:	**Antioch, CA**
Source(s):	DPW (1931)

No comments

- n/a -

Quotation: "*From early days, Antioch has obtained all or most of its domestic and municipal water supply from the San Joaquin River immediately offshore from the city. This supply also has always been affected to some extent by saline invasion with the water becoming brackish during certain periods in the late summer and early fall months. However, conditions were fairly satisfactory in this respect until 1917, when the increased degree and duration of saline invasion began to result in the water becoming too brackish for domestic use during considerable periods in the summer and fall.*" (DPW, 1931, pg. 60)

Summary: Until 1917, the City of Antioch obtained all or most of its freshwater supplies directly from the San Joaquin River. Salinity intrusion has prevented domestic use of water at the Antioch intake in summer and fall after 1917.

Location: **Benicia, CA (Suisun Bay)**

Source(s): Dillon (1980) and Cowell (1963)

Quotation: "*In 1889, an artificial lake was constructed. This reservoir, filled with fresh water from Suisun Bay during the spring runoff of the Sierra snow melt water ...*" (Dillon, 1980, pg. 131)

Quotation: "*...in 1889, construction began on an artificial lake for the* [Benicia] *arsenal which would serve throughout its remaining history as a reservoir, being filled with fresh water pumped from Suisun Bay during spring runoffs of the Sacramento and San Joaquin Rivers which emptied into the bay a short distance north of the installation.*" (Cowell, 1963, pg. 31)

Summary: In the late 19th Century, fresh water was available in the Suisun Bay and Carquinez Straits for use by the City of Benicia.

The reported presence of relatively fresh water in the western Delta and the Suisun Bay during the late 1800's and early 1900's is consistent with the relatively fresh conditions observed in the paleoclimate records for this time period (Section 2.3) and the relatively wet conditions observed in the Sacramento River runoff and precipitation records (Section 3.1).

Additional observations between 1775 and 1841 are included in Appendix E. These qualitative observations indicated the presence of "*sweet*" water near the confluence of the Sacramento and San Joaquin Rivers in the vicinity of Collinsville in August 1775 (a period of average or above-average Sacramento River flow), and September 1776 (a period of below-average Sacramento River flow). The presence of "*very clear, fresh, sweet, and good*" water was reported in April 1776 (a dry year). Historical observations from 1796 and August 1841 (dry periods) indicated salinity "*far upstream*" at high tide and the presence of brackish (undrinkable) water in Threemile Slough. Current salinity controls and regulations put brackish water (averaged over 14 days) near Jersey Point and Emmaton, each about 2.5 miles below Threemile Slough, on a regular basis annually.

No comments

- n/a -

5. Conclusions

1. Measurements of ancient plant pollen, carbon isotope and tree ring data show that the Delta was predominately a freshwater marsh for the past 2,500 years, and that the Delta has become far more saline in the past 100 years because of human activity. Salinity intrusion during the last 100 years is comparable to the highest levels over the past 2,500 years.
2. Human activities during the last 150 years, including channelization of the Delta, elimination of tidal marsh, construction of deep water ship channels, and diversions of water, have resulted in increased salinity levels in the Delta. Today, salinity typically intrudes 3 to 15 miles farther into the Delta than it did in the early 20th Century.
3. Before the substantial increase in freshwater diversions in the 1940's, the Delta and Suisun Bay would freshen every winter, even during the extreme drought of the 1930's. However, that pattern has changed. During the most recent droughts (1976-1977, 1987-1994, and 2007-2009), the Delta did not always freshen in winter. Without seasonal freshening, contaminants and toxics can accumulate in the system and young aquatic species do not experience the same fresh conditions in the spring that occurred naturally.
4. While half of the past 25 years have been relatively wet, the fall salinity levels in 21 of those 25 years have resembled dry-year conditions. In terms of salinity, the Delta is now in a state of drought almost every fall because of human activity, including water diversions.
5. Seasonal and inter-annual variation in salinity has also been changed; however, this change is the result of reduced freshwater flows into the Delta. At any given location in the western Delta and Suisun Bay, the percentage of the year when fresh water is present has been greatly reduced or even eliminated.
6. The historical record and published studies show the Delta is far saltier now, even after the construction of reservoirs that have been used in part to meet State Water Resources Control Board water quality requirements in the Delta. Operation of reservoirs and water diversions for salinity management somewhat ameliorates the increased salinity intrusion, but the levels still exceed pre-1900 salinities.

No comments

- n/a -

No comments

- n/a -

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No comments

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No comments

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Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay

A summary of historical reviews, reports, analyses and measurements

Appendices

Water Resources Department

Contra Costa Water District

Concord, California

February 2010

Technical Memorandum WR10-001

Exhibit CCWD-6

No comments

- n/a -

No comments

- n/a -

Exhibit CCWD-6

Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay

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February 2010

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No comments

- n/a -

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No comments

- n/a -

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No comments

- n/a -

No comments

- n/a -

Appendix A. Factors Influencing Salinity Intrusion

Salinity intrusion in the Delta is the result of the interaction between tidally-driven saline water from the Pacific Ocean and fresh water from rivers flowing into the Delta. Regional climate change (e.g., sea level rise and change in precipitation regime), physical changes to the Central Valley landscape (e.g., creation of artificial channels and land use changes), and water management practices (e.g., reservoir storage, water diversions for agricultural and municipal and industrial use) affect this interaction between the ocean tides and the freshwater flow, in turn affecting salinity intrusion in the Delta (The Bay Institute (TBI), 1998, Department of Public Works (DPW), 1931, Nichols *et al.*, 1986, Conomos, 1979, and Knowles, 2000).

These factors are grouped into three categories (Table A-1) and discussed individually and qualitatively to provide context for observed salinity variability, which is necessarily due to the cumulative impact of all factors.

Table A-1 – Factors Affecting Salinity Intrusion into the Delta

Natural and artificial factors affect the salinity of the Delta. The factors are grouped into three categories: regional climate change, physical changes to the landscape, and water management practices.

Category	Factors affecting salinity intrusion and specific effect on Delta salinity
Regional Climate Change	• Precipitation regime o Long-term reduction of spring (April-July) snowmelt runoff may increase salinity in the spring, summer, and fall. o A shift to more intense winter runoff may not decrease salinity in the winter because outflows are typically already high during winter storms. • Ocean conditions o Added periodic variability to precipitation (via mechanisms such as the El Niño/Southern Oscillation (ENSO) or Pacific Decadal Oscillation (PDO)) • Sea level rise o Expected to increase salinity intrusion (DWR, 2006). Actual salinity response to rising sea level will depend upon actions taken to protect against flooding or overtopping (e.g., new tidal marsh vs. sea walls or dykes).
Physical Changes to the Landscape	• Deepening, widening, and straightening of Delta channels o Generally increase salinity, but response will depend upon location within the Delta (DWR, 2006)

No comments

- n/a -

Category	Factors affecting salinity intrusion and specific effect on Delta salinity
	• Separation of natural floodplains from valley rivers o Confining peak flows to river channels would reduce salinity during flood events. o Preventing floodplains from draining back into the main channel would increase salinity after floods (late spring and summer). • Reclamation of Delta islands o Varies (the effect on salinity depends on marsh vegetation, depth, and location), but marshes generally dampen tides, reducing salinity intrusion • Creation of canals and channel "cuts" o Generally creates more efficient routes for tidal flows to enter the Delta, thereby increasing salinity intrusion relative to native conditions • Deposition and erosion of sediments in Suisun Bay (Cappiella *et al.*, 1999) o Deposition of mining debris (occurred from 1860's to approximately 1887) reduced salinity in Suisun Bay and the western and central Delta (Enright, 2004, Enright and Culberson, 2009) o Erosion (occurring since 1887) increases salinity in Suisun Bay and the western and central Delta (Enright, 2004, Enright and Culberson, 2009)
Water Management Practices (reservoir operations, water diversions, and exports from the Delta)	• Decreasing Net Delta Outflow (NDO) by increasing upstream and in-Delta diversions as well as exports o Increases salinity • Increasing upstream storage capacity o Generally increases salinity when reservoirs are filling. Reservoir releases may decrease salinity if they increase outflow. Historically, this occurred when flood control or other releases were required in wetter years. However, as this study shows, this has generally been small and intermittent; salinity measurements indicate it occurred occasionally prior to 1985, and very seldom since. Increased early winter diversion of runoff to storage will maintain or increase high salinities in the winter.

No comments

- n/a -

No comments

- n/a -

A.1. Climatic Variability

Changes in precipitation regimes and sea levels, brought about by a changing climate, can affect the spatial and temporal salinity conditions in the Delta. Long-term variations in river runoff, precipitation and sea level are discussed below.

A.1.1. Regional Precipitation and Runoff

Precipitation in the Bay-Delta watershed sets the amount of water available within the system which could ultimately reach the Bay and affect salinity conditions. However, since precipitation falls as both rain and snow, runoff to river channels is spread over more months than the precipitation events themselves; any runoff from rain generally reaches the river channels within days of the precipitation event, but runoff resulting from snow is delayed until the spring snowmelt. For this reason, estimates of unimpaired flow (runoff), rather than precipitation, are generally used to characterize hydrological variability. Unimpaired runoff represents the natural water production of a river basin, unaltered by water diversions, reservoir storage and operation, and export of water to or import of water from other basins.

Knowles (2000) determined that variability in freshwater flows accounts for the majority of the Bay's salinity variability. The spatial distribution, seasonal timing, annual magnitude, decadal variability, and long-term trends of unimpaired flow all affect the hydrology and salinity transport in the Delta. Total annual unimpaired flow in the Sacramento and San Joaquin basins from 1872 through 2009 is presented in Section 3.1, with the seasonal distribution provided for 1921 through 2003.

The total annual unimpaired flow of the upper Sacramento Basin for water years 1906 through 2006 exhibits substantial year-to-year variability with a strong decadal oscillation in the 5-year running average (see Figure 3-1). On average, over the last 100 years, the total annual unimpaired Sacramento River flow is increasing by about 0.06% or 11 thousand-acre feet (TAF) each year. However, increased total annual unimpaired flow does not necessarily reduce salinity intrusion. Knowles (2000) illustrated that the seasonal timing of runoff can significantly alter salinity intrusion without any change to the total annual runoff.

Typically, most precipitation in California occurs during winter in the form of snow in the Sierra Nevada. The subsequent melting of this snow, beginning in the spring, feeds the rivers that flow into the Delta. The four months from April through July approximately span the spring season and represent the period of runoff due to snow melt. The long-term trend in spring (April-July) runoff decreased by approximately 1.3 MAF from 1906 to 2006 (Figure A-1). This effect is believed to be caused by climate change; as temperatures warm, more precipitation falls as rain instead of snow, and what snowpack that does accumulate tends to melt earlier in the year. This leads to higher runoff during winter months, but lower runoff in spring or summer, resulting in the potential for greater salinity intrusion. These observed changes in the magnitude and timing of spring runoff of the Sacramento River watershed are consistent with similar changes in spring runoff observed across river watersheds of the

western United States (e.g., Dettinger, 2005; Mote *et al.*, 2005; Stewart *et al.*, 2005). Note that, from 1920 to 2006, the long-term trend in spring runoff actually increased slightly (approximately 0.5 MAF).

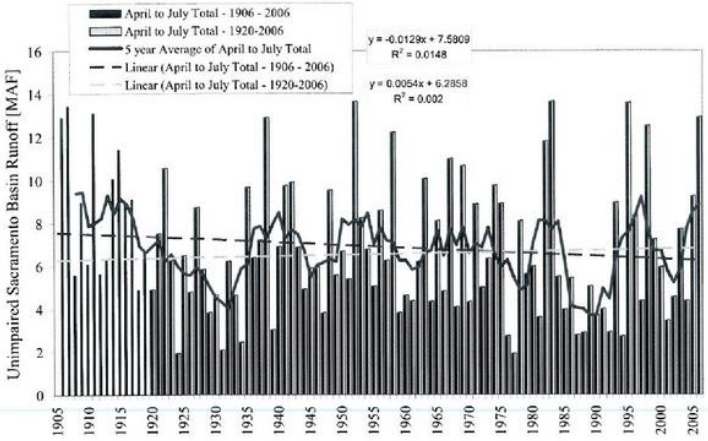

Figure A-1 – Unimpaired runoff from the Sacramento River basins from April to July
Data source: http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST.

Precipitation and runoff are influenced by regional events such as the Little Ice Age (about 1300 to 1850 CE) and the Medieval Warm Period (about 800 to about 1300 CE). During the Little Ice Age, the winter snowline in the Sierra was generally at a lower elevation, and spring and summer nighttime temperatures were significantly lower. This temperature pattern would allow the snowmelt to last further into the summer, providing a more uniform seasonal distribution of runoff such that significantly less salinity intrusion than occurs today would be expected. This expectation is borne out by paleosalinity studies (see Section 2.3).

At shorter time scales, oceanic conditions such as the Pacific Decadal Oscillation (PDO) and El Niño/Southern Oscillation (ENSO) also impact precipitation and runoff patterns. Runoff in the upper watershed is the primary factor that determines freshwater outflow from the Delta. Anthropogenic flow management (upstream diversions, reservoir operations, in-Delta diversions, and south-of-Delta exports) alters the amount and timing of flow from the upper watershed (see Section 2.3). Changes to the physical landscape further alter the amount and timing of flow (see Section 2.2).

No comments

- n/a -

A.1.2. Sea Level Rise

Sea level fluctuations resulting from the repeated glacial advance and retreat during the Pleistocene epoch (extending from 2 million years ago to 15,000 years ago) resulted in deposition of alternating layers of marine and alluvial sediments in the Delta (TBI, 1998). A warming trend starting about 15,000 years ago ended the last glacial advance and triggered rapid sea-level rise. At the end of this period (known as the "Holocene Transgression") approximately 6,000 years ago, sea level had risen sufficiently to inundate the Delta at high tide (Atwater *et al.*, 1979).

Sea level is estimated to have risen at an average rate of about 5 cm/century during the past 6,000 years and at an average rate of 1-2 cm/century during the past 3,000 years (Cayan *et al.*, 2008). Observations of sea level at the Golden Gate in San Francisco reveal that the mean sea level has risen at an average rate of 2.2 cm/decade (or 0.22 mm/yr) over the past 100 years (Cayan *et al.*, 2008). Future increases in sea level are expected to increase salinity intrusion into the Delta (DWR, 2006); actual salinity response to rising sea level will depend upon actions taken to protect against flooding or levee overtopping (e.g. new tidal marsh would generally reduce salinity intrusion, while construction of sea walls or dykes may further increase salinity).

A.2. Physical Changes to the Delta and Central Valley

Creation of artificial channels, reclamation of marshlands, land use changes and other physical changes to the landscape of the Delta and Central Valley have significantly altered water movement through the Delta and the intrusion of salinity into the Delta. Major physical changes to the Delta and Central Valley landscape have occurred over the last 150 years. As many of these physical changes were made prior to flow and salinity monitoring (which began in the 1920's), only a qualitative discussion is presented below.

A.2.1. Deepening, Widening, and Straightening Channels (early 1900's-present)

The lower Sacramento River was widened to 3,500 feet and straightened (creating Decker Island) around 1910 (Lund *et al.*, 2007). Progressive deepening of shipping channels began in the early 1900's. Original channel depths were less than 10 feet; channels were gradually dredged to depths exceeding 30 feet, and maintenance dredging continues today.

These changes to the river channels have increased salinity intrusion. Deepening the river channels increases the propagation speed of tidal waves, leading to increased salinity intrusion. Similarly, straightening the river channels provides a shorter path for the passage of the tidal waves and increases salinity intrusion. Widening of the river channels increases the tidal prism (the volume of water in the channels), resulting in further salinity intrusion. Larger cross-sections reduce velocities, lowering friction losses and maintaining more tidal energy, which is the driving force for dispersing salinity into the Delta.

No comments

- n/a -

A.2.2. Reclamation of Marshland (1850-1920)

In the Central Valley

The original natural floodplains captured large winter flows, gradually releasing the water back into the river channels throughout the spring and summer, resulting in a more uniform flow into the Delta (reduced peak flow and increased low flow) compared to current conditions. The increased surface area of water stored in these natural floodplains increased total evaporation and groundwater recharge, reducing total annual inflow into the Delta.

Even with less Delta inflow, the difference in the seasonal flow pattern may have limited salinity intrusion. The drainage of floodplains back into rivers during the spring and groundwater seepage back to the rivers in the summer and fall provided a delayed increase in river flows during the low flow period. Raising and strengthening natural levees in the Central Valley effectively disconnected the rivers from their floodplains, removing this natural water storage, increasing the peak flood flows and reducing the low flows. The net effect of these changes in the Central Valley was to reduce salinity during floods, when salinity is typically already low, and increase salinity during the following summers and falls, which is likely to have led to increased maximum annual salinity intrusion.

In the Delta

Reclamation of Delta marshland began around 1850. By 1920, almost all land within the legal Delta[1] had been diked and drained for agriculture (DPW, 1931). Before the levees were armored and the marshes were drained, the channels would have been shallower and longer (more sinuous), which would have slowed propagation of the tides into the Delta, reduced tidal energy and reduced salinity intrusion.

The natural marsh surface would have increased the tidal prism. However, the shallow marsh depth and native vegetation would have slowed the tidal wave progression. The combined effect on salinity intrusion depends on the location and depth of the marsh, the native vegetation distribution, and the dendritic channels that were removed from the tidally active system.

Figure A-2 shows the western, central, and southern portions of the Delta in 1869. For comparison, Figure A-3 shows the same area in 1992, with man-made channels highlighted grey.

A.2.3. Mining debris

Hydraulic mining in the Sierra Nevada began in the 1860's and produced large quantities of debris which traveled down the Sacramento River, through the Delta and into the Bay. Mining debris may have contributed to the extensive flooding reported in 1878 and 1881. Cappiella *et al.* (1999) estimate that, from 1867 to 1887, approximately 115 million cubic meters (Mm3) of sediment were deposited in Suisun Bay. This deposition was due to the inflow of hydraulic mining debris.

[1] The legal Delta is defined in California Water Code Section 12220.

No comments

- n/a -

Figure A-2 - Map of the Delta in 1869

Channels of the western, central, and southern Delta in 1869, prior to extensive reclamation efforts (Gibbes, 1869)

No comments

- n/a -

Figure A-3 – Map of the Delta in 1992

Channels of the western, central, and southern Delta from the Delta Atlas (DWR, 1992) Constructed waterways (highlighted in grey) generally create more efficient routes for tidal flows to enter the Delta, thereby increasing salinity intrusion relative to the native tidal marshes.

No comments

- n/a -

Cessation of hydraulic mining around 1884 resulted in erosion of Suisun Bay, which continues to erode even today. From 1887 to 1990, approximately 262 Mm3 of sediment were eroded from Suisun Bay. The net change in volume of sediment during 1867-1887 was 68 Mm3 (net deposition) and during 1887-1990 was -175 Mm3 (net erosion). As a result of these changes, the tidal flat of Suisun Bay increased from about 41 km^2 in 1867 to 52 km^2 in 1887, but decreased to 12 km^2 by 1990 (due to erosion subsequent to the cessation of hydraulic mining). Cappiella *et al.* (1999) attributed the change in the Suisun Bay area from being a largely depositional environment to an erosional environment not only to the hydraulic mining practices of the late 1800's but also to increased upstream water management practices. The Suisun Marsh Branch of the DWR estimated that erosion of Suisun Bay (modeled as a uniform change in depth of 0.75 meters) has increased salinity in Suisun Bay and the western Delta by as much as 20% (Enright, 2004; Enright and Culberson, 2009).

A.3. Water Management Practices

Extensive local, state, and federal projects have been built to move water around the state, altering the natural flow patterns throughout the Delta and in upstream watersheds. For clarity in the discussion that follows, definitions and discussions of actual flow and salinity, unimpaired flow and salinity, and natural flow and salinity, are given below.

Historical (actual) flow and salinity

Historical (or actual) flow and salinity refer to the flow and electrical conductivity, total dissolved solids concentration, or chloride concentration that occurred in the estuary. Historical conditions have been observed, measured, or estimated at various times and locations; they are now measured at monitoring stations throughout the estuary. Historical data are also used to estimate flow and water quality conditions at other locations with the following tools: the DAYFLOW program from IEP, the DSM2 model from the California Department of Water Resources, the X2[2] equation (Kimmerer and Monismith, 1992) and Contra Costa Water District's salinity outflow model (also referred to as the G-model) (Denton, 1993; Denton and Sullivan, 1993). The use of these tools to estimate flow and water quality is necessarily dependent upon the Delta configuration to which they were calibrated. Use of these tools in hypothetical configurations (such as pre-levee conditions, flooding of islands, etc) is subject to un-quantified error.

Unimpaired flow and salinity

Unimpaired flows are hypothetical flows that would have occurred in the absence of upstream diversions and storage, but with the existing Delta and tributary configuration. Unimpaired flows are estimated by the California Department of Water Resources (DWR) for the 24 basins of the Central Valley; the Delta is one of the 24 basins. Additionally, DWR estimates unimpaired in-Delta use and unimpaired net Delta outflow (NDO). Unimpaired NDO estimates can be used to estimate unimpaired water quality using a salinity-outflow relationship such as the X2 or G-model tools discussed above.

[2] X2 is defined as the distance from the Golden Gate to the 2 part-per-thousand isohaline (equivalent to a salinity of 2 grams of salt per kilogram of water), measured along the axis of the San Francisco Estuary. X2 is often used as an indicator of freshwater availability and fish habitat conditions in the Delta (Jassby *et al.*, 1995; Monismith, 1998).

No comments

- n/a -

Since unimpaired flows assume the existing Delta configuration, the use of these tools should not violate their basic assumptions. However, the results should be taken in context. Water quality based on unimpaired flows compared to water quality based on historical (actual) flows shows how water management activities affect water quality. Water quality based on unimpaired flows cannot be considered natural.

Natural flow and salinity

Natural flow and salinity reflect pre-European settlement conditions, with a virgin landscape in both the Central Valley and the Delta, native vegetation, and no diversions or constructed storage. As discussed above, the natural landscape included natural storage on the floodplains and extensive Delta marsh. Estimation of natural flow requires assumptions regarding the pre-European landscape and vegetation throughout the Central Valley. Estimation of natural salinity requires development of new models to account for pre-European Delta geometry, incorporating the estimates of natural flow. These assumptions induce an unknown level of error. For this reason, no attempt is made in this report to calculate natural flow or the resulting salinity. Instead, paleosalinity studies are examined to provide evidence of salinity in the pre-European era.

Water management practices have continually evolved since the mid-1850's. As discussed in Section 1.1, anthropogenic modification include diversion of water upstream and within the Delta, construction of reservoirs, and system operations to meet regulatory requirements.

The irrigated acreage in the Central Valley has been steadily increasing since 1880 (Figure 1-3), increasing the upstream diversions of water. There were two periods of rapid growth in irrigated acreage: from 1880 to 1920 and from 1940 to 1980. In-Delta diversions (Figure 1-3) began in 1869 with reclamation of Sherman Island; from 1869 to 1930, in-Delta diversions are assumed to have grown in proportion to the area of reclaimed marshland (from Atwater *et al.*, 1979).

Upstream diversions first became an issue with respect to Delta salinity around 1916 with the rapid growth of the rice cultivation industry (Antioch Case, Town of Antioch v. Williams Irrigation District, 1922, 188 Cal. 451; see Appendix E.2). These early "pre-project" diversions for irrigation had particularly large impacts because of the seasonality of water availability and water use. Diversions for agriculture typically start in the spring and continue through the early fall (when river flow is already low). These early irrigation practices, combined with the decrease in spring and summer flow due to the separation of rivers from their natural floodplains, resulted in a significant reduction of the spring and summer river flow, leading to increased salinity intrusion.

Figure A-4 shows the Department of Water Resources' estimates of the effects of upstream diversions and south-of-Delta exports on the salinity in the San Joaquin River at Antioch (DWR, 1960). DWR's 1960 report indicated that water with less than 350 mg/L chlorides would be present at Antioch approximately 88% of the time on average "naturally," and that availability decreased to approximately 62% by 1940 due to upstream diversions. This illustrates that upstream depletions had a significant effect on salinity at Antioch during 1900-1940, prior to the construction of large upstream reservoirs. (For reference, Shasta Dam was completed in 1945.)

No comments

- n/a -

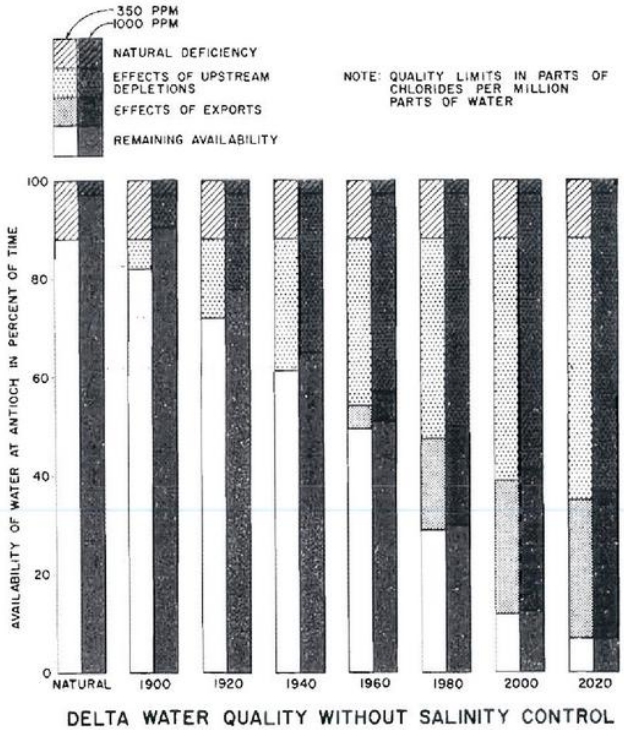

Figure A-4 - Salinity on the San Joaquin River at Antioch (DWR, 1960)

The Department of Water Resources examined the effects of upstream depletions and south-of-Delta exports on salinity in the San Joaquin River at Antioch, estimating the percent of time water that a certain quality of water (with less than 350 mg/L chlorides; or less than 1,000 mg/L chlorides) would be available in the river without reservoir releases to provide salinity control. The estimates for 1960, 1980, 2000, and 2020 assume the reservoirs do not make releases for salinity control and therefore underestimate the actual quality of water during these years.

Figure A-4 also shows estimates of the availability of water in 1960, 1980, 2000, and 2020, without reservoir releases to provide salinity control, demonstrating that upstream depletions and in-Delta exports would have continued to degrade water quality at Antioch.

No comments

- n/a -

Exports from the south Delta started in 1951 with the completion of the federal Central Valley Project pumping facility near Tracy, California. Exports from the State Water Project Banks Pumping Plant, just to the west of the federal facility, began in 1967. As shown in Figure 1-3, south-of-Delta exports increased rapidly from 1951 through the mid-1970s, and since then the combined exports have averaged more than 4 million acre-feet per year.

Construction of upstream reservoirs also altered natural patterns of flow into the Delta. Figure A-5 and Figure A-6 show the extent and rapid rise of constructed reservoirs in the upstream watersheds of the Delta (DWR, 1993). The location, year of completion and approximate storage capacities (in acre-feet, AF) are shown in Figure A-5. Figure A-6 shows the temporal development of reservoir capacity. Reservoir construction began in 1850. The major reservoirs of the Central Valley Project (CVP) and State Water Project (SWP) are the Shasta (4.5 MAF capacity) and Oroville (3.5 MAF) reservoirs, respectively. These reservoirs capture the flow in the wet season (reducing the flow into the Delta in the wet season) and release water for irrigation and diversions.

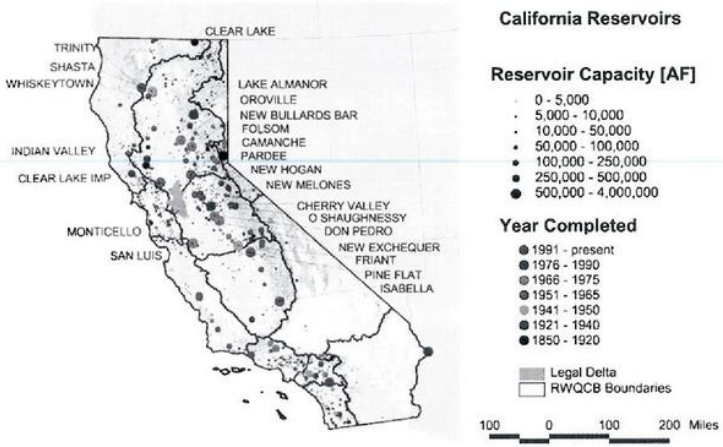

Figure A-5 – Storage reservoirs in California

Location of storage reservoirs within California. Reservoir capacity is indicated by the size of the circle, while the year construction was completed is indicated by color.

No comments

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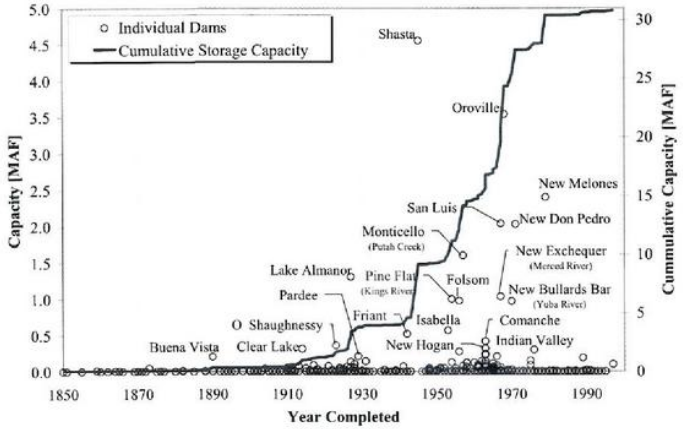

Figure A-6 – Surface Reservoir Capacity

Timeline of reservoir development in California. Individual reservoir capacity is indicated by the blue circles (left axis), while the cumulative capacity is indicated with the red line (right axis).

Water management practices have been altered by regulations that require maintenance of specified flow and salinity conditions at locations in the Bay-Delta region during certain periods of the year. The 1978 Water Quality Control Plan and State Water Resources Control Board (SWRCB) Decision 1485 established water quality standards to manage salinity to protect Delta agriculture and municipal and industrial (M&I) uses. The listing of delta smelt as a threatened species under the Endangered Species Act in 1993, followed by the Bay-Delta Accord in 1994 and the adoption of a new water quality control plan by the State Water Resources Control Board in 1995 changed the amount and timing of reservoir releases and south-of-Delta exports. California's Rice Straw Burning Act was enacted in 1992 to reduce air pollution by phasing out the burning of rice field stubble; by 1999, Sacramento Basin rice farmers were diverting additional water to flood harvested fields to decompose the stubble.

Changes in water diversions and reservoir operations have altered the magnitude and timing of river flows to the Delta, and anthropogenic modifications to the Delta landscape have altered the interaction of fresh water from the rivers with salt water from the ocean, thus changing patterns of salinity intrusion into the Delta.

No comments

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No comments

- n/a -

No comments

- n/a -

Appendix B. Paleoclimatic Records of Hydrology and Salinity

This section presents paleoclimate records of hydrology (precipitation and unimpaired runoff) and salinity in the Bay-Delta region, in addition to those presented in Section 2 of the main report.

B.1. Methods of Paleoclimatic Reconstruction

The field of paleoclimatology aims to deduce climatological information from natural "archives" in order to reconstruct past global climate. These archives are created by such Earth processes as the formation of ice sheets, sediments, rocks, and forests. Examples of information sampled from such archives include atmospheric temperatures from ice cores and precipitation cycles from tree rings. When samples are dated, through radiometric or other methods, the data preserved therein become proxy indices, establishing a timeline of major events in the local environment of the sample. Multiple samples collected over larger spatial scales can be cross-dated to create regional climate and landscape process chronologies.

The material sampled for paleoclimatic reconstructions has limitations that decrease the resolution and confidence of data going back in time. Although paleoclimatic reconstructions have a coarser temporal resolution than modern measurements, the variations in climate and landscape responses to change are reliably described "in the first person" because the evidence of localized climate change is preserved as a time series *in situ*, absent of human influence.

The San Francisco Bay-Delta has been the focus of several paleoclimatic reconstructions. Surveys have sampled from Browns Island (Goman and Wells, 2000; May, 1999; Malamud-Roam and Ingram, 2004), Roe Island (May, 1999; Malamud-Roam and Ingram, 2004) Rush Ranch (Starratt, 2001; Byrne *et al.*, 2001; Starratt, 2004), and China Camp and Benicia State Parks (Malamud-Roam and Ingram, 2004).

Sediment cores are the predominate archive used to reconstruct Bay-Delta climate. Changes in wetland plant and algae communities are the dominant response in the Bay-Delta to climate change and associated fluctuations in temperature and precipitation. Proxies of plant and algae response to environmental conditions are preserved in the sediment cores and determined by quantification and taxonomic identification of diatom frustules (Byrne *et al.*, 2001; Starratt, 2001; Starratt, 2004), plant seeds and roots (Goman and Wells, 2000) and plant pollen (May, 1999; Byrne *et al.*, 2001; Malamud-Roam and Ingram, 2004) and measurement of peat carbon isotope ratios (Byrne *et al.*, 2001; Malamud-Roam and Ingram, 2004).

Plant communities in the Delta are characterized by salt tolerance. Salt-tolerant plant communities are dominated by pickleweed (*Salicornia* spp.) while freshwater plant

assemblages are dominated by tule (*Scirpus* spp.) and cattail (*Typha* spp.) (Atwater *et al.*, 1979). Plants contribute pollen, seeds, and vegetative tissue in the form of peat to the sediment archive. Plant material deposited to surface sediments are significantly correlated to the surrounding standing vegetation, and thus plant material preserved in sediment cores are considered autochthonous to the type of wetland existent at the time of sediment deposition, allowing reconstruction of the salinity conditions in the Delta over time.

Diatom taxa are classified according to their salinity preference expressed as the Diatom Salinity Index (DSI) (Eq 1) (Starratt, 2004). Starratt (2001) classified salinity preference as freshwater (F; 0-2‰), freshwater and brackish water (FB; 0-30‰), brackish (B; 2-30‰), brackish and marine (BM; 2-35‰), and marine (M; 30-35‰). Samples dominated by marine taxa have a DSI range of 0.00 to 0.30.

$$DSI = \frac{F + FB + 0.5B}{F + FB + B + BM + M} \quad (1)$$

Carbon-isotope ratios ($^{13}C/^{12}C$) (Eq 2) are measured by spectrometry and the δ notation calculated as

$$\delta^{13}C = \left[\left(\frac{^{13}C/^{12}C_{sample}}{^{13}C/^{12}C_{std}} \right) - 1 \right] \times 1000 \quad (2)$$

The $\delta^{13}C$ value of peat samples is a proxy for the composition of the plant assemblages contributing vegetation to the formation of the peat. Plants utilizing the C_4 mechanism have higher $\delta^{13}C$ values (~-14‰) than those utilizing the C_3 or CAM (~-27‰) (Table B-1). Using the $\delta^{13}C$ proxy can detect the presence of upland bunchgrasses such as *Spartina* and *Distichlis*.

Pollen can be classified to the taxonomic family level. *Chenopodiaceae (*now *Salicornioideae*) is representative of salt-tolerant *Salicornia*. *Cyperaceae* is representative of freshwater species including *Scirpus*. The ratio of *Chenopodiaceae* to the sum of *Chenopodiaceae* and *Cyperaceae* (Eq. 3) is a proxy of the percent relative abundance of salt-tolerant species (May, 1999).

$$\%ST = \frac{Chenopodiaceae}{Chenopodiaceae + Cyperaceae} \quad (3)$$

To establish chronologies for sediment archives, dates must be established for when material was deposited through the length of the sediment cores. Radiocarbon dating by Accelerator Mass Spectrometry (AMS) determines age by counting the ^{14}C content of plant seeds or carbonate shells calibrated against a northern hemisphere atmospheric carbon calibration curve (Malamud-Roam *et al.*, 2006). Radiocarbon dating is valid to about 40,000 years

No comments

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before present (BP) [3], making it an ideal method for establishing dates through the period of interest for the Bay and Delta. When archived proxies are correlated with the sediment core chronology, a timeline is established reconstructing past climate and landscape response.

Table B-1 – Carbon Isotope Ratios ($\delta^{13}C$) of Plant Species in the San Francisco Estuary
(adapted from Byrne et al. 2001)

Species	Common Name	Photosynthetic Pathway	δ13C (‰)
Distichlis spicata	Saltgrass	C4	-13.5
Spartina foliosa	California cordgrass	C4	-12.7
Cuscuta salina	Salt-marsh dodder	C3	-29.8
Frankenia grandifolia	Alkali heath	C3	-30.2
Grindelia stricta	Gumplant	C3	-26.4
Jaumea carnosa	Marsh jaumea	C3	-27.2
Juncus balticus	Baltic rush	C3	-28.4
Lepidium latifolium	Perennial pepperweed	C3	-26.6
Scirpus californicus	California bulrush	C3	-27.5
Scirpus maritimus	Alkali bulrush	C3	-25.5
Typha latifolia	Cattail	C3	-27.8
Salicornia virginica	Pickleweed	CAM	-27.2

A large number of paleoclimatic reconstructions exist for California and the western U.S., but a complete discussion is beyond the scope of this report. These reconstructions are reviewed by Malamud-Roam *et al.* (2006; 2007) and provide important context to events in the Bay and Delta by recording major non-localized events and larger regional climate shifts. Important examples include: Central Valley oaks, Sierra Nevada giant sequoias, and White Mountain Bristlecone pines used to establish precipitation and temperature from the location of the tree line and tree rings; Mono Lake sediments and submerged tree stump rings for precipitation; and Sacramento and San Joaquin River floodplain deposits for flood events. These studies establish a record of environmental conditions in the Bay and Delta from their formation to the present.

B.2. Major Regional Climatic Events

Formation of the Sacramento-San Joaquin Delta

The Holocene epoch began approximately 8000 BCE at the end of Pleistocene glaciations (Malamud-Roam *et al.*, 2007). In the early Holocene, a general warming and drying period in California accompanied high orbitally driven insolation until insolation reached current values at approximately 6000 BCE. In the Sierra Nevada, western slopes were in the early stages of ecological succession following the retreat of glaciers. The modern river floodplain systems were forming in the Central Valley. Parts of the Delta and Bay were river valleys

[3] Before Present (BP) is a time scale, with the year 1950 as the origin, used in many scientific disciplines. Thus, 100 BP refers to the calendar year 1850.

No comments

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prior to approximately 8000 to 6000 BCE, when rapidly rising sea level entered the Golden Gate and formed the early Bay estuary (Atwater *et al.*, 1979). A fringe of tidal marshes retreated from a spreading Bay until approximately 4000 BCE when the rate of submergence slowed to 1 to 2 cm per year, allowing the formation of extensive Delta marshes over the next 2000 years (Atwater *et al.*, 1979). Sedimentation from upstream sources kept up with subsidence from increasing sea-level rise.

2000 – 1 BCE

After 2000 BCE, information from archives indicates climate in the Bay and Delta was cooler with greater freshwater inflows. The Sierra Nevada became more moist and cooler during a period ca. 4000-3500 BP (Malamud-Roam *et al.*, 2006).

1 BCE - Present

The cooler and wetter period ended approximately 1 BCE, replaced by more arid conditions (Malamud-Roam, 2007). Major climatic events, known from other parts of the world, are captured in the regional paleoclimatic reconstructions and help to calibrate or correlate these reconstructions to global events. Unusually dry conditions prevailed during the Medieval Warm Period (approximately 800-1300 CE). Wetter and cooler conditions existed during the Little Ice Age (approximately 1400-1700 CE). These climate variations are reflected in variations in the plant communities.

Droughts

Two extreme droughts occurred in the region from about 900 to 1150 CE and from 1200 to 1350 CE. Low freshwater inflows to the Delta occurred during periods 1230-1150, 1400-1300, 2700-2600, and 3700-3450 B.P.

Flood Events

Periods of increase moisture occurred from 800-730 BP and 650-300 BP. Massive flooding inundated the Central Valley in the winter of 1861 (Malamud-Roam *et al.*, 2006). High periods of inflow occurred during 1180-1100, 2400-2200, 3400-3100, and 5100-3800 BP.

Sampling for paleoclimatic reconstructions captures the modern era, enabling a comparison of current conditions with conditions over the past several thousand years. The erratic nature of precipitation in California observed over the past century have been normal and small compared to natural variations over the past millennia.

Reconstructed River Flow and Precipitation Records

Meko *et al.* (2001a) used tree-ring chronologies in statistical regression models to reconstruct time series of annual unimpaired Sacramento River flow for approximately the past 1,100 years (see Section 2.1). Similarly, Graumlich (1987) used tree ring data from the Pacific Northwest to reconstruct precipitation records for the period of 1675-1975 (Figure B-1). Compared to the average observed precipitation from 1899 to 1975, the reconstructed record has above-average precipitation during the latter half of the nineteenth century (1850-1900) (Figure B-1). These relatively wet conditions during the late 1800's and the severe dry

No comments

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conditions from the 1920's trough the 1930's in the reconstructed precipitation record are consistent with the annual unimpaired Sacramento River flow reconstruction from Meko *et al.* (2001) presented in Section 2.1.

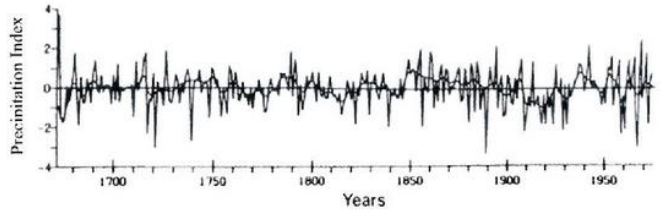

Figure B-1 – Reconstructed annual precipitation, 1675-1975
Data from Graumlich (1987). Precipitation index is presented in units of standard deviation from the 1899-1975 observed mean value.

Estimates of annual precipitation (Graumlich, 1987) and unimpaired runoff (Meko *et al.*, 2001a) from tree ring analysis are used in this study to provide hydrological context, indicating the relative hydrology (e.g. wet or dry) of a specific year and surrounding decade. The reconstructed hydrological data are not used to estimate salinity intrusion for two reasons. First, the seasonal distribution of hydrology is critical in determining salinity variability; two years with the same total annual flow could have significantly different salinity intrusion due to the timing of the flow (Knowles, 2000). Second, since 1850, anthropogenic modifications to the landscape and river flows alter the hydrodynamic response to freshwater flow, somewhat decoupling the unimpaired hydrology from the downstream response (i.e. salinity intrusion).

Malamud-Roam *et al.* (2005) and Goman *et al.* (2008) review paleoclimate as it relates to San Francisco Bay. Generally, they found that paleoclimatic studies showed that a wetter (and fresher) period existed from about 4000 BP to about 2000 BP. In the past 2,000 years, the climate has been cooling and becoming drier, with several extreme periods, including decades-long periods of very wet conditions and century-long periods of drought. As discussed in the next section, the century-long periods of drought are found in paleosalinity records in Suisun Bay and Rush Ranch in Suisun Marsh, but are much less evident in Browns Island, indicating a predominately freshwater marsh throughout the Delta. Citing Meko *et al.* (2001), they note that only one period had a six-year drought more severe than the 1928-1934 period: a seven-year drought ending in 984 CE. They also not the most extreme dry year was in 1580 CE, and state that it was almost certainly drier than 1977. On the whole, however, the last 600 years have been a generally wet period. This is reflected in the salinity records discussed in the next section.

No comments

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B.3. Reconstructed Salinity in the Bay-Delta

Starratt (2001) reconstructed historical salinity variability at Rush Ranch, in the northwestern Suisun Marsh, over the last 3,000 years by examining diatoms from sediment cores. The taxa were classified according to their salinity preference: freshwater (< 2‰), freshwater and brackish water (0‰ to 30‰), brackish (2‰ to 30‰), brackish and marine (2‰ to > 30‰), and marine (> 30‰). Based on the composition of the diatom assemblages, Starrat identified centennial-scale salinity cycles (Table B-2).

Table B-2 – Salinity Intervals over the last 3,000 years at Rush Ranch
Salinity intervals determined from the diatom populations in a sediment core in northwestern Suisun Marsh.

Approximate Years	*Type of Interval* [a]
1850 CE – present	[not classified]
1250 CE – 1850 CE	fresh
250 CE – 1250 CE	brackish
500 BCE – 250 CE	fresh
1000 BCE – 500 BCE	brackish

[a] Classification according to Starratt (2001)

These results correspond well to other paleoclimatic reconstructions. The most recent broad-scale freshwater interval roughly corresponds to the Little Ice Age, and the most recent brackish interval corresponds to the Medieval Warm Period.

Starratt notes that the post-1850 interval indicates an increase in the percentage of diatoms that prefer brackish and marine salinities compared to the last freshwater interval, indicating an increase in salinity during the last 150 years, in comparison to the previous 600 years. During the post-1850 period, diatoms that prefer "marine" environments constitute as much as 50% of the total diatom population, a percentage that is at or above that of any other period. During the most recent years, "freshwater" assemblages constitute about 20% of the total population, a percentage that is only about 10% higher than the most recent *brackish* interval from 250 to 1250 CE.

Malamud-Roam *et al.* (2006) compared reconstructed salinity records for the past three thousand years from four locations (three tidal marsh locations and one location in the Bay) in the Bay-Delta region (Figure B-2(a)). Figure B-2(b) shows several periods with higher than average salinity (e.g., 1600-1300 and 1000-800 BP and 1900 CE to present) and several periods with lower than average salinity (e.g., 1300 to 1200 BP and 150 to 100 BP). These paleosalinity records are consistent with each other and with the paleoclimatic records of river flow and salinity presented in Section 2.

No comments

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No comments

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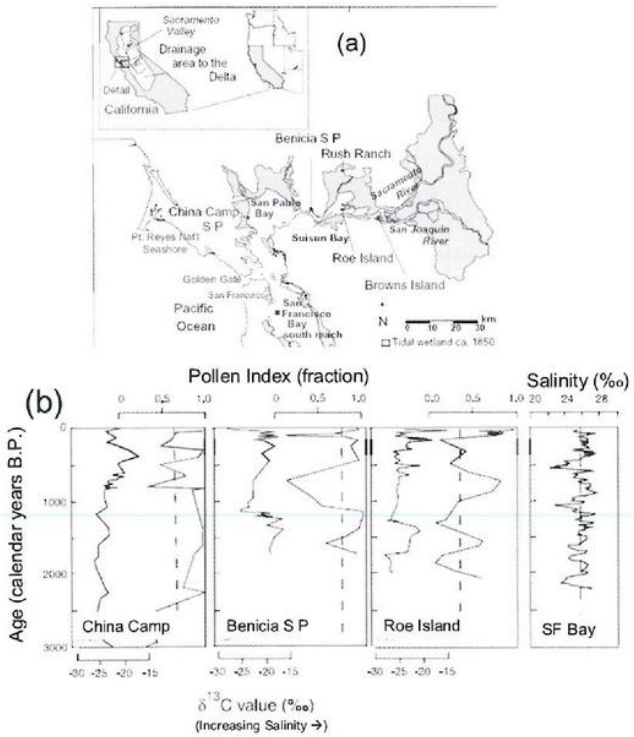

Figure B-2 – Paleosalinity records at selected sites in the San Francisco Estuary

(a) location of the three tidal marsh sites (China Camp, Benicia State Park and Roe Island) and one site in the Estuary (Oyster Point in San Francisco Bay) where sediment cores were obtained. (b) time series for the pollen index (ranging from 0 to 1, higher values corresponding to higher salinity) and the δ13C values at the tidal marsh sites; salinity at Oyster Point, San Francisco Bay (inferred from δ13O values) is also shown. The broken line shows the estimated mean pollen index prior to European disturbance. (modified from Malamud-Roam and Ingram (2004) and Malamud-Roam et al. (2006))

No comments

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No comments

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Appendix C. Quantitative Hydrological Observations

Long-term records of river runoff are useful in understanding hydroclimatic variations. Section 3.1 discusses the long-term variations of the unimpaired Sacramento River runoff and unimpaired San Joaquin River runoff. The estimates of these variables from early 1900's to the present are available on the internet . Estimates prior to the early 1900's (late 1800's to early 1900's) were obtained from a 1923 California Department of Public Works report (DPW, 1923). Table C-1 through Table C-4 present estimates of Sacramento River runoff and San Joaquin River runoff for the period of 1872-2008, obtained from DPW (1923) and http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST.

The unimpaired Sacramento River runoff is the sum of the flows from the Sacramento River at Bend Bridge, Feather River inflow to Lake Oroville, Yuba River at Smartville, and the American River inflow to Folsom Lake. The unimpaired San Joaquin River runoff is the sum of the flows from the Stanislaus River inflow to New Melones Lake, Tuolumne River inflow to New Don Pedro Reservoir, Merced River inflow to Lake McClure, and San Joaquin River inflow to Millerton Lake.

Table C-1 – Annual unimpaired Sacramento River runoff for 1872-1905
Data source: DPW (1923

Water Year	Sacramento River @ Bend Bridge	Feather River @ Lake Oroville	Yuba River @ Smartville	American River @ Folsom Lake	Sacramento River Runoff
	Acre-feet (AF)				Million acre-feet (MAF)
1872	10,200,000	7,254,000	4,352,000	4,215,600	**26.0**
1873	4,780,000	3,347,000	1,638,400	1,862,200	**11.6**
1874	7,300,000	5,571,000	3,340,800	3,079,800	**19.3**
1875	4,390,000	2,747,000	1,561,600	1,391,600	**10.1**
1876	14,500,000	6,867,000	3,594,000	4,450,900	**29.4**
1877	9,870,000	2,437,000	1,292,800	1,289,200	**14.9**
1878	17,800,000	4,836,000	2,528,000	2,721,700	**27.9**
1879	8,380,000	5,513,000	2,796,800	3,304,900	**20.0**
1880	12,300,000	7,061,000	3,641,600	4,502,100	**27.5**
1881	15,400,000	5,610,000	3,104,000	3,540,300	**27.7**
1882	8,000,000	4,797,000	2,150,400	3,264,000	**18.2**
1883	6,670,000	3,714,000	1,804,800	2,169,200	**14.4**
1884	11,400,000	6,190,000	3,104,000	4,103,000	**24.8**
1885	6,460,000	3,482,000	2,304,000	1,780,400	**14.0**
1886	14,400,000	6,384,000	3,174,400	3,918,900	**27.9**
1887	6,670,000	2,611,000	1,561,600	1,862,200	**12.7**
1888	5,430,000	2,669,000	998,400	1,575,700	**10.7**
1889	10,600,000	5,126,000	1,612,800	1,903,200	**19.2**
1890	22,700,000	12,090,000	6,176,000	7,725,200	**48.7**

Water Year	Sacramento River @ Bend Bridge	Feather River @ Lake Oroville	Yuba River @ Smartville	American River @ Folsom Lake	Sacramento River Runoff
1891	6,460,000	3,482,000	1,747,200	1,944,100	**13.6**
1892	7,250,000	5,416,000	1,945,600	2,568,200	**17.2**
1893	12,400,000	7,177,000	3,488,000	4,399,800	**27.5**
1894	8,640,000	4,410,000	2,432,000	3,304,900	**18.8**
1895	12,300,000	7,177,000	4,160,000	4,737,400	**28.4**
1896	11,343,200	7,738,000	3,641,600	3,857,500	**26.6**
1897	10,391,400	5,610,000	3,040,000	3,632,400	**22.7**
1898	5,135,800	2,805,000	1,184,000	1,186,900	**10.3**
1899	5,977,400	3,288,000	1,984,000	2,362,600	**13.6**
1900	8,712,500	6,500,000	2,956,800	3,683,500	**21.9**
1901	9,020,900	6,229,000	2,854,400	3,714,200	**21.8**
1902	11,380,600	4,468,000	2,432,000	3,079,800	**21.4**
1903	9,941,800	4,483,500	2,368,000	3,038,900	**19.8**
1904	16,095,800	9,377,000	4,101,800	5,249,000	**34.8**
1905	10,775,200	4,529,200	2,403,500	2,050,000	**19.8**

No comments

- n/a -

Table C-2 – Annual unimpaired Sacramento River runoff for 1906-2009
Data Source: http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST

Water Year	Sacramento River Runoff (MAF)	Water Year	Sacramento River Runoff (MAF)	Water Year	Sacramento River Runoff (MAF)	Water Year	Sacramento River Runoff (MAF)
1906	26.7	1936	17.4	1966	13.0	1996	22.3
1907	33.7	1937	13.3	1967	24.1	1997	25.4
1908	14.8	1938	31.8	1968	13.6	1998	31.4
1909	30.7	1939	8.2	1969	27.0	1999	21.2
1910	20.1	1940	22.4	1970	24.1	2000	18.9
1911	26.4	1941	27.1	1971	22.6	2001	9.8
1912	11.4	1942	25.2	1972	13.4	2002	14.6
1913	12.9	1943	21.1	1973	20.1	2003	19.3
1914	27.8	1944	10.4	1974	32.5	2004	16.0
1915	23.9	1945	15.1	1975	19.2	2005	18.6
1916	24.1	1946	17.6	1976	8.2	2006	32.1
1917	17.3	1947	10.4	1977	5.1	2007	10.3
1918	11.0	1948	15.8	1978	23.9	2008	10.3
1919	15.7	1949	12.0	1979	12.4	2009	12.9
1920	9.2	1950	14.4	1980	22.3		
1921	23.8	1951	23.0	1981	11.1		
1922	18.0	1952	28.6	1982	33.4		
1923	13.2	1953	20.1	1983	37.7		
1924	5.7	1954	17.4	1984	22.4		
1925	16.0	1955	11.0	1985	11.0		
1926	11.8	1956	29.9	1986	25.8		
1927	23.8	1957	14.9	1987	9.3		
1928	16.8	1958	29.7	1988	9.2		
1929	8.4	1959	12.1	1989	14.8		
1930	13.5	1960	13.1	1990	9.3		
1931	6.1	1961	12.0	1991	8.4		
1932	13.1	1962	15.1	1992	8.9		
1933	8.9	1963	23.0	1993	22.2		
1934	8.6	1964	10.9	1994	7.8		
1935	16.6	1965	25.6	1995	34.6		

No comments

- n/a -

Table C-3 – Annual unimpaired San Joaquin River runoff for 1872-1900
Data source: DPW (1923)

Water Year	Stanislaus River @ New Melones Lake	Tuolumne River @ New Don Pedro Reservoir	Merced River @ Lake McClure	San Joaquin River @ Millerton Lake	San Joaquin River Runoff
	units of acre-feet (AF)				units of million acre-feet (MAF)
1872	1,860,000	2,624,000	1,511,000	2,627,000	**8.6**
1873	959,000	1,543,000	769,000	1,122,000	**4.4**
1874	970,000	1,576,000	791,000	1,862,000	**5.2**
1875	482,000	982,000	439,000	887,000	**2.8**
1876	2,930,000	4,059,000	2,384,000	2,862,000	**12.2**
1877	408,900	561,000	220,000	809,000	**2.0**
1878	1,570,000	2,286,000	1,274,000	2,218,000	**7.3**
1879	823,000	1,353,000	659,000	470,000	**3.3**
1880	1,390,000	2,071,000	1,132,000	3,349,000	**7.9**
1881	970,000	1,576,000	791,000	2,740,000	**6.1**
1882	944,000	1,526,000	764,000	1,000,000	**4.2**
1883	1,020,000	1,600,000	813,000	1,392,000	**4.8**
1884	2,250,000	3,152,000	1,840,000	5,732,000	**13.0**
1885	582,000	1,097,000	505,000	1,218,000	**3.4**
1886	2,070,000	2,929,000	1,692,000	5,211,000	**11.9**
1887	619,000	1,139,000	538,000	1,479,000	**3.8**
1888	540,000	1,048,000	478,000	957,000	**3.0**
1889	718,000	1,262,000	599,000	1,574,000	**4.2**
1890	3,580,000	5,099,000	2,955,000	4,349,000	**16.0**
1891	959,000	1,543,000	769,000	1,227,000	**4.5**
1892	1,050,000	1,650,000	846,000	1,931,000	**5.5**
1893	2,150,000	3,036,000	1,758,000	1,914,000	**8.9**
1894	1,860,000	2,624,000	1,511,000	1,331,000	**7.3**
1895	2,700,000	3,795,000	2,236,000	2,786,700	**11.5**
1896	1,380,000	1,588,100	1,110,000	1,985,700	**6.1**
1897	1,920,000	2,437100	1,566,000	2,219,700	**8.1**
1898	498,000	960,500	450,000	922,300	**2.8**
1899	1,030,000	1,334,700	824,000	1,269,500	**4.5**
1900	1,350,000	1,628,100	1,099,000	1,343,000	**5.4**

No comments

- n/a -

Table C-4 – Annual unimpaired San Joaquin River runoff for 1901-2009
Data Source: http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST

Water Year	San Joaquin River Runoff (MAF)	Water Year	San Joaquin River Runoff (MAF)	Water Year	San Joaquin River Runoff (MAF)	Water Year	San Joaquin River Runoff (MAF)
1901	9.4	1931	1.7	1961	2.1	1991	3.2
1902	5.1	1932	6.6	1962	5.6	1992	2.6
1903	5.7	1933	3.3	1963	6.2	1993	8.4
1904	7.6	1934	2.3	1964	3.1	1994	2.5
1905	5.3	1935	6.4	1965	8.1	1995	12.3
1906	12.4	1936	6.5	1966	4.0	1996	7.2
1907	11.8	1937	6.5	1967	10.0	1997	9.5
1908	3.3	1938	11.2	1968	2.9	1998	10.4
1909	9.0	1939	2.9	1969	12.3	1999	5.9
1910	6.6	1940	6.6	1970	5.6	2000	5.9
1911	11.5	1941	7.9	1971	4.9	2001	3.2
1912	3.2	1942	7.4	1972	3.6	2002	4.1
1913	3.0	1943	7.3	1973	6.5	2003	4.9
1914	8.7	1944	3.9	1974	7.1	2004	3.8
1915	6.4	1945	6.6	1975	6.2	2005	9.2
1916	8.4	1946	5.7	1976	2.0	2006	10.4
1917	6.7	1947	3.4	1977	1.1	2007	2.5
1918	4.6	1948	4.2	1978	9.7	2008	3.5
1919	4.1	1949	3.8	1979	6.0	2009	5.0
1920	4.1	1950	4.7	1980	9.5		
1921	5.9	1951	7.3	1981	3.2		
1922	7.7	1952	9.3	1982	11.4		
1923	5.5	1953	4.4	1983	15.0		
1924	1.5	1954	4.3	1984	7.1		
1925	5.5	1955	3.5	1985	3.6		
1926	3.5	1956	9.7	1986	9.5		
1927	6.5	1957	4.3	1987	2.1		
1928	4.4	1958	8.4	1988	2.5		
1929	2.8	1959	3.0	1989	3.6		
1930	3.3	1960	3.0	1990	2.5		

No comments

- n/a -

No comments

- n/a -

No comments

- n/a -

Appendix D. Instrumental Observations of Salinity

In Section 3, historical variations in the net quantity of water flowing from the Delta to the Suisun Bay (called net Delta outflow or NDO) and salinity in the western Delta were discussed using available observations and a suite of commonly used modeling tools. This section presents additional information on the historical variations of NDO and salinity in the western Delta and Suisun Bay discussed in Section 3.

D.1. Introduction

D.1.1. Salinity Units

Salinity is specified in this report either as electrical conductivity (EC, in units of microSiemens per centimeter, or µS/cm) or as a concentration of chloride in water (in units of milligrams of chloride per liter of water, or mg/L). Conversion between EC and chloride concentration is accomplished using site-specific empirical relationships developed by Kamyar Guivetchi (DWR, 1986). Table D-1 presents a sample of typical EC concentrations and their approximate equivalent chloride concentrations.

Table D-1 – Typical electrical conductivity (EC) and equivalent chloride concentration

Electrical Conductivity (µS/cm)	Chloride (mg/L)
350	50
525	100
1,050	250
1,900	500
2,640	700
3,600	1,000

Qualitative terms such as "fresh" and "brackish" are often used to describe relative salinity. The quantitative thresholds of average chloride concentration that distinguish fresh water from brackish water and the averaging time period vary among studies. For instance, chloride concentrations of 1,000 mg/L, 700 mg/L, and 50 mg/L have been used by different studies (Table D-2).

D.1.2. Temporal and Spatial Variability of Salinity

The main variability in salinity along the length of the Bay-Delta system is due to the gradient from saline Pacific Ocean water (EC of approximately 50,000 µS/cm) to fresh water of the Central Valley rivers (EC of approximately 100 µS/cm). However, the salinity in the Bay-Delta varies both in space and time. It is important to clarify which time scales and measurement locations are being used when comparing and discussing salinity trends.

Table D-2 – Metrics used to distinguish between "fresh" and "brackish" water

Description	Sample timing or averaging	Salinity Value	
		Chloride (mg/L)	EC (µS/cm)
Isohalines in Delta Atlas (DWR, 1995)	Annual maximum of the daily maximum	1,000 mg/L	3,700 µS/cm
X2 position (Jassby *et al.*, 1995)	Daily average (or a 14-day average)	700 mg/L	2,640 µS/cm
Barge travel by C&H[4]	Monthly average of the daily maximum	50 mg/L	350 µS/cm

Salinity in the western Delta is strongly influenced by tides. The hourly or daily variability of salinity can be much larger than the seasonal or annual variability. For instance, during the fall of 1999 (following a relatively wet year[5]), hourly EC in the San Joaquin River at Antioch varied by about 6,000 µS/cm (from about 3,000 µS/cm to 9,000 µS/cm) while the daily-averaged EC for all of 1999 ranged from about 100 µS/cm to 6,000 µS/cm (Figure D-1).

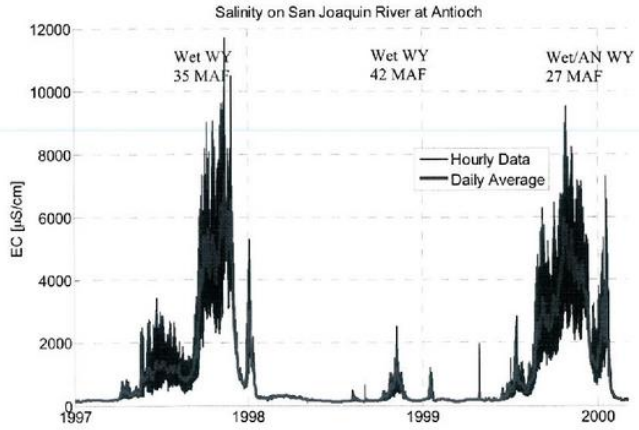


Figure D-1 – Hourly and daily salinity variability in the San Joaquin River at Antioch
Total annual unimpaired Sacramento River flow and water year type is indicated for each water year.
Data Source: IEP Data Vaults (http://www.iep.ca.gov/dss/)

[4] The California & Hawaiian Sugar Refining Corporation in Crockett (C&H) obtained its freshwater supply from barges traveling up the Sacramento and San Joaquin Rivers, generally twice a day beginning in 1908 (DPW, 1931).
[5] Water year 1999 was classified as wet using the Sacramento Valley 40-30-30 index and above-normal using the San Joaquin Valley 60-20-20 index; indices are defined in D-1641.

No comments

- n/a -

No comments

- n/a -

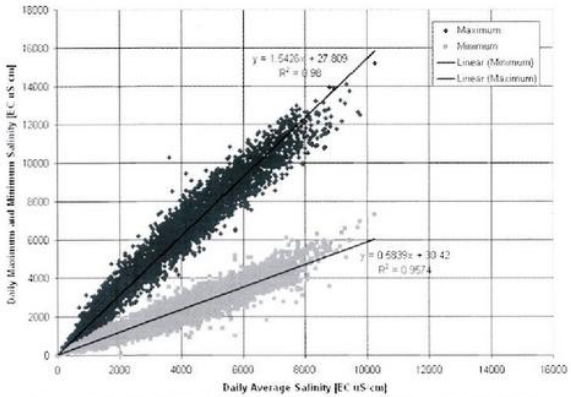


Figure D-2 – Tidal Variability in Salinity at Antioch (1967 to 1992)
Data Source: IEP Data Vaults (http://www.iep.ca.gov/dss/)

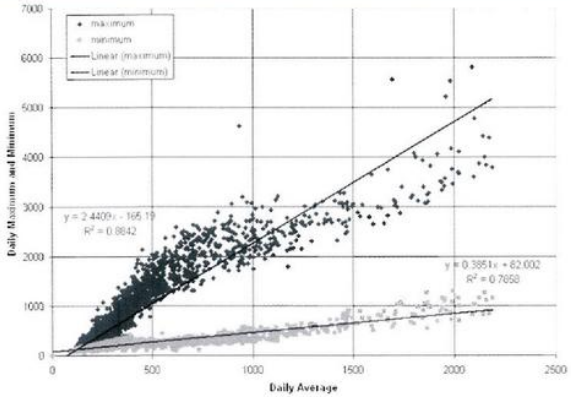


Figure D-3 – Tidal Variability in Salinity at Rio Vista (1967 to 1992)
Data Source: IEP Data Vaults (http://www.iep.ca.gov/dss/)

No comments

- n/a -

The high tide maximum, low tide minimum, and daily-averaged salinity at a given location are very different. As shown in Figure D-2, the daily maximum salinity in the San Joaquin River at Antioch can be double the daily-averaged salinity. Because of the large tidal variability in salinity, any comparisons of salinity observations should be at the same phase of the tide, or at least take into account tidal variability.

Similarly, as shown in Figure D-3, the daily maximum salinity in the Sacramento River at Rio Vista can be 170-400% of the daily average salinity. The daily minimum at Rio Vista may be 10-65% of the daily average.

D.2. Variations in the Spatial Salinity Distribution

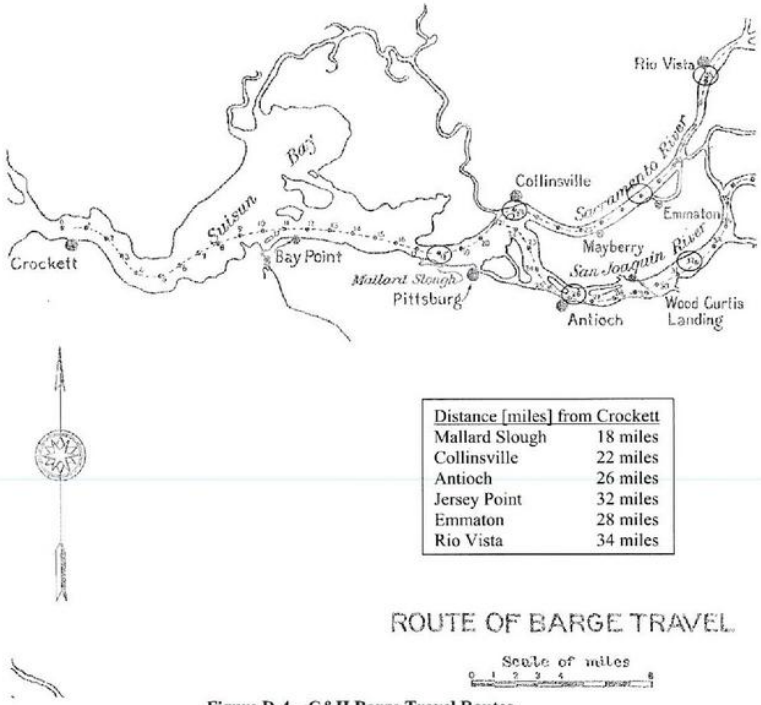
Observations examined in this section and Section 3.3 include records from the early 1900's from the California & Hawaiian Sugar Refining Corporation in Crockett (C&H) and the long-term monitoring data from the Interagency Ecological Program (IEP). Estimates of salinity at specific locations of interest were obtained from DWR's DSM2 model and Contra Costa Water District's salinity-outflow model (also known as the G-model) (Denton, 1993). Estimates of salinity intrusion were obtained using the K-M equation (Kimmerer and Monismith, 1992).

D.2.1. Distance to Freshwater from Crockett

The California & Hawaiian Sugar Refining Corporation in Crockett (C&H) obtained its freshwater supply from barges traveling up the Sacramento and San Joaquin Rivers, generally twice a day beginning in 1905 through 1929 or later (DPW, 1931). The salinity information recorded by C&H is the most detailed salinity record available prior to the intensive salinity monitoring by the State of California, which started in 1920. This section presents a comparison of the salinity observations of C&H with recent monitoring data and modeling results to determine how the managed salinity regime of the late 20th Century compares to the salinity regime of the early 1900's.

Data Sources and Methods

C&H data: C&H operations required water with less than 50 mg/L chloride concentration. According to DPW (1931), the C&H barges typically traveled up the river on flood tide and returned downstream on ebb tide. Since the maximum daily salinity for a given location in the river channel typically occurs about one to two hours after high slack tide, the distance traveled by the C&H barges represents approximately the daily maximum distance to 50 mg/L water from Crockett. The monthly minimum, average, and maximum distance traveled by C&H barges are shown in Figure D-4 and Figure D-5. For the following analysis, monthly averages of the C&H daily maximum distances were extracted from Figure D-5 for the period of 1908-1918 (after 1917, extensive salinity intrusion was reported and agricultural diversions reportedly started affecting flows into the Delta).



Distance [miles] from Crockett	
Mallard Slough	18 miles
Collinsville	22 miles
Antioch	26 miles
Jersey Point	32 miles
Emmaton	28 miles
Rio Vista	34 miles

Figure D-4 – C&H Barge Travel Routes

Map adapted from DPW (1931). Red circles indicate locations of landmarks, with distance from Crockett listed in the inset box.

No comments

- n/a -

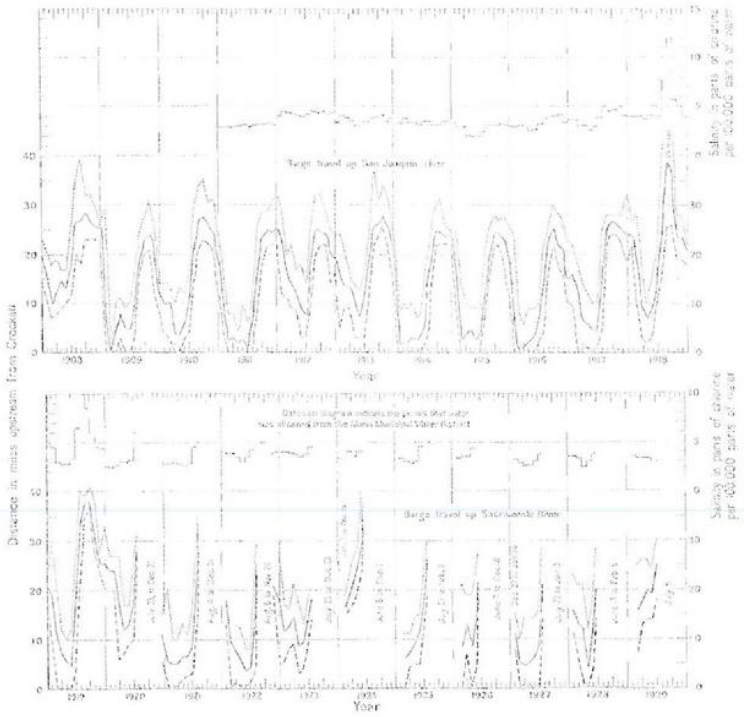


Figure D-5 – C&H Barge Travel and Quality of Water obtained

C&H barge travel up the San Joaquin River (1908 through 1918, top panel) and Sacramento River (1919 through 1929, bottom panel). The lower three lines on each panel (reference to the left axes) indicate the monthly minimum (dashed line), monthly maximum (dotted line), and monthly average (solid line) distance traveled by C&H barges to obtain their fresh water supply. The uppermost solid line on each panel (reference to the right axes) indicates the average monthly salinity of the water obtained by the barges. Figure adapted from DPW (1931)

From 1908 through 1917, C&H was able to obtain water with less than 50 mg/L chlorides within 30 miles of Crockett on average (below Jersey Point on the San Joaquin River). In 1918, the salinity of the water obtained by C&H barges had increased due to a combination of a lack of precipitation and upstream diversions (especially for newly introduced rice cultivation) (DPW, 1931). During August and September 1918, salinity exceeded 60 mg/L chloride, and the C&H barges traveled farther upstream than any time previously recorded.

No comments

- n/a -

In 1919, a wetter year than 1918, salinity was high for an even longer period of time, most likely due to increased upstream diversions for irrigation. Salinity exceeded 60 mg/L chloride during July, August, and September. Beginning in 1920, C&H abandoned the Sacramento and San Joaquin Rivers during the summer and fall seasons, replacing the water supply with a contract from Marin County. However, even during the driest years of the 1920's, C&H obtained water with less than 50 mg/L chloride below the confluence of the Sacramento and San Joaquin Rivers during a portion of every year.

Salinity observations from the Interagency Ecological Program (IEP): Long-term monitoring of electrical conductivity (EC) at multiple stations within the Bay and Delta began around 1964. Publicly-available daily-averaged data were obtained for this analysis from the Interagency Ecological Program (IEP) data vaults (Table D-3).

Table D-3 – Overview of long-term salinity observation records from IEP
(see http://www.iep.ca.gov/dss/)

Location	*Station*	*Source*	*Data*
Selby	RSAC045	USGS-BAY	Historical
Martinez	RSAC054	CDEC	Real-time
Benicia Bridge	RSAC056	USBR-CVO	Historical
Port Chicago	RSAC064	USBR-CVO	Historical
Mallard	RSAC075	CDEC	Real-time
Pittsburg	RSAC077	USBR-CVO	Historical
Collinsville	RSAC081	USBR-CVO	Historical
Emmaton	RSAC092	USBR-CVO	Historical
Rio Vista	RSAC101	USBR-CVO	Historical
		DWR-ESO-D1485C	Historical
Georgiana Slough	RSAC123	DWR-CD-SURFWATER	Historical
Greens Landing	RSAC139	USBR-CVO	Historical
Antioch	RSAN008	USBR-CVO	Historical
Jersey Pont	RSAN018	USBR-CVO	Historical
Bradford Point	RSAN024	USBR-CVO	Historical
San Andreas Landing	RSAN032	USBR-CVO	Historical

Delta Simulation Model (DSM2) Historical Simulation: The DSM2 historical simulation (1989-2006) was used to provide estimates of water quality to complement the limited field data from IEP. Because DSM2 has a very detailed spatial computational network covering the Delta and Suisun Bay, DSM2 can output much more detailed spatial and temporal salinity information than just the water quality at the IEP monitoring stations. DSM2 results include the daily-averaged EC at each model node along the lower Sacramento and San Joaquin Rivers. The location of the 350 µS/cm EC isohaline (corresponding to 50 mg/L chloride) was identified from the DSM2 results and compared with the equivalent C&H and IEP data.

No comments

- n/a -

Analysis time frame: The first decade of C&H barge travel (1908-1917) was a relatively wet period compared to the entire period of record (1906-2006) (Figure D-6). To compare conditions under similar hydrological conditions, specific recent decades (Figure D-6(a)) and select recent years (Figure D-6(b)) were selected that have comparable or slightly wetter hydrology than the C&H years. The periods 1966-1975 and 1995-2004 have similar annual unimpaired Sacramento River flow to the C&H data period (1908-1917) (see Figure D-6(a)). In addition, two wet years (1911 and 1916) and two dry years (1913 and 1918) selected from the C&H time period were compared with two wet years (1969 and 1998) and two dry years (1968 and 2002) from the IEP record.

Limitations of the analysis: The C&H data approximately represent the maximum daily salinity at a given location, whereas recent conditions (IEP or DSM2 data) are represented by the daily-averaged salinity. The estimates of the distance that must be traveled to reach fresh water under current conditions are, therefore, underestimated.

In addition, the C&H barges traveled up the San Joaquin River from 1908 through 1917, yet the equivalent travel distance for C&H barges under current conditions are estimated for the Sacramento River, and not the San Joaquin River. Under present-day conditions, the upstream distance to fresh water on the San Joaquin River is greater than for the Sacramento River, so this approach will also serve to underestimate the actual distance that C&H barges would have to travel under present-day conditions.

No comments

- n/a -

No comments

- n/a -

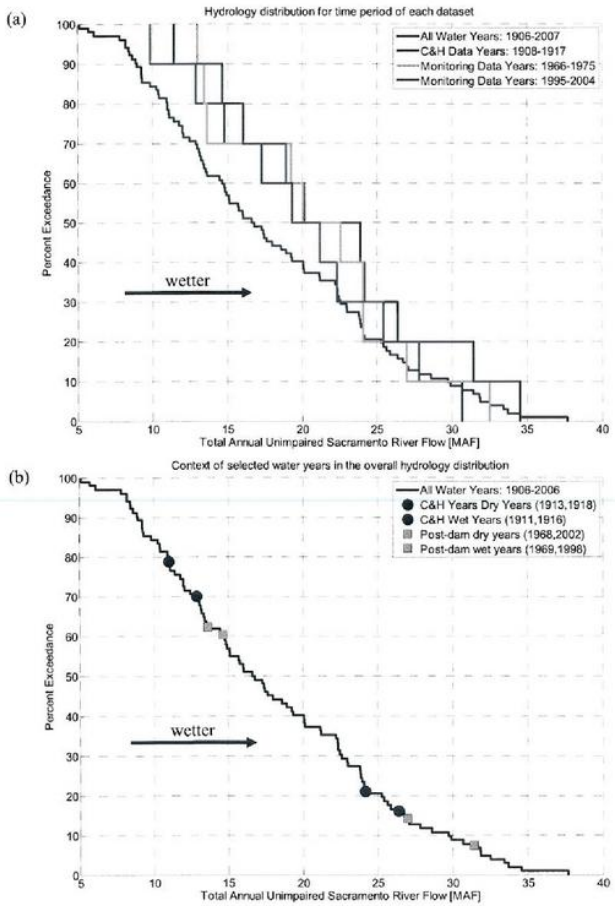


Figure D-6 – Hydrologic Context for Analysis of Distance to Fresh Water
(a) Hydrology distribution for water years 1906 to 2007, and select decades.
(b) Hydrology distribution for water years 1906 to 2007, with select water years shown for context.

Results and Discussion

Selected Wet Years

As shown in Figure D-7, the salinity patterns during the two selected C&H-era wet years, 1911 and 1916, are similar to each other. During these wet years, the location of 50 mg/L chloride water is west of Martinez for about 4-5 months (late February to early August in 1911 and from early February to late June in 1916). In contrast, during recent wet years 1969 and 1998, water with 50 mg/L chlorides or less was west of Martinez for only about 6 weeks in February and March. This comparison shows that in 1969 and 1998 the western Delta was saltier in the fall and spring than it was in 1911 and 1916, and salinity intrusion occurred much earlier in 1969 and 1998.

If barges were still traveling up the Sacramento River today to find fresh water, they would have to travel farther during the fall, spring, and summer than the C&H barges traveled during similar wet years. In 1916, fresh water retreated upstream about one month earlier than in 1911, possibly influenced by the increasing upstream diversions during 1911-1916 (see Figure 1-3). In recent years with even greater unimpaired runoff, fresh water retreats two to three months earlier than in 1916. Additionally, fresh water reaches Martinez for a much shorter period of time, about less than one month in recent years compared to four and five months during 1916 and 1911, respectively.

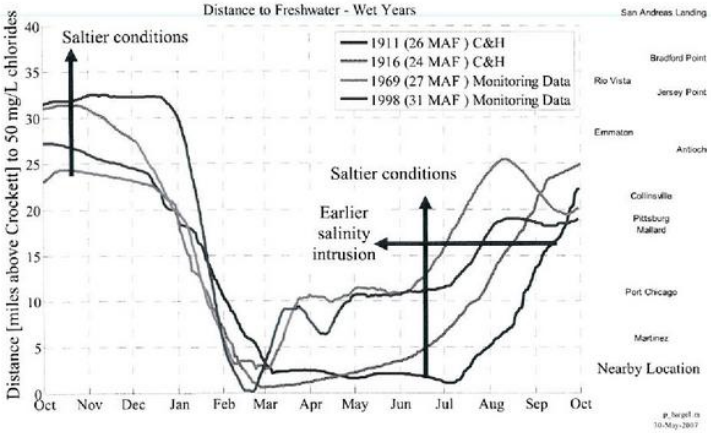


Figure D-7 – Distance to Fresh Water in Select Wet Years

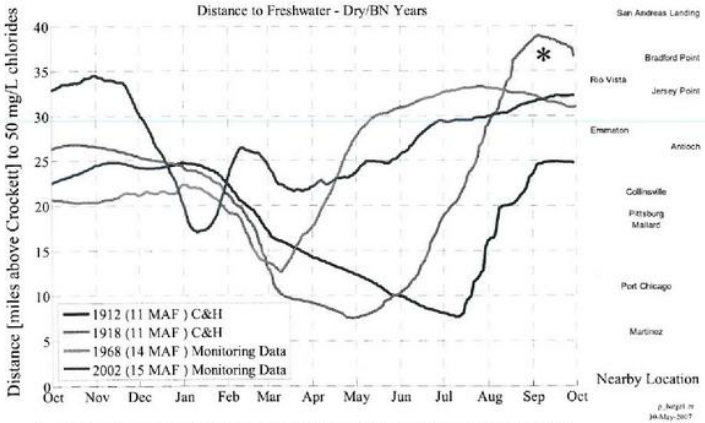
No comments

- n/a -

Selected Dry Years

Figure D-8 shows that the most visible difference between the distance to fresh water in dry years of the early 1900's and more recent dry years is the substantial increase in distance to fresh water, particularly from April through June. This indicates the spring was much fresher during the dry years of the early 1900's, before large upstream reservoirs were built to capture the spring runoff. In dry and below-normal water years under today's conditions, barges would have to travel farther during spring, summer and fall than they traveled in the early 20th Century.

The C&H barge travel distance in the dry years of 1913 and 1918 are quite different, especially the additional 10 miles of distance to fresh water traveled in August and September of 1918. C&H recorded relatively high salinity (greater than 110 mg/L chlorides) above Bradford Point on the San Joaquin in 1918, which is greater than observed salinity on the Sacramento River near Rio Vista in similar water years. This may be partially explained by the development of the rice cultivation industry around 1912 (DPW, 1931) and increased upstream diversions when seasonal river flows were already low.



* During August and September 1918, average water quality obtained by C&H exceeded 110 mg/L chlorides

Figure D-8 – Distance to Fresh water in Select Dry or Below Normal Years

Figure D-9 shows the exceedance probabilities for distance traveled up the Sacramento River for different salinity levels. During 1908-1917, on a monthly-averaged basis, C&H barges had to travel above the confluence of the Sacramento and San Joaquin Rivers (approximately 22 miles above Crockett) about 26% of this time period to reach water with salinity less than

No comments

- n/a -

350 µS/cm EC (about 50 mg/L chlorides). In contrast, from 1995-2006, DSM2 simulations suggest that barges would have to travel above the confluence approximately 56% of the time to reach water with salinity of 350 µS/cm EC.

The location of the 50 mg/L chloride isohaline during 1908-1917 approximately corresponds to the location of X2 (2,640 µS/cm EC, or 700 mg/L chlorides) during 1995-2006 (Figure D-9). This is equivalent to more than a 7-fold increase in salinity from the early 1900's to the present day.

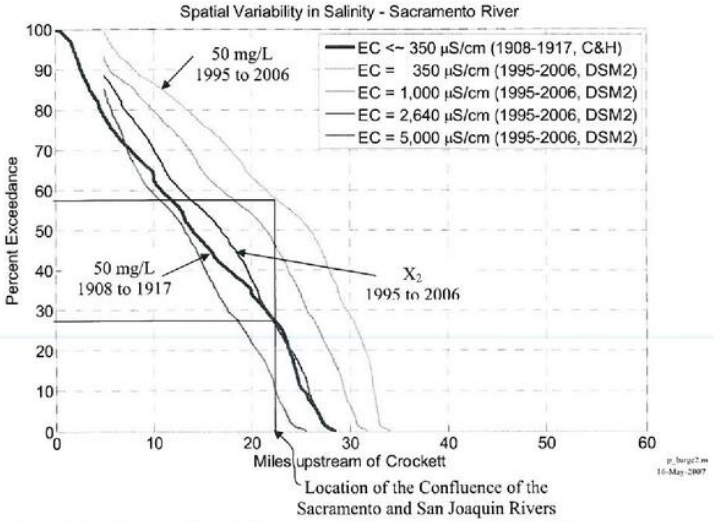


Figure D-9 – Distance along the Sacramento River to Specific Salinity Values

No comments

- n/a -

D.2.2. Maximum Annual Salinity Intrusion Before and After Large-scale Reservoir Construction

Figure D-10 shows maximum salinity intrusion during 1921-1943 (pre-CVP period), prior to the completion of the Shasta Dam of the Central Valley Project in 1945. Salinity intrusion is presented in terms of contours of 1,000 mg/L chlorides. Figure D-11 shows the maximum salinity intrusion during the post-CVP period of 1944-1990. These figures indicate the pre-CVP period experienced greater salinity intrusion than the post-CVP period, with seawater intruding farther into the Delta during 6 of the 24 pre-CVP years (1920, 1924, 1926, 1931, 1934, and 1939) than in any of the 47 years in the post-CVP period (1944-1990).

The extreme salinity intrusion during the pre-CVP period was due, in part, to relatively low runoff during these years. Meko *et al.* (2001a) determined that the period from 1917 through 1936 was the driest 20-year period in the past 400 years; this long-term drought encompassed 16 of the 24 years in the pre-CVP period. In addition, estimates of unimpaired runoff from the Sacramento River (obtained from http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST) indicate that the Sacramento River had 6 critical water years during the 24-year period of 1920-1943, whereas, the Sacramento River had only 4 critical water years during the 47-year period of 1944-1990.

Figure D-12 shows that the peak salinity intrusion during the pre-CVP period occurred between mid-August and mid-September, while peak salinity intrusion during the first portion of the the post-CVP period (1944-1960) occurred between late-July and late-August. Salinity intrusion during the pre-CVP period was not only affected by relatively low runoff, but also by extensive upstream diversions (DPW, 1931).

The salinity investigations of the pre-CVP era found that the extreme salinity intrusion was larger than any previous intrusions known to local residents and concluded the intrusion was due, in part, to the extensive upstream diversions. As observed in DPW (1931):

> "Under conditions of natural stream flow before upstream irrigation and storage developments occurred, the extent of saline invasion and the degree of salinity reached was much smaller than during the last ten to fifteen years." (DPW, 1931, page 15)
>
> "Beginning in 1917, there has been an almost unbroken succession of subnormal years of precipitation and stream flow which, in combination with increased irrigation and storage diversions from the upper Sacramento and San Joaquin River systems, has resulted in a degree and extent of saline invasion greater than has occurred ever before as far as known." (DPW, 1931, page 15)
>
> "The abnormal degree and extent of saline invasion into the delta during recent years since 1917 have been due chiefly to: first, subnormal precipitation and run-off with a subnormal amount of stream flow naturally available to the delta, and second, increased upstream diversions

No comments

- n/a -

for irrigation and storage on the Sacramento and San Joaquin River systems, reducing the inflow naturally available to the delta. It is probable that the degree of salinity in the lower channels of the delta and the extent of saline invasion above the confluence of the Sacramento and San Joaquin rivers have been about doubled by reason of the second factor." (DPW, 1931, page 42)

Conclusions from DPW (1931) and similar investigations have been corroborated by paleosalinty studies (see Section 2.3), which indicate that Browns Island in the western Delta was a freshwater marsh for approximately 2,500 years until salinity intruded in the early 20th Century.

No comments

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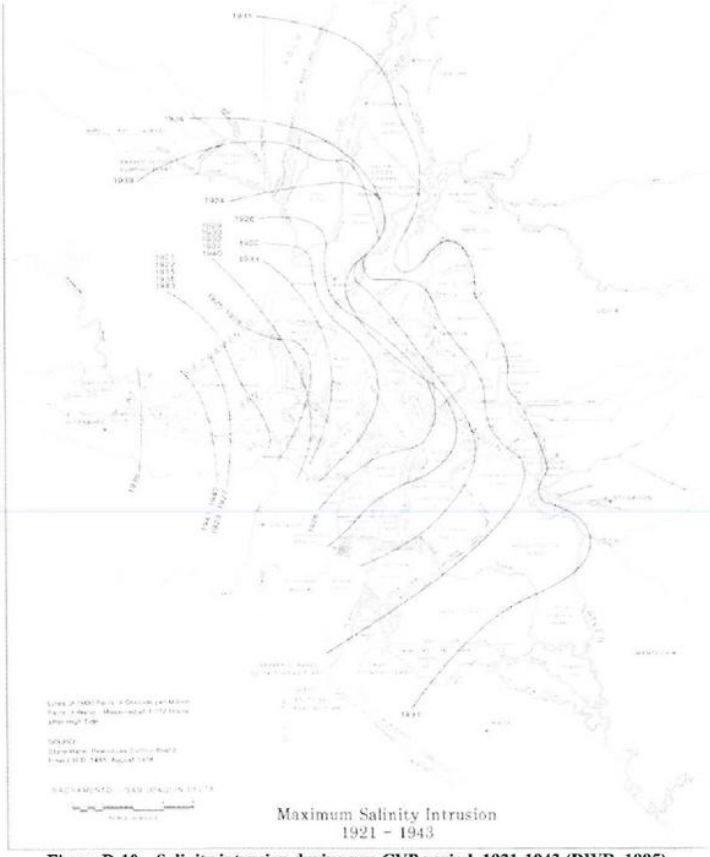

Figure D-10 – Salinity intrusion during pre-CVP period, 1921-1943 (DWR, 1995)

No comments

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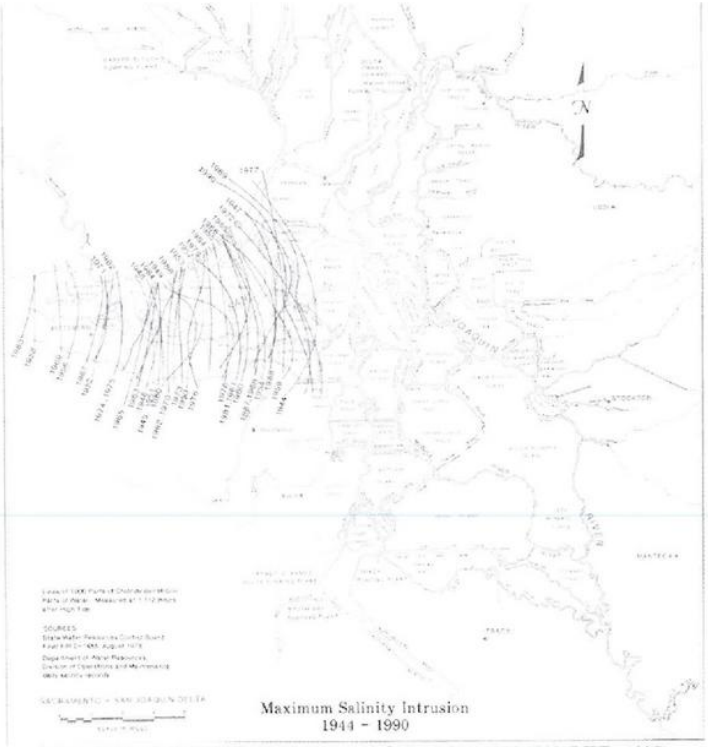

Figure D-11 – Salinity intrusion during post-CVP period, 1944-1990 (DWR, 1995)

No comments

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No comments

- n/a -

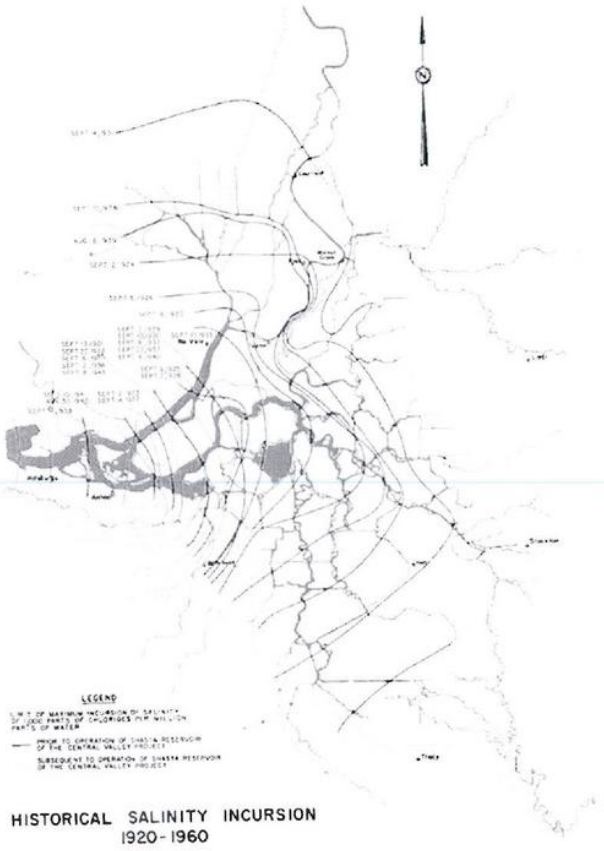

Figure D-12 – Salinity intrusion during 1920-1960 (DWR, 1960)

Figure D-13 illustrates the maximum annual salinity intrusion for comparable dry years[6]. Water year 1913 experienced the least extent of intrusion, most likely because upstream diversions were significantly less than in later years. Water years 1926 and 1932 were subject to extensive upstream agricultural diversions, while water years 1979 and 2002 had the benefit of the CVP and SWP to provide "salinity control". The CVP and SWP operations now regulate the amount of freshwater flowing through the Delta in order to prevent extreme salinity intrusions such as those observed during the 1920's and 1930's.

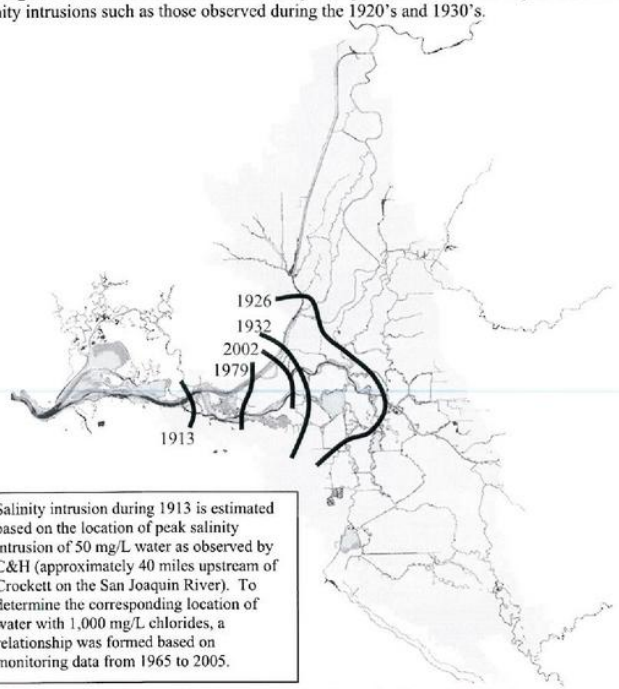

Figure D-13 – Annual Maximum Salinity Intrusion for relatively dry years
Salinity intrusion for relatively dry water years with similar total annual unimpaired runoff, using 1,000 mg/L chloride concentration to distinguish the extent of intrusion.

[6] Hydrological metrics from http://cdec.water.ca.gov/cgi-progs/iodir/wsihist for comparison: total unimpaired Sacramento River and San Joaquin River flow for water years 1913, 1926, 1932, 1979, and 2002 was 15.9 MAF, 15.3 MAF, 19.8 MAF, 18.4 MAF, and 18.7 MAF, respectively; Sacramento River water year type index for water years 1913, 1926, 1932, 1979, and 2002 was 6.24, 5.75, 5.48, 6.67, and 6.35, respectively; and San Joaquin River water year type index for water years 1913, 1979, and 2002 was 2.00, 2.30, 3.41, 3.67, and 2.34, respectively.

No comments

- n/a -

D.3. Temporal Variability of Salinity in the Western Delta

D.3.1. Seasonal Salinity at Collinsville

Collinsville, near the confluence of the Sacramento and San Joaquin Rivers, was one of the first long-term sampling locations implemented by the State of California. The Suisun Marsh Branch[7] of the DWR estimated monthly average salinity at Collinsville for the period 1920-2002, using a combination of 4-day TDS (total dissolved solids) grab samples from 1920-1971 and EC measurements from 1966-2002. Data from the overlap period of 5 years between the TDS grab samples and EC measurements were used in a statistical regression model, and the monthly averaged 4-day TDS samples were converted to monthly average EC (Enright, 2004). The result of this regression analysis was a time series of monthly EC values at Collinsville for the period of 1920-2002.

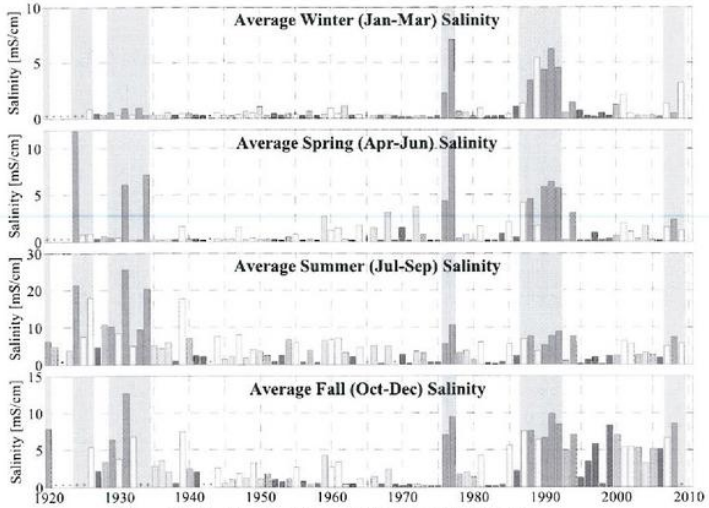

Figure D-14 – Average Seasonal Salinity at Collinsville

[7] Data provided by Chris Enright (DWR), personal communication, 2007.

No comments

- n/a -

D.3.2. Effects of Water Management on Salinity at Collinsville

In order to compare the effects of water management on salinity at Collinsville, an empirical model of salinity transport (Denton (1993), Denton and Sullivan (1993)) was used in the following analyses. Contra Costa Water District's salinity-outflow model (also known as the G-model) estimates salinity in the western Delta as a function of NDO. Estimates of salinity at Collinsville were derived for both actual historical flow (1930-2008) and unimpaired flow (1922-2003) conditions.

Figure D-15 shows the estimated monthly-averaged salinity at Collinsville under unimpaired and actual historical flow conditions. The predicted seasonal and annual variations of EC at Collinsville are dependent on corresponding variations of NDO under both unimpaired and actual flow conditions. Water management practices have a significant effect on the seasonal variability of salinity at Collinsville, particularly during dry years (1930's, 1976-1977 and 1987-1993), when Collinsville experiences a much greater range of monthly-averaged salinity under actual historical conditions than would be the case under unimpaired conditions.

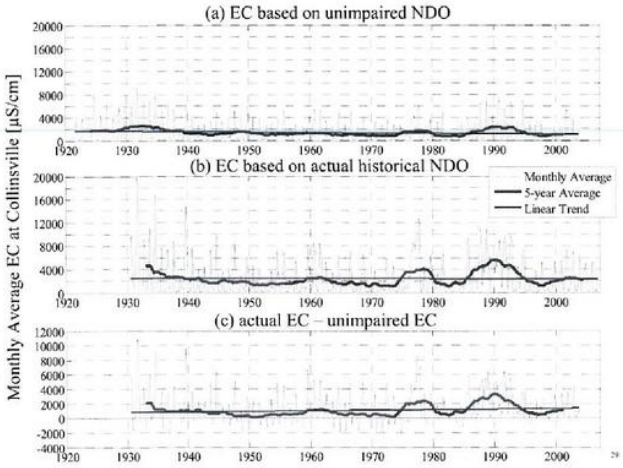

Figure D-15 – Estimates of Collinsville salinity using the G-model for unimpaired and actual historical flow conditions

Historical (actual) NDO during the 1930's was relatively low, sometimes averaging about -3,000 cfs for several months under actual conditions. The low values of NDO result in the high variability of estimated salinity in the 1930's under actual historical conditions.

No comments

- n/a -

The effects of water management on salinity at Collinsville are highlighted in Figure D-16, which shows the estimated salinity under actual historical conditions as a percent change from the unimpaired conditions. The data in Figure D-16 are the change in G-model estimates of salinity at Collinsville for the period of 1956-2003, computed as the difference between actual and unimpaired salinity as a percent change from the unimpaired salinity. Positive values indicate an increase in salinity under actual conditions and negative values indicate a decrease in salinity (freshening).

From April through August, estimated median salinity under actual historical conditions is substantially greater (more than a 100% increase) than median salinity under unimpaired conditions (Figure D-16). For the remainder of the year, there are no substantial differences between the estimates of median salinity under unimpaired and actual conditions. These distributions of estimated salinity indicate that water management practices result in significant increase in salinity throughout the year at Collinsville.

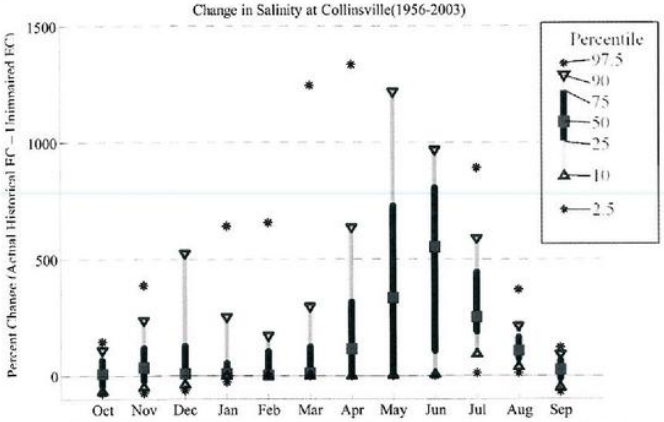

Figure D-16 – Estimated change in salinity at Collinsville under actual historical conditions, as a percent change from unimpaired conditions, 1956-2003

Figure D-17 shows the estimated salinities at Collinsville under actual historical and unimpaired conditions for just the more recent years (1994-2003). Positive values again indicate an increase in salinity under actual conditions and negative values indicate a decrease in salinity. The effects of water management on fall salinity are greater during this recent period 1994-2003 than during the longer period (1956-2003), but the effects during the recent period in the spring and early summer are smaller. This response reflects implementation of the X2 regulatory requirements agreed upon in the 1994 Bay-Delta Accord and regulated by the subsequent 1995 Water Quality Control Plan.

No comments

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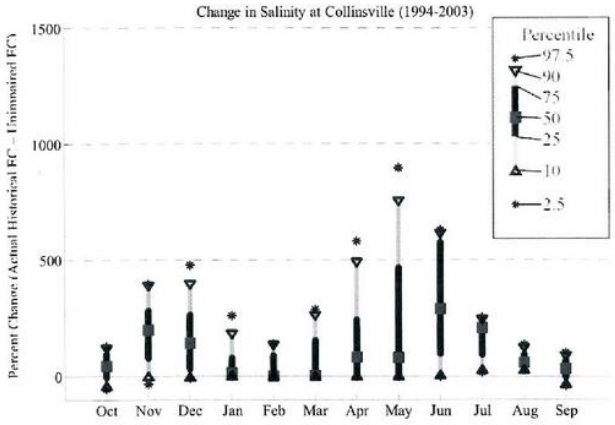

Figure D-17 – Estimated change in salinity at Collinsville under actual historical conditions, as a percent change from unimpaired conditions, 1994-2003

D.3.3. Fall Salinity in the Western Delta

Figure D-18 shows the average fall salinity (October-December) at three stations in Suisun Bay and the western Delta (Chipps Island, Collinsville, and Jersey Point). The fall salinity data categorized according to the pre-Endangered Species Act (ESA) period of 1964-1992 and the post-ESA period (1993-2006)[8]. Figure D-18 illustrates that there has been a noticeable increase in fall salinity since the release of the ESA biological opinions for winter-run salmon and Delta smelt in 1993. These increases occur during normal water years, when total annual runoff ranges from 15 to 30 MAF. During very wet years, there are large Delta outflows and the ESA limits do not affect water operations. Similarly, during very dry years, the biological opinions do not have a large effect on water operations because upstream reservoir storage is low and exports from the south Delta are already small.

[8] In 1993, delta smelt and winter-run salmon were listed under the California ESA, triggering new water management regulations.

No comments

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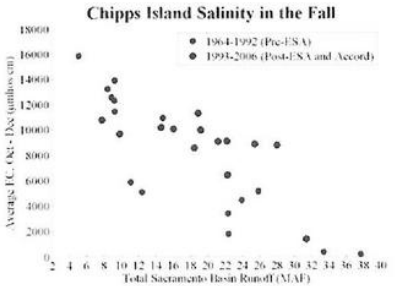

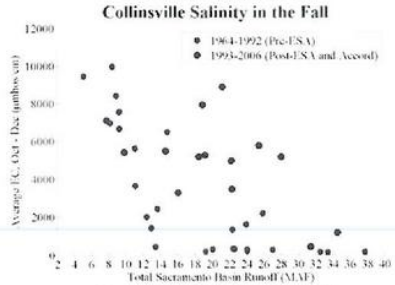

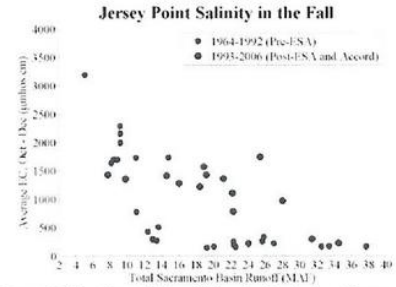

Figure D-18 – Post-ESA salinity in the Suisun Bay and western Delta

Figure D-19 shows the observed salinity at Chipps Island during the fall (October-December) for the period of 1976-1992 (pre-ESA) and 1993-2005 (post-ESA). Fall salinity at Chipps

No comments

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Island during normal years is now comparable to fall salinity during dry and critical years prior to 1994.

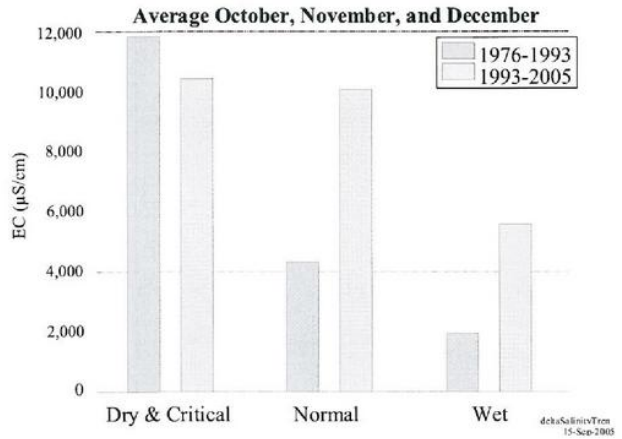

Figure D-19 – Increase in Fall Salinity at Chipps Island

D.4. General conceptual overview of salinity changes

Observed changes in seasonal salinity with time

The salinity regime in the western Delta has changed as the level of development has increased and water project operations have changed due to regulatory requirements. The comparison of three decades with similar hydrology in Figure D-20 presents a conceptual illustration of the changing salinity regime in Suisun Bay and the western Delta.

Monthly-averaged salinity in the spring and summer was substantially greater from 1966 through 1975 than during the early 1900's. However, fall and early winter salinity was lower than the early 1900's. This reduction in salinity in the fall and early winter was likely due in part to CVP and SWP reservoir releases for flood control purposes in the fall, which freshened the Delta. Flood control releases during this period were large because CVP and SWP diversions and exports were not fully developed and upstream reservoirs were often above flood control maximum storage levels in the fall, entering the wet season.

Salinity during 1995 through 2004, however, exceeded the salinities in the early 1900's during all months, for years with similar hydrologic conditions. The dramatic increase in fall

No comments

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salinity relative to observed levels from 1966 to 1975 is accompanied by a slight decrease in spring and summer salinity. This is likely due to minimum flow and X2 requirements imposed by the State Water Resources Board in 1995. However, spring and summer salinities remain much greater relative to salinity in the early 1900's.

The range of seasonal variability during 1966-1975 was greatly reduced because the Delta did not get as fresh as it did in the early 1900's. During the last decade, seasonal variability has increased such that the range of salinity observed in the Delta over the course of a year is similar to that in the early 1900's. However, salinity intrusion has moved inland relative to the early 1900's, resulting in saltier conditions in the Suisun Bay and western Delta and a reduction in the period when fresher water is available.

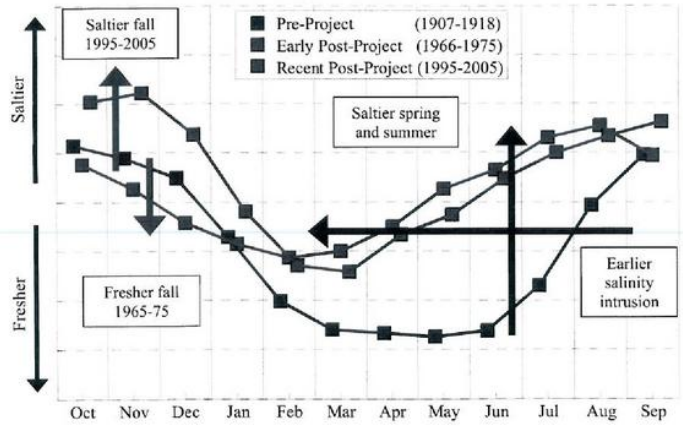

Figure D-20 – Conceptual plot of seasonal variability of salinity in Suisun Bay and the western Delta during different water management eras

The effect of water management for wet and dry years

Water management has the largest effect during dry years when the Delta stays relatively salty throughout the year with limited seasonal variability compared to unimpaired conditions. As shown conceptually in Figure D-21, during wet years the Delta freshens as much as it would under unimpaired conditions, but the Delta does not stay fresh for as long.

No comments

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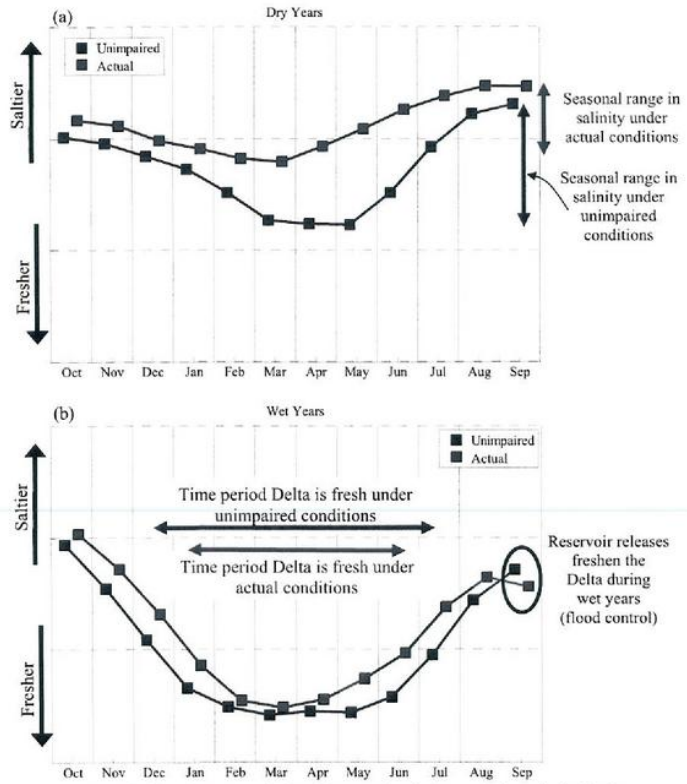

Figure D-21 – Conceptual plot of seasonal salinity variations in the Delta under actual historical conditions compared to unimpaired conditions in (a) dry years and (b) wet years

No comments

- n/a -

Appendix E. Qualitative Salinity Observations

The earliest written accounts of explorers were often concerned with adequate drinking water, and salinity was generally described in qualitative terms, such as "brackish," "fresh," or "sweet." For the purposes of comparing the present-day water quality with the historical conditions, these qualitative observations need to be quantified.

Testimony from Antioch Case (Town of Antioch v. Williams Irrigation District, 188 Cal. 451) indicated early settlers required water with less than 100 mg/L of chloride (approximately 525 µS/cm EC) for municipal use.[9] Similarly, DPW (1931) indicated that a "noticeable" level of salinity was 100 mg/L chloride. The current secondary water quality standard for municipal and industrial use is 250 mg/L chloride (1,000 µS/cm EC) (SWRCB 2006; US EPA 2003). This report assumes a value of 250 mg/L chloride (equivalent to 1000 µS/cm EC) to be the demarcation between "fresh" (or "sweet") water and "brackish" water.

E.1. Observations from Early Explorers

Table E-1 summarizes some reported observations of water quality made by early explorers and settlers. These observations were qualitative and were most likely only a glimpse of the ambient conditions and may not completely represent true historical water quality conditions. Moreover, these observations were from a time period when anthropogenic effects on this region were minimal and this region was close to natural conditions.

Table E-1 also lists the reconstructed Sacramento River annual flow (MAF) from Meko *et al.* (2001b) for the year of observation and for the previous year. For reference, the average Sacramento River flow from Meko *et al.* (2001b) for the period 1860-1977 is 18 MAF/yr.

Table E-1 – Qualitative salinity observations from early explorers

Date	Location	Description	Year / Reconstructed Flow [MAF]	Observer	Reference
1775 August	near the Sacramento-San Joaquin confluence	sweet, the same as in a lake	1774 / 25 1775 / 19	Canizares	Britton, 1987 in Fox, 1987b
1776 April	near Antioch (San Joaquin River)	very clear, fresh, sweet, and good	1775 / 19 1776 / 9	Font	Britton, 1987 in Fox, 1987b
1776 September	near the Sacramento-San Joaquin confluence	sweet	1775 / 19 1776 / 9	Canizares	Britton, 1987 in Fox, 1987b

[9] Supplement to Respondent's Answering Brief, p. 10.

No comments

- n/a -

Date	Location	Description	Year / Reconstructed Flow [MAF]	Observer	Reference
1796	unknown	salinity "far upstream" at high tide	1795 / 6 1796 / 10	Hermengildo Sal	Cook, 1960 in TBI, 1998
1811 October	near the Sacramento-San Joaquin confluence	sweet	1810 / 19 1811 / 23	Abella	Britton, 1987 in Fox, 1987b
1841 August	Three Mile Slough north of Emmaton	brackish (undrinkable)	1840 / 16 1841 / 6	Wilkes	Britton, 1987 in Fox 1987b

E.1.1. Fresh Conditions

Table E-1 indicates that some early explorers observed "sweet" water near the confluence of the Sacramento and San Joaquin Rivers both in relatively wet years (August of 1775 and October of 1811, reconstructed runoff about 19 MAF/yr) and in relatively dry years (September of 1776, reconstructed runoff about 9 MAF/yr). Except as noted, it is unknown whether these observations were made at high tide or low tide.

In order to provide a context for these anecdotal observations, present-day observed monthly salinity (EC) conditions at Collinsville (located near the confluence of Sacramento and San Joaquin Rivers) are plotted against unimpaired annual Sacramento River flow in Figure E-1. The observed data are monthly-averaged salinity (µS/cm) during August-October for the period 1965-2005. The data for the post-ESA years (1994-2005) are shown as shaded circles. Note that the anecdotal observations in Table E-1 are likely "one-time" observations, while those shown in Figure E-1 are average monthly values.

No comments

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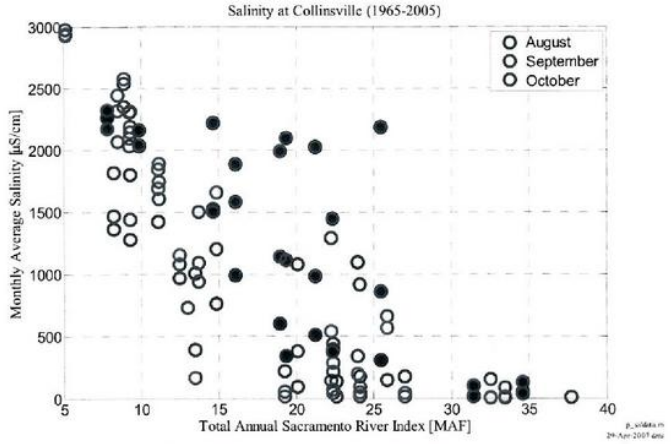

Figure E-1 – Observed salinity at Collinsville, 1965-2005

Under current management conditions, the monthly average salinity at Collinsville from August through October is only less than 1,000 µS/cm EC (the interpretation of the "sweet" threshold for drinking water) when the unimpaired runoff is greater than about 20 to 25 MAF/yr (Figure E-1). This suggests either the "sweet" threshold used in this report is too small, or salinity at Collinsville is higher today than it was in the late 18th and early 19th centuries.

If the definition of the "sweet" threshold is changed to 1,300 µS/cm EC and the post-ESA years (1994-2005) are excluded, then the monthly-averaged salinity at Collinsville during August-October is "fresh" (less than 1,300 µS/cm EC) when runoff is greater than 16 MAF/yr. This corresponds better to the anecdotal observations, discussed above, but suggests a recent increase in salinity at Collinsville during moderately wet years (with runoff between 14 and 26 MAF/yr). In 5 of the 12 post-ESA years (1997, 1999, 2000, 2003 and 2004), the water at Collinsville in October would not be considered "sweet" even under the relaxed criterion of 1,300 µS/cm EC, suggesting that October salinity under present conditions could be greater than it was in 1811.

E.1.2. Brackish Conditions

The qualitative observations of high salinity intrusion in Table E-1 are less specific about location. However, some of these observations have been interpreted by others (Cook, 1960, in TBI, 1998; Fox, 1987b) to indicate intrusion as far upstream as Rio Vista. The drought periods of 1976-1977 and 1987-1992 are similar to these periods when these qualitative

No comments

- n/a -

observations were made. During 1976-1977, daily average salinity at Rio Vista exceeded 1,000 µS/cm for approximately six months of the year. During 1987-1992, salinity at Rio Vista at high tide often exceeded 2,000 µS/cm, particularly during the fall. This is consistent with the anecdotal observations made in 1796 and 1841, which report salt water extending into the western Delta.

Summary: Interpretation of the above observations in the context of the reconstructed Sacramento River flows shows that the Delta is generally saltier than the historical levels for equivalent runoff conditions and does not support the hypothesis that the present-day Delta is managed as a freshwater system in comparison with its historical salinity regime. Moreover, this analysis indicates that salinity in the western Delta has increased during September and October in the recent years (post-1994 period).

E.2. Observations from early settlers in the Western Delta

Observations from early settlers in the western Delta provide a more complete description of salinity in the late 1800's and early 1900's than the observations from early explorers discussed earlier. Assuming the early settlers inhabited a particular region for longer time periods than the early explorers, observations from the early settlers capture the temporal variability better than those from the early explorers.

E.2.1. Town of Antioch Injunction on Upstream Diverters

In 1920, the Town of Antioch filed a lawsuit against upstream irrigation districts alleging that the upstream diversions were causing increased salinity intrusion at Antioch. The court decision, legal briefings, and petitions provide salinity observations from a variety of witnesses. Although anecdotal testimony summarized in these legal briefs is far from scientific evidence, it provides a perspective of the salinity conditions prevailing in the early 1900's. Because the proceedings were adversarial in nature, this report focuses on the testimony of the upstream interests, who were trying to demonstrate that salinity intrusion was common near Antioch prior to their diverting water (prior to 1920). Consequently, the testimony may be biased in support of this "more saline" argument. Nonetheless, these anecdotal testimonies indicate that the western Delta was less salty in the past than it is today. Analyses of some of the testimonies are presented below.

Case History

On July 2, 1920, the Town of Antioch filed suit in the Superior Court of the State of California (hereinafter referred to as the "Antioch Case") against upstream diverters on the Sacramento River and Yuba River. A hearing for a temporary injunction began on July 26, 1920, and lasted approximately three months. On January 7, 1921, Judge A. F. St. Sure granted a temporary injunction, restraining the defendants "from diverting so much water from the said Sacramento River and its tributaries, to non-riparian lands, that the amount of water flowing past the City of Sacramento, in the County of Sacramento, State of California, shall be less than 3500 cubic feet per second" (Town of Antioch v. Williams Irrigation District, Supplement to Appellants' Opening Brief, p. 13).

No comments

- n/a -

The defendants appealed to the Supreme Court of the State of California, which issued its opinion on March 23, 1922. The Supreme Court reversed the lower court and withdrew the injunction, declaring "[i]t is evident from all these considerations that to allow an appropriator of fresh water near the outlet of these two rivers to stop diversions above so as to maintain sufficient volume in the stream to hold the tide water below his place of diversion and secure him fresh water from the stream at that point, under the circumstances existing in this state, would be extremely unreasonable and unjust to the inhabitants of the valleys above and highly detrimental to the public interests besides."

The Supreme Court did not make any comment whatsoever on the evidence of salinity intrusion prior to the upstream diversions in question. The Court indicated that their decision was based on a "policy of our law, which undoubtedly favors in every possible manner the use of the waters of the streams for the purpose of irrigating the lands of the state to render them fertile and productive, and discourages and forbids every kind of unnecessary waste thereof." (Town of Antioch v. Williams Irrigation District (1922) 188 Cal. 451). The Court concluded that allowing 3,500 cubic feet per second (cfs) to "waste" into the Bay to provide less than 1 cfs of adequate quality water for the Town of Antioch would constitute unreasonable use of California's limited supply of water.

The court did not base their decision on historical salinity observations at Antioch, which indicate that Antioch was able to divert freshwater at low tide at all times from 1866 to 1918, except possibly for some fall months during some dry years (Section 3.1).

E.2.2. Salinity at Antioch – then and now

In the present day, the City of Antioch maintains a municipal water intake on the San Joaquin River at Antioch. As a general operating rule, the City of Antioch pumps water from the river when salinity at the intake is less than 1,000 µS/cm EC. Salinity varies substantially with the tide; generally the greatest salinity is observed near high tide and the lowest salinity is observed at low tide. Figure E-2 shows that salinity in the San Joaquin River at Antioch is highly variable and is dependent on tidal conditions and season. Figure E-2 indicates that for water year 2000 (an above-normal water year) the City of Antioch could pump water all day for about four and half months (early February through mid-June) and could pump for a portion of the day at low tide for another three and half months (mid-June through September). For the remaining four months (October-January), water at Antioch's intakes exceeded 1,000 µS/cm EC for the entire day, regardless of tidal phase.

Testimony from multiple witnesses in the Antioch Case indicates that fresh water was always available in the San Joaquin River at Antioch at low tide until just prior to 1920. Antioch's legal position was that fresh water was always available before upstream development. In cross-examination of Antioch's witnesses, the upstream irrigators demonstrated that brackish conditions did occasionally exist at high tide.

No comments

- n/a -

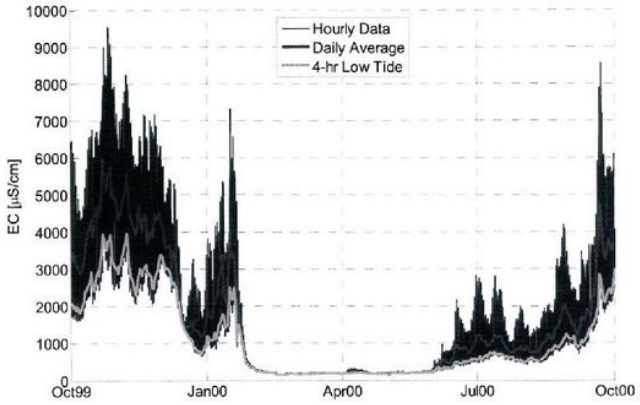

Figure E-2 – Salinity variations in the San Joaquin River at Antioch, water year 2000

Figure E-3 shows the distribution of low tide salinity (salinity during the freshest 4 hours of each day) for the period of May 1, 1983 through September 30, 2002.[10] These data indicate that, on average (in 50% of the water years), low tide salinity exceeds 1,000 µS/cm EC from late-August through December. The data in Figure E-3 provide context for the qualitative observations from the Antioch Case. During the driest 25% of the years (5 out of 20 years), low tide salinity exceeds 1,000 µS/cm EC from June through January, leaving the Antioch intake with no fresh water for eight months of the year.

Under average conditions corresponding to the period 1983-2002, Antioch would have to stop pumping from late August to late December in 10 of the 20 years; i.e., they would have an average of eight months of low-tide pumping per year, compared to the pre-1915 average of twelve months per year (based on the anecdotal information filed by the Appellants (upstream diverters) in the Antioch Case).

[10] Data Source: Interagency Ecological Program, HEC-DSS Time-Series Databases. Station RSAN007. Agency: DWR-ESO-D1485C. Measurement: 1-hour EC. Time Range: May 1, 1983 through September 30, 2002

No comments

- n/a -

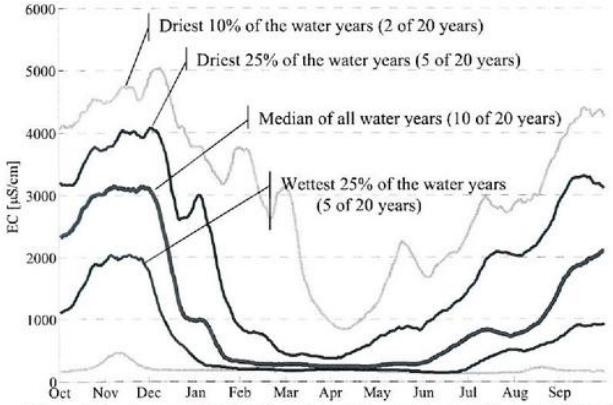

Figure E-3 – Seasonal Distribution of low-tide salinity at Antioch, 1983-2002

Conclusions

- The window, when Antioch is able to pump water with salinity less than 1,000 µS/cm EC, has substantially narrowed in the last 125 years.
- Antioch was apparently able to pump fresh water at low tide year-round in the late 1800's, with the possible exception of the fall season during one or two dry years.
- During 10 of the 20 years between 1983 and 2002, salinity was less than 1,000 µS/cm EC at low tide for only about eight months of the year.
- During the driest 5 years between 1983 and 2002, salinity was less than 1,000 µS/cm for only about four months per year; i.e., no fresh water was available at any time of the day for about eight months of the year.

E.2.3. Salinity at Kentucky Point on Twitchell Island – then and now

The appellants in the Antioch Case, representing the upstream diverters, identified one resident of Twitchell Island who reported the water at Kentucky Landing was brackish on "one or two occasions" between 1870 and 1875 during August and September. During this time, he had to travel up the San Joaquin River to Seven Mile Slough (the eastern boundary of Twitchell Island) and sailed as far as the mouth of the Mokelumne River (approximately 2

No comments

- n/a -

miles further up the San Joaquin River than the Seven Mile Slough junction) to obtain fresh drinking water.

For comparison, we look at salinity monitoring data in that region for 1981 and 2002 to see the location of potable water.[11] The source document (Town of Antioch v. Williams Irrigation District, 188 Cal. 451) for the 1870's drought uses up to 100 mg/L chloride concentration as the threshold for a potable water supply. Monitoring data from 1981 shows similar salinity intrusion as described by the Twitchell Island resident; salinity along the San Joaquin River at Bradford Island (about 1.5 miles upstream of Three Mile Slough) exceeded 1,000 µS/cm EC (about 250 mg/L Cl) during August and September. During the same time period, salinity was around 400 µS/cm EC (about 64 mg/L Cl) approximately 5 miles upstream on the San Joaquin River between Seven Mile Slough and the Mokelumne River. This comparison indicates that the extent of salinity intrusion in 1981 is similar to that which occurred in 1870 and 1871.

Similarly, in September 2002, the salinity in the San Joaquin River at San Andreas landing (less than 2 miles downstream of the Mokelumne River mouth) peaked at 977 µS/cm EC, which corresponds to approximately 225 mg/L chloride concentration. Therefore, if the observer was to travel upriver for potable water in 2002, they would have likely traveled up to the mouth of the Mokelumne River as they did in 1870. Salinity intrusion in critically dry years is even farther into the Delta than was found in 2002.

In conclusion, salinity intrusion up the San Joaquin River during the dry years of 1870 and 1871 as described by a Twitchell Island resident is consistent with salinity intrusion in 1981 and 2002 under similar hydrological conditions. There is no evidence that salinity intrusion during the drought of 1870-71 was more extensive than salinity intrusion during similar water years in the current salinity regime.

[11] 1981 and 2002 were both dry water years in the Sacramento River basin as defined in D-1641 with similar annual unimpaired Sacramento River flow to the years 1870 and 1871. Annual unimpaired Sacramento River flow in 1870, 1871, 1981, and 2002 was 11 MAF, 10 MAF, 11 MAF, and 14 MAF, respectively.

No comments

- n/a -

Delta Flow Criteria Informational Proceeding

Before the

State Water Resources Control Board

Scheduled to Commence
March 22, 2010

Exhibit CCWD-6

Historical Fresh Water and Salinity Conditions
in the Western Sacramento-San Joaquin Delta and Suisun Bay

Technical Memorandum WR10-001
Contra Costa Water District
Water Resources Department
February 2010

Submitted on behalf of

Contra Costa Water District
P.O. Box H2O
Concord, CA 94524

No comments

- n/a -

Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay

A summary of historical reviews, reports, analyses and measurements

Water Resources Department

Contra Costa Water District

Concord, California

February 2010

Technical Memorandum WR10-001

Exhibit CCWD-6

No comments

- n/a -

Acknowledgements

CCWD would like to thank the City of Antioch for their contribution towards funding a technical review of CCWD's draft report "Trends in Hydrology and Salinity in Suisun Bay and the Western Delta" (June 2007); their review substantially improved the work and led to the final report "Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay". CCWD is grateful to the many reviewers including Richard Denton, Matthew Emrick, Gopi Goteti, Phil Harrington, E. John List, Susan Paulsen, David Pene, Mat Rogers, and Peter Vorster. We also thank the following for sharing their data and analyses: Roger Byrne, Chris Enright, Spreck Rosekrans, and Scott Starratt, and we thank Ann Spaulding for her contributions.

No comments

- n/a -

Foreword - Establishing the Historical Baseline

The watershed of the Sacramento–San Joaquin Delta (Delta) provides drinking water to more than 23 million Californians as well as irrigation water for millions of acres of agriculture in the Central Valley. The Delta itself is a complex estuarine ecosystem, with populations of many native species now in serious decline. The Delta estuary as we know it began to form about 6,000 years ago, following the end of the last ice age. Because the estuary is connected to the Pacific Ocean through San Francisco Bay, seawater intrusion causes the salinity of Suisun Bay and the Delta to vary depending on hydrological conditions. This seawater intrusion into the Delta affects estuarine species as well as drinking water and irrigation water supplies.

Successful restoration of the Delta ecosystem requires an understanding of the conditions under which native species evolved. Contra Costa Water District's report on "Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay" presents a detailed review of more than 100 years of studies, monitoring data, scientific reports, and modeling analyses that establish an historical record of the salinity conditions in the Western Delta and Suisun Bay.

No comments

- n/a -

No comments

- n/a -

Executive Summary

The historical record and published studies consistently show the Delta is now managed at a salinity level much higher than would have occurred under natural conditions. Human activities, including channelization of the Delta, elimination of tidal marsh, and water diversions, have resulted in increased salinity levels in the Delta during the past 150 years.

Eighty years ago, Thomas H. Means wrote ("*Salt Water Problem, San Francisco Bay and Delta of Sacramento and San Joaquin Rivers*," April 1928, pp 9-10):

> "Under natural conditions, Carquinez Straits marked, approximately, the boundary between salt and fresh water in the upper San Francisco Bay and delta region of the two tributary rivers—the Sacramento and San Joaquin. Ordinarily salt water was present below the straits and fresh water was present above. Native vegetation in the tide marshes was predominately of salt water types around San Pablo Bay and of fresh water types around Suisun Bay....
>
> The definite statement that salt water under natural conditions did not penetrate higher upstream than the mouth of the river, except in the driest years and then only for a few days at a time, is warranted....
>
> At present [1928] salt water reaches Antioch every year, in two-thirds of the years running further [sic] upstream. It is to be expected that it will continue to do so in the future, even in the years of greatest runoff. In other words, the penetration of salt water has become a permanent phenomenon in the lower river region.
>
> The cause of this change in salt water condition is due almost entirely to the works of man."

In 1928, Thomas Means had limited data over a short historical period from which to draw these conclusions. Nonetheless, his conclusions remain accurate and have been confirmed by numerous subsequent studies, including paleosalinity records that reveal salinity conditions in the western Delta as far back as 2,500 years ago. The paleosalinity studies indicate that the last 100 years are among the most saline of periods in the past 2,500 years. Paleoclimatology and paleosalinity studies indicate that the prior 1,500 years (going back to about 4,000 years ago) were even wetter and less saline in San Francisco Bay and the Delta. The recent increase in salinity began after the Delta freshwater marshes had been drained, after the Delta was channelized and after large-scale upstream diversions of water, largely for agricultural purposes, had significantly reduced flows from the tributaries into the Delta. It has continued, even after the construction of reservoirs that have been used in part to manage salinity intrusion.

No comments

- n/a -

Increased Salinity Intrusion into the Delta

Studies and salinity measurements confirm that despite salinity management efforts, Delta salinity is now at or above the highest salinity levels found in the past 2,500 to 4,000 years. Under equivalent hydrological conditions, the boundary between salt and fresh water is now 3 to 15 miles farther into the Delta than it would have been without the increased diversions of fresh water that have taken place in the past 150 years.

Reservoir operations artificially manage salinity intrusion to conditions that are saltier than had been experienced prior to the early 1900's. While these managed conditions are certainly fresher than would occur in today's altered system if operated without any salinity management, they are still saltier than what the Delta experienced under similar hydrological conditions in the past. While the Delta is being managed to a somewhat acceptable saline condition to meet many beneficial uses, it is still managed at a more saline condition than would have occurred prior to the anthropogenic changes of the past 150 years.

For example, the 1928-1934 drought was one of the driest periods in the past 1,000 years (Meko *et al.*, 2001a), and occurred after tidal marshes within the Delta had been reclaimed and water diversions began removing substantial amounts of fresh water from the Bay-Delta system. Nonetheless, the Delta freshened during the winter in those drought years. This winter freshening of the Delta has not occurred during recent droughts. While salinity intrusion into the Delta was previously only seen in the driest years, significant salinity intrusion now occurs in nearly every year – exceptions are only found in the wettest conditions.

Changed Variation in Salinity

The variability of fresh and saline conditions in the Delta has considerably changed because of upstream and in-Delta water diversions and water exports (Enright and Culberson, 2009). This change in variability results largely from the lack of fresh conditions in Suisun Bay and the western Delta, especially in the winter and spring. Restoring a variable salinity regime that more closely approximates conditions prior to the early 1900's would require much higher flows and much fresher conditions than current management practices provide, with larger outflows in the fall in most years and much larger outflows in the late winter and spring in all years.

Key Conclusions

The major conclusions of this study are:

1. Salinity intrusion during the last 100 years has been among the highest levels over the past 2,500 years. The Delta has been predominantly a freshwater tidal marsh for the last 2,500 years.
2. Human activities during the last 150 years, including channelization of the Delta, elimination of tidal marsh, construction of deep ship channels, and diversion of water, have resulted in the increased salinity levels in the Delta.

No comments

- n/a -

3. Conditions in the Delta during the early 1900's were much fresher than current conditions for hydrologically similar periods. Salinity typically intrudes 3 to 15 miles farther into the Delta today.
4. The historical record and published studies uniformly demonstrate and conclude the Delta is now managed at a salinity level that is much higher than would have occurred under pre-1900 conditions. Operation of new reservoirs and water diversion facilities for salinity management reduces salinity intrusion somewhat, but the levels still exceed pre-1900 salinities.
5. Seasonal and inter-annual variation in salinity has also been changed; however, this change is largely the result of reduced freshwater flows into the Delta. At any given location in the western Delta and Suisun Bay, the percentage of time during the year when fresh water is present has been greatly reduced or, in some cases, largely eliminated.

Background

Flows and water quality in the Sacramento-San Joaquin Delta (Delta) are strongly influenced by freshwater inflow from the rivers, by the tides in San Francisco Bay and by salinity from Bay waters. Prior to human influence, the historical distribution of salinity in the Delta was controlled primarily by the seasonal and inter-annual distribution of precipitation, the geomorphology of the Bay and Delta, daily tides, the spring-neap[1] tidal cycle, and the mean sea level at Golden Gate. Extended wet and dry periods are both evident in the historical record. Since about 1860, a number of morphological changes to the Delta landscape and operational changes of reservoirs and water diversions have affected flows and the distribution of salinity within the Delta.

Between 1860 and 1920, there was significant modification of the Delta by humans:
(i) marsh land was reclaimed,
(ii) hydraulic mining caused extensive deposition and then erosion of sediment, and,
(iii) Delta channels were widened, interconnected and deepened.

Large-scale reservoir construction began in about 1920 and continued through the 1970's, changing the timing and magnitude of flows to the Delta. Large volumes of water began to be diverted for agricultural use upstream of and within the Delta in the same time period. In more recent times, California's Delta water resources have been extensively managed to meet the water supply needs of the State's municipal, industrial, and agricultural water users, with attempts made to also provide flow and water quality conditions to meet fishery needs.

Proposals for significant additional alteration of the Delta and of flows within the Delta are currently being developed as part of the Bay-Delta Conservation Plan process[2]. To

[1] During a spring tide, the gravitational forces from the sun and moon are largely the same direction and the high-low tidal range is greatest. During a neap tide, the gravitational forces sun and moon are largely not aligned and the tidal range is the lowest. The spring-neap tidal cycle, from strong spring tides through weak neap tides and back to spring tides, in San Francisco Bay has a period of about 14 days.
[2] www.baydeltaconservationplan.com

No comments

- n/a -

understand the effect of those proposals, it is important to accurately establish historical conditions. For example, for ecological restoration to be successful, it is necessary to establish and understand the conditions to which native species have previously adapted and survived in order to predict their response to future changes in climate or water management. This report uses available data and modeling to examine the consequences of structural changes in the Delta (channelization, channel dredging), increased diversions of water upstream of the Delta, reservoir operations, climate and sea level effects, and other factors on Delta salinity.

Objective

The objective of this report is to answer two major questions regarding the historical extent of fresh water and salinity in the western Delta and Suisun Bay:

I. What was the extent of fresh water and what were the salinity conditions prior to large-scale reservoir operations and water diversions (i.e., prior to early 1900's) and prior to structural changes in the Delta (i.e., prior to the 1860's)?

II. What are the effects of large-scale water management practices (reservoir operations and diversions) on salinity conditions in the western Delta and Suisun Bay?

Approach

Available data were used to characterize historical and present-day fresh water extent and salinity intrusion into the Delta. The data examined in this report include paleohistorical records (over geologic time scales) of river flow and salinity (Section 2), instrumental observations of hydrology and salinity (Section 3), and literature reports on the extent of fresh water in the Delta (Section 4). Additional details and supplemental information are presented in the Appendices to this report.

No comments

- n/a -

Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay

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No comments

- n/a -

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No comments

- n/a -

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No comments

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No comments

- n/a -

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Acronyms

C&H	California and Hawaiian Sugar Refining Corporation
CCWD	Contra Costa Water District
CDEC	California Data Exchange Center
Cl	Chloride concentration
CVP	Central Valley Project
DPW	Department of Public Works
DSM2	Delta Simulation Model 2
DWR	California Department of Water Resources
DWSC	Deep water ship channel
EC	Electrical conductivity
ENSO	El Niño/Southern Oscillation
ESA	Endangered Species Act
IEP	Interagency Ecological Program
M&I	Municipal and Indutrial
NDO	Net Delta Outflow
PDO	Pacific Decadal Oscillation
PPIC	Public Policy Institute of California
SWRCB	State Water Resource Control Board
SRI	Sacramento River Index
STORET	Storage and Retrieval
SWP	State Water Project
TBI	The Bay Institute
TDS	Total Dissolved Solids

Units

AF	Acre-feet
MAF	Million acre-feet
TAF	Thousand acre-ft
µS/cm	MicroSiemens per centimeter, a measure of EC
cfs	Cubic feet per second
mg/L	Milligrams per liter
ppm	Parts per million
ppt	Parts per thousand

No comments

- n/a -

No comments

- n/a -

1. Introduction

1.1. Background

The Sacramento-San Joaquin River Delta (Delta) is fed by fresh water from the Sacramento River and the San Joaquin River basins (Figure 1-1). The Delta is connected to the San Francisco Bay through Suisun and San Pablo Bays, and the movement of water back and forth between the Delta and the Bay results in mixing between saline water from the Pacific Ocean and fresh water from the rivers flowing into the Delta. The extent to which salty ocean water intrudes into the Delta is a function of natural processes such as ocean tides and precipitation and runoff from the upstream watersheds. It has also been greatly influenced by anthropogenic activities (e.g. construction of artificial river channels, removal of tidal marsh, removal of floodplain connections to channels, deepening of channels for navigation purposes, reservoir storage and release operations, and water diversions).

Proposals for significant additional alteration of Delta channels and marshland, of flows within the Delta, and of reoperation of upstream reservoirs are currently being developed as part of the Bay-Delta Conservation Plan, which builds upon earlier work by the Delta Vision Blue Ribbon Task Force[3], and others (e.g., see Lund *et al.*, 2007). To understand the context and effect of those proposals, it is important to accurately understand the historical conditions previously experienced by Delta species.

An analysis of the salinity trends and variability in northern San Francisco Bay since the 1920's and the factors controlling those salinity trends has recently been published (Enright and Culberson, 2009), with a focus on a comparison of pre-1968 salinity and flows with post-1968 conditions. This report includes analysis and review of reports, data and information from the period prior to Enright and Culberson's analysis, and includes the review of salinity trends using paleohistorical data.

Historically, reproduction of most species in the Bay-Delta (biotic production phase) occurred during the high-flow periods (winter and spring) and biotic reduction occurred in the low-flow periods (summer and fall) (Baxter *et al.*, 2008). Multi-year wet periods most likely resulted in population increases, whereas drought periods likely resulted in reduced reproduction and increased predation. The recent report on Pelagic Organism Decline (POD, Baxter *et al.*, 2008) indicated that reduced flow variability under the current water management conditions may have exacerbated the effects of predation on the population abundance of pelagic fish species in the Bay-Delta estuary. Native species of the Bay-Delta system adapted to the historical salinity conditions that occurred prior to large-scale water management practices and physical changes in the Delta. The historical salinity conditions in the Delta provide insight into the response of fish species to proposed ecosystem restoration actions, and the response of species to future changes in climate or water management.

[3] Delta Vision Blue Ribbon Task Force was appointed by California Governor Arnold Schwarzenegger in February 2007 and adopted the Delta Vision Strategic Plan in October 2008.

No comments

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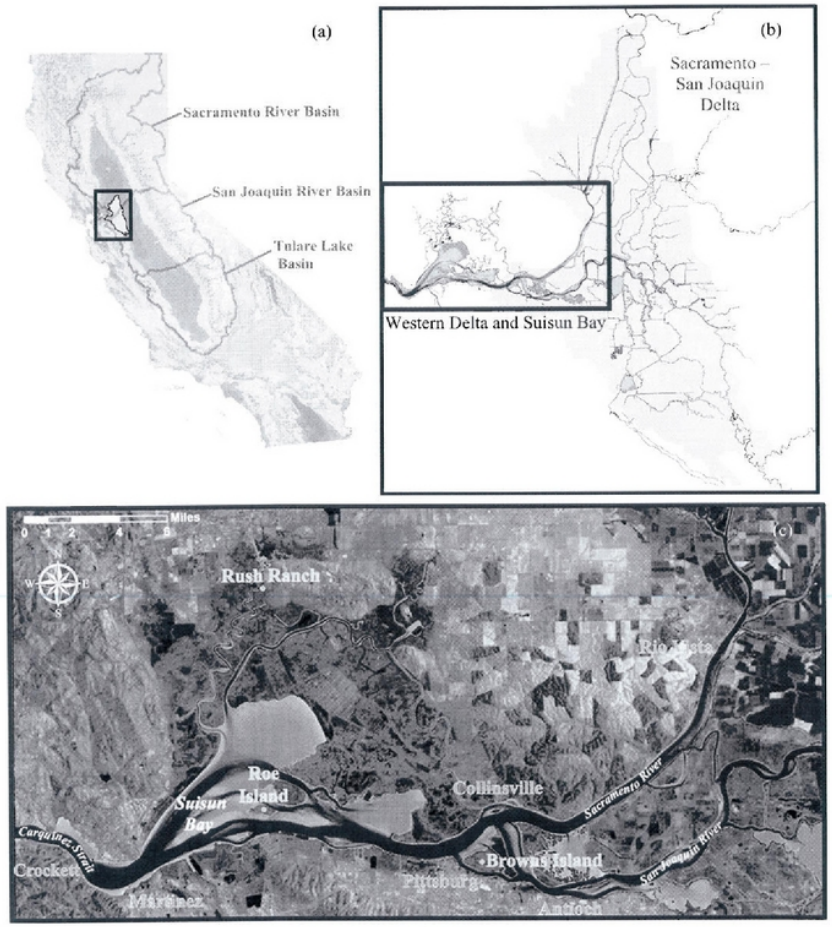

Figure 1-1 – Map

(a) Topographical map of California, with outlines of the Sacramento River, San Joaquin River, and Tulare Lake basins; purple rectangle indicates the extent of the inset in panel (b). (b) Sacramento – San Joaquin Delta and Suisun Bay region; green rectangle indicates the extent of the Western Delta and Suisun Bay enlarged in panel (c). (c) Extent of salinity evaluations considered within this study, including names of locations referenced throughout this report.

No comments

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The salinity concentrations in San Francisco Bay and the Delta are the result of tides that move seawater into the system and are controlled in large part by the amount of fresh water passing through the system (Denton, 1993; Uncles and Peterson, 1996; Knowles *et al.*, 1998). The salinity distribution is driven by the motion of the tides, which convey ocean water into the system on the flood tide and draw a mixture of ocean and river water back out again on the ebb tide. These tides act on natural diurnal (repeating twice per day) and spring-neap (repeating every 14 days) cycles driven by the gravitational forces of the sun and moon (Oltmann and Simpson, 1997; Burau *et al.*, 1999).

Other factors affecting Bay-Delta salinity (discussed in Appendix A) may be smaller but are not insignificant. When comparing historical salinity conditions in the Bay-Delta watershed, it is often helpful to compare periods with similar hydrological conditions so that the changes due to other factors can be discerned. This will reveal if there is an anomalous change in salinity, even if the specific cause of that change in salinity is not known.

Major anthropogenic modifications to the Delta that affect salinity intrusion began with the European settlement of the region and can be classified into two categories: physical modifications of the landscape (e.g., removal of tidal marsh, separation of natural floodplains from valley rivers, construction of permanent artificial river channels, and land-use changes) and water management activities (e.g. diversion of water for direct agriculture, municipal, or industrial use, and reservoir storage and release operations).

As shown in Figure 1-2, tidal marsh acreage in the Delta decreased significantly from nearly 346,000 acres in the 1870's to less than 25,000 acres in the 1920's and has since continued to decrease. Even after hydraulic mining for gold was banned in California in 1884, large quantities of mining debris continued to be carried by runoff into the Delta, where it was deposited as sediment, filling channels in the Delta and Suisun Bay. Between 1887 and 1920, Suisun Bay became an erosional environment and continued to lose sediment through 1990. Enright and Culberson (2009) discuss the effects of the changes in Suisun Bay bathymetry on salinity intrusion. Major dredging projects on the main Delta channels to create the Stockton and Sacramento Deep Water Ship Channels (DWSC) have also changed how flows and, therefore, salinity are distributed throughout the Delta.

Each of these factors has changed the salinity regime: loss of tidal marsh lands has allowed increased tidal energy deeper into the Delta, increasing tidal flows and salinity dispersion (Enright and Culberson, 2009), net erosion and increasing depth within Suisun Bay likely increased dispersive transport of salt up the estuary (Enright and Culberson, 2009), and deeper channels allow increased salinity intrusion due to increased baroclinic circulation and increased tidal flow and dispersion..

However, these physical modifications generally have had less effect on salinity intrusion in the Delta than the major water management activities that have resulted in large-scale diversion of water for reservoir storage and agricultural, domestic, and industrial water use (Nichols *et al*, 1986; Knowles, 2002). As will be seen in data presented in this document, early diversions before large-scale storage projects resulted in greatly increased salinity intrusion, especially in the summer irrigation season, peaking in September. Later, reservoir operations reduced salinity intrusion in the summer and fall, but increased it in the winter and

No comments

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spring, up until the mid-1980's. Subsequent water operations have resulted in increased salinity intrusion year round.

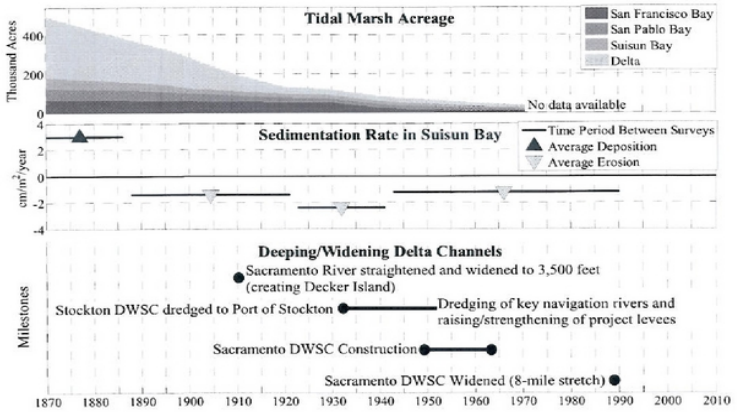

Figure 1-2 – Chronology of anthropogenic modifications to the Bay-Delta landscape

Bay-Delta landscape has undergone significant changes since the mid-1800's. Tidal marsh acreage (top panel) has been significantly reduced (data from Atwater, et al., 1979). Suisun Bay received a pulse of sediment from hydraulic mining in the late 1800's (middle panel), but lost sediment from 1887 to 1990 (data from Cappiella et al., 1999). Numerous efforts to widen and deepen the main channels within the Delta have occurred throughout the 20th Century (bottom panel).

The largest reservoir of the federal Central Valley Project (CVP), Lake Shasta, was completed in 1945, and the largest reservoir of the State Water Project (SWP), Lake Oroville, was completed in 1968. Total upstream reservoir storage capacity increased from 1 MAF in 1920 to more than 30 MAF by 1979. The CVP began exporting water from the southern Delta through Jones Pumping Plant (formerly known as the Tracy Pumping Plant) in 1951, and the SWP began exports through Banks Pumping Plant in 1968. By 1990, the combined export of water from the southern Delta through the Banks and Jones Pumping Plants was about 6 MAF per year.

Figure 1-3 shows that the greatest increase in upstream reservoir storage occurred from the 1920's through the 1960's. Prior to the construction of major water management reservoirs, irrigated acreage grew to about 4 MAF. The construction of the reservoirs allowed irrigated acreage to increase to about 9 MAF. Since 1951, when the first south Delta export facility was completed, annual diversions from the Delta have increased to a maximum of about 8 MAF; total annual diversions from the system are estimated at up to 15 MAF.

No comments

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No comments

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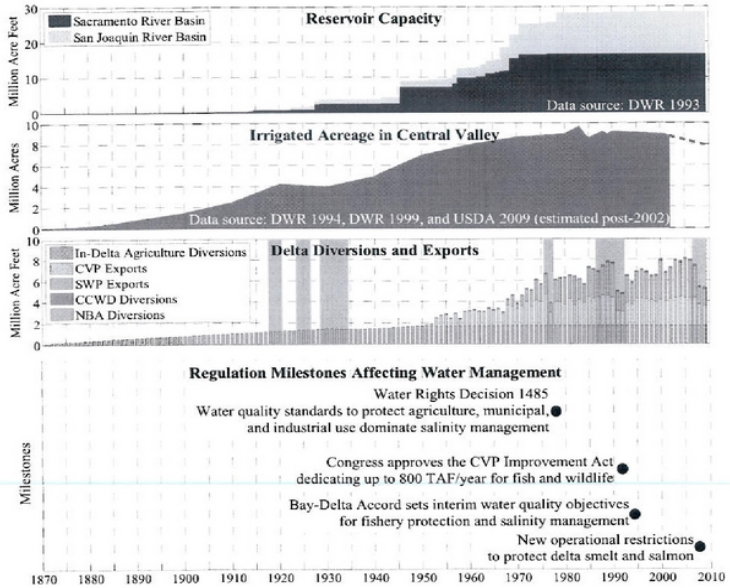

Figure 1-3 – Chronology of anthropogenic activities that affect water management

Reservoirs (top panel) and irrigated crops in the Central Valley (second panel) alter the timing and magnitude of water flow to reach the Delta. Diversions and exports within the Delta (third panel) further reduce the amount of water to flow through the Delta to Suisun Bay. Regulations (bottom panel) require modifications to water management activities to meet specific flow and water quality objectives.

Figure 1-3 also presents the timeline for recent regulatory milestones that have affected Delta water quality. Salinity management was dominated by water quality standards to protect Delta agriculture and municipal and industrial (M&I) uses in the 1978 Water Quality Control Plan and State Water Resources Control Board (SWRCB) Decision 1485. The Bay-Delta Accord of 1994 and subsequent SWRCB Water Rights Decision 1641 made fishery protection the dominant factor for salinity management with new estuarine habitat or "X2 Standards"[4] from February through June, with minimum outflows for the remainder of the

[4] X2 is the distance, in kilometers from the Golden Gate, to the location of the 2 part per thousand salinity line. A larger X2 means salinity has intruded farther into the Delta.

year. The relationship between X2 and estuarine habitat is discussed in detail in Jassby *et al.* (1995).

These regulations apply throughout the year and have modified how the large-scale water management reservoirs and export facilities are operated. For instance, delta smelt was listed as a threatened species under the federal Endangered Species Act in 1993, and Sacramento River winter-run salmon was listed as endangered in 1994. The subsequent biological opinions, 1994 Bay-Delta Accord, and the adoption of a new water quality control plan by the State Water Resources Control Board in 1995, required increased reservoir releases in some months for temperature control in the Sacramento River below Shasta and for salinity control in Suisun Bay. They also applied additional limits on pumping at the export facilities in the south Delta.

Changes in water diversions and reservoir operations have altered the magnitude and timing of river flows to the Delta, and anthropogenic modifications to the Delta landscape have altered the interaction of fresh water from the rivers with salt water from the ocean, thus changing patterns of salinity intrusion into the Delta.

1.2. Comparing Historical Conditions

Flow and salinity conditions prior to human interference varied according to seasonal and annual hydrological conditions, short-term and long-term drought cycles and other natural changes, so "natural" conditions include variability that must be considered in any analysis. Hydroclimatic variability is described by "unimpaired" runoff, which represents the natural water production of a river basin, unaltered by water diversions, reservoir storage and operation, and export of water to or import of water from other basins.

As discussed above, large-scale water management operations during the last 100 years superimposed on the anthropogenic modifications to the Delta landscape have significantly changed Delta conditions. It is possible to remove the effect that water management operations have had on flows and generate a corresponding set of unimpaired flows. However, it is not possible, without complex assumptions and modeling, to also remove the additional effect of the land use, channel and tidal marsh modifications to the Delta.

The historical conditions presented in this report have been determined from records in paleoclimatic fossils and measured directly with various scientific instruments. The paleoclimatic data start well before human influence, but continue through the 20th Century when anthropogenic modifications became significant.

Because of the natural hydroclimatic variability, no past historical period may fully represent "natural" conditions. Therefore, this report summarizes the available historical salinity information with reference to the time period of the observations, and then compares each period to the salinity regime during present day periods with similar upstream unimpaired hydrology. Where there are significant changes in salinity, despite similar upstream unimpaired hydrology, other factors such as landscape modifications and water management operations must be contributing factors.

No comments

- n/a -

1.3. Objective

The objective of this report is to answer two major questions regarding the historical extent of fresh water and salinity in the western Delta and Suisun Bay:

I. What was the extent of fresh water and what were the salinity conditions prior to large-scale reservoir operations and water diversions (i.e., prior to early 1900's) and prior to structural changes in the Delta (i.e., prior to the 1860's)?

II. What are the effects of large-scale water management practices (reservoir operations and diversions) on salinity conditions in the western Delta and Suisun Bay?

1.4. Report Structure

The remainder of this report is organized as follows:

Section 2: Paleoclimatic Evidence of the Last 10,000 Years

Estimated river flow data and salinity records for the past several thousand years have been obtained from paleoclimatic records, such as tree rings and sediment cores. These records capture the hydroclimatic variations over decadal and centennial time scales and are useful tools in understanding the freshwater flow and salinity regimes before modern instrumentation.

Section 3: Instrumental Observations of the Last 140 Years

Long-term precipitation and river runoff records from the 1870's to the present provide context for the salinity observations. Climatic variability of precipitation and runoff in the upper watershed has a significant influence on salinity intrusion, with greater salinity during dry periods and lower salinity during wet periods. If, for example, the salinity is greater or less than what would be expected based on the natural climatic variability, as measured by unimpaired runoff, other factors must be influencing salinity intrusion.

Reservoir operations, diversions and consumptive use (collectively termed "water management") alter the amount of runoff from the upper watershed that actually flows out of the Delta. Observations and common computer models are used to assess the effects of this water management on Net Delta Outflow (the net quantity of water flowing from the Delta to the Suisun Bay) and on salinity in the western Delta and Suisun Bay. Observations include measurements of salinity indicators by the California & Hawaiian Sugar Refining Corporation (C&H) from the early 1900's and long-term monitoring data from the Interagency Ecological Program (IEP). Modeling tools include the DAYFLOW program from IEP, the DSM2 model from the California Department of Water Resources, the X2[5]

[5] X2 is defined as the distance from the Golden Gate to the 2 part-per-thousand isohaline (equivalent to a salinity of 2 grams of salt per kilogram of water), measured along the axis of the San Francisco Estuary. X2 is often used as an indicator of freshwater availability and fish habitat conditions in the Delta (Jassby *et al.*, 1995; Monismith, 1998).

No comments

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equation (Kimmerer and Monismith, 1992) and Contra Costa Water District's salinity outflow model (also referred to as the G-model) (Denton, 1993; Denton and Sullivan, 1993).

Section 4: Qualitative Observations of Historical Freshwater Flow and Salinity Conditions

Qualitative observations on salinity conditions in the western Delta and Suisun Bay from an early water rights lawsuit and from various literature reports are discussed to provide a perspective of the salinity conditions prevailing in the late 1800's and early 1900's. The 1920 lawsuit filed by the Town of Antioch against upstream irrigation districts alleged that the upstream water diversions were causing increased salinity intrusion at Antioch (Town of Antioch v. Williams Irrigation District, 1922). Briefings and testimony from the legal proceedings are indicative of the salinity conditions prevailing in the early 1900's, as are literature reports of conditions in the western Delta and Suisun Bay. These reports contain both qualitative observations and anecdotal information regarding historical salinity conditions. Because the proceedings were adversarial in nature, this report focuses on the testimony of the upstream interests, who were trying to demonstrate the extent of salinity intrusion in the Delta prior to their diverting water. Note that the Supreme Court did not base its final decision on the evidence of whether or not Antioch had continuous access to fresh water. The Court's decision was based on the State policy to irrigate as much land as possible for agriculture; the Court did not pass judgment on the accuracy of the testimony of either side.

Section 5: Conclusions

This section synthesizes the findings from Sections 2 through 4 and presents the overall conclusions regarding trends in the historical Delta salinity.

No comments

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2. Paleoclimatic Evidence of the Last 10,000 Years

Paleoclimatic evidence from the watershed of San Francisco Bay (Bay) and Sacramento-San Joaquin Delta (Delta), obtained from proxy information such as tree rings and sediment deposits, provides a history of conditions before modern direct instrumental observations. Evidence of major regional climatic events that represent long-term wet period and drought cycles will be discussed, followed by discussions of Delta watershed runoff and Delta salinity, as measured by flow and electrical conductivity instrumentation.

2.1. Major Regional Climatic Events

The modern Bay-Delta is relatively young in terms of geologic timescales. The estuary started forming around 8,000 to 10,000 years ago (Atwater *et al.* 1979), when rapid sea level rise allowed the ocean to enter the Golden Gate. At this time, there was no Bay or Delta, but simply river valleys. Rapid sea level rise continued, such that approximately 6,000 years ago, the outline of San Francisco Bay, including San Pablo Bay and Suisun Bay, resembled the modern extent. At about the same time, sea level rise slowed to a more moderate pace, allowing tidal marshes to begin to form.

Malamud-Roam *et al.* (2007) review paleoclimate studies in the Bay-Delta watershed, summarizing evidence of climate variability through the development of the present day Bay-Delta system (Table 2-1).

Table 2-1 – Climate during the evolution of the Bay-Delta estuary

Overview of precipitation, temperature, and sea level conditions during the last 10,000 years based on data from Malamud-Roam et al. (2007) and Meko et al. (2001). Time periods are given in terms of number of years ago (represented as age, a; or ka for 1,000 year ago) and the Common Era (BCE/CE) calendar system. The shading indicates relatively dry periods.

Approximate Time Period	*Prevailing Climate and Geomorphology*
10 ka to 8 ka 8000 BCE to 6000 BCE	▪ Rapid sea level rise ▪ Ocean enters Golden Gate ▪ San Francisco Bay is just a river valley ▪ Cooler than 20th Century, but becoming warmer and drier
6 ka to 5 ka 4000 BCE to 3000 BCE	▪ Sea level rise slows to more moderate pace ▪ Outline of San Francisco Bay resembles modern extent ▪ Tidal marsh begins to form in the Delta ▪ Temperature reaches a maximum of the last 10,000 years ▪ Relatively dry conditions ▪ Central Valley floodplain system began to develop

No comments

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Approximate Time Period	*Prevailing Climate and Geomorphology*
4 ka to 2 ka 2000 BCE to 1 CE	▪ Cooling trend with increased precipitation ▪ Large flood occurred ~ 3,600 years ago (1600 BCE)

2 ka to 0.6 ka
1 CE to 1400 CE
	▪ Trend to more arid, dry conditions
	▪ Severe droughts:
	  ▪ 1,100 to 850 years ago (900 CE to 1150 CE)
	  ▪ 800 to 650 years ago (1200 CE to 1350 CE)

0.6 ka to 0.2 ka 1400 CE to 1800 CE	▪ Relatively cool and wet conditions ▪ Numerous episodes of extreme flooding ▪ Includes "Little Ice Age" (1400 CE to 1700 CE)

90 a to 50 a
1910 CE to 1950 CE
	▪ Dry period in the Sacramento River Basin.
	  ▪ Longest dry period in the last 420 years (34 years centered on the 1930's)
	  ▪ Driest 20-year period in the last 370 years (1917 CE to 1936 CE)

A number of scientific studies have used paleo-reconstruction techniques to obtain long-term (decadal, centennial and millennial time scale) records of river flow (e.g., Earle, 1993; Meko *et al.*, 2001) and salinity of the Bay and Delta (e.g., Ingram and DePaolo, 1993; Wells and Goman, 1995; Ingram *et al.*, 1996; May, 1999; Byrne *et al.*, 2001; Goman and Wells, 2000; Starratt, 2001; Malamud-Roam and Ingram, 2004; Malamud-Roam *et al.*, 2006; Malamud-Roam *et al.*, 2007; and Goman *et al.*, 2008). The reconstructions described in the following sections focus on the 2,000 years before present. As indicated in Table 2-1, this period was relatively dry with two extreme regional droughts, followed by relatively cool and wet conditions during the "Little Ice Age," then by a return of dry conditions at the early part of the 20th Century.

2.2. Reconstructed Unimpaired Sacramento River Flow

Meko *et al.* (2001a,b) used tree-ring chronologies in statistical regression models to reconstruct time series of annual unimpaired Sacramento River flow[6] for approximately the past 1,100 years (for the period 869 CE – 1977 CE). As discussed in Section 1.2, unimpaired flow is an estimate of the flow that would occur in the basin without the effects of water management activities.

The 1,100-year record shows strong variability between individual water years (Figure 2-1), with annual flow ranging from approximately 8% of average to 265% of average, where average is defined here for practical purposes as the average observed unimpaired flow from

[6] Meko *et al.* (2001a) used the annual unimpaired flow record for the Sacramento River provided by the Department of Water Resources, which is the sum of the following: flow of the Sacramento River at Bend Bridge, inflow of the Feather River to Lake Oroville, flow of the Yuba River at Smartville, and the flow of the American River to Folsom Lake. This definition is consistent with the definition typically used in hydro-climatic studies of this region (e.g., http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)

No comments

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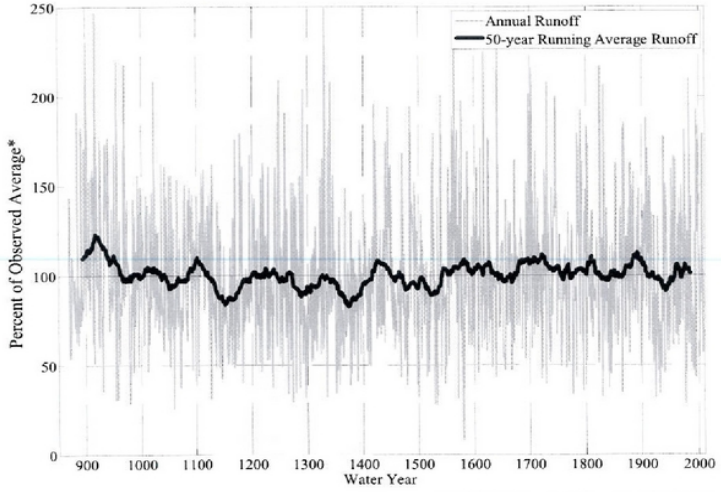
1906 to 2009 of 18 million acre-feet per year (MAF/yr). The reconstructed record shows alternating periods of wet and dry conditions and is consistent with historical droughts (such as the drought in the Mono Lake region of California in the medieval period, around 1150 CE) reported by other paleoclimate studies (Malamud-Roam *et al.*, 2006).

As indicated by the shading in Figure 2-1, the driest long-term drought in the Sacramento River basin in the last 1,100 years occurred from approximately 1130 CE to 1415 CE when the 50-year average flow was seldom above normal for nearly 300 years. Following this drought, conditions were relatively wet (from approximately 1550 CE to 1900 CE). The timing of these droughts and wet periods will be compared to paleosalinity records in the following section.



* Average of 1906-2009 Observed Runoff is 18 MAF/yr.

Figure 2-1 – Reconstructed annual unimpaired Sacramento River flow 869 CE to 2009 CE

Annual reconstructed unimpaired Sacramento River flow (grey line) as a percentage of the average annual observed runoff from 1906 to 2009 shows strong variability between years. The 50-year running average (thick black line) illustrates there were extended periods of above-normal and below-normal runoff conditions. The orange shading highlights an extended dry period in the reconstructed unimpaired Sacramento River data when the 50-year average flow is seldom above normal for nearly 300 years. Data for 869 CE to 1905 CE were reconstructed by Meko et al. (2001b); data for 1906 CE to 2009 CE are observed records from the California DWR (2009).

No comments

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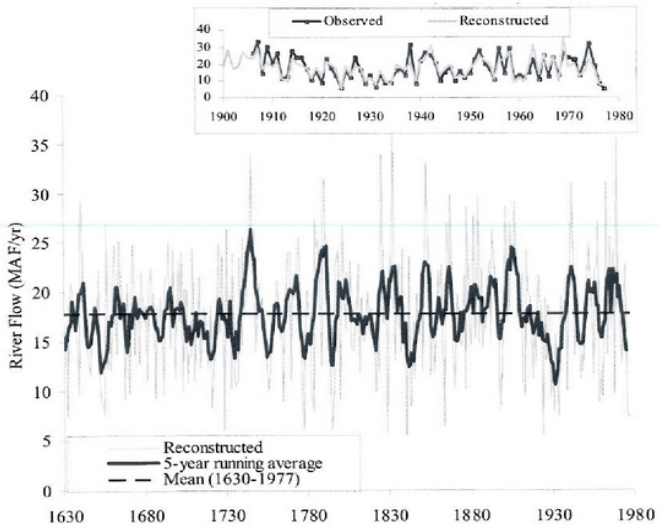
Meko *et al.* (2001a) indicated that for their 1,100-year reconstructed period, the 1630-1977 data are more reliable than the earlier time period, because of better availability of tree-ring information and superior regression model statistics. Figure 2-2 shows the reconstructed time series of annual unimpaired Sacramento River flow from 1630 to 1977 from Meko *et al.* (2001b). The inset in Figure 2-2 shows there is a good match between the reconstructed flows (grey line) and the observed annual flows (red line) during the period of overlap between the reconstructed and observed records (from 1906 to 1977).

Multi-decadal periods of alternating wet and dry conditions are pervasive throughout the reconstructed record. The wet conditions of the late 1800's and early 1900's, which were followed by severe dry conditions in the 1920's and 1930's, are consistent both with observed precipitation and estimated Sacramento River runoff for these time periods (see Section 3) and with literature reports of historical conditions (see Section 4).



No comments

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Figure 2-2 – Reconstructed annual unimpaired Sacramento River flow from 1630-1977.

Annual reconstructed unimpaired Sacramento River flow (grey line in main panel and inset) for the 1630 to 1977 time period was identified by Meko et al. (2001a) as the most accurate period of reconstruction. Inset panel illustrates the comparison between observed (red) and reconstructed (grey) unimpaired flows during the overlap period. The mean of the reconstructed unimpaired flow for 1630-1977 is 17.7 MAF/yr (dashed horizontal line in main panel). The 5-year centered running average (thick solid blue line in main panel) illustrates the decadal trends.

Meko *et al.* (2001a) identified the severe drought periods in the reconstructed Sacramento River flow record (1630-1977) by computing the lowest *n*-year moving average. For instance, to determine the most severe 6-year drought, Meko *et al.* calculated the moving average using a 6-year window for the entire data set and then identified the lowest 6-year average. Meko *et al.* found that the period from the early 1920's to late 1930's experienced the lowest 6-year, 10-year, 20-year, and 50-year averages (or droughts), both in the reconstructed and observed records. The observed droughts in Table 2-2 have been updated through present (1906-2009) using the same analysis; this update did not change the drought time periods identified by Meko *et al.* The reconstructed record of unimpaired Sacramento River flow shows the period from early 1920's to late 1930's experienced some of the worst drought conditions since 1630. Additional data are presented in Appendix B.

Table 2-2 – Periods of drought from the reconstructed and observed records of unimpaired Sacramento River flow

Severe drought periods in the reconstructed Sacramento River flow record (1630-1977) were determined by Meko et al. (2001a) by computing the lowest n-year moving average of the reconstructed annual unimpaired Sacramento River flow. The same method was used to determine the most severe droughts of the observed record (1906-2009).

	Period of lowest *n*-Year moving average Sacramento River flow					
	1-Year	3-Year	6-Year	10-Year	20-Year	50-Year
Reconstruction (1630-1977)	1924	1775 to 1778	1929 to 1934	1924 to 1933	1917 to 1936	1912 to 1961
Observations (1906-2009)	1977	1990 to 1992	1929 to 1934	1924 to 1933	1918 to 1937	1917 to 1966

Conclusions

Reconstruction of unimpaired Sacramento River flow indicates:

- Annual precipitation is highly variable. Even during long dry periods, individual years can be very wet.
- The Sacramento River basin experienced a multi-century dry period from about 1100 C.E. to 1400 C.E.
- The drought period in the 1920's and 1930's represents some of the worst drought conditions in the last 400 years.

No comments

- n/a -

2.3. Reconstructed Salinity in the Bay-Delta Estuary

Tree Ring Data

The interaction between saline ocean water from the Pacific Ocean and fresh water from the rivers flowing into the Delta determines the ambient salinity conditions in the Delta and the Bay. Estimates of historical precipitation derived from tree ring data can therefore be used to estimate the corresponding salinity conditions in the Delta.

Stahle *et al.* (2001) used tree ring chronologies from blue oak trees located in the drainage basin to San Francisco Bay to reconstruct salinity at the mouth of San Francisco Bay. Recognizing that a number of factors influence salinity other than precipitation (estimated from tree rings), the authors chose a time period prior to substantial water development when the salinity data were fairly constant in mean and variance. During the calibration period (1922-1952), annual tree ring growth correlates well with average salinity near the Golden Gate Bridge (r^2=0.81). Using this transfer function, Stahle *et al.* (2001) reconstructed annual average January to July salinity for all years 1604 to 1997.

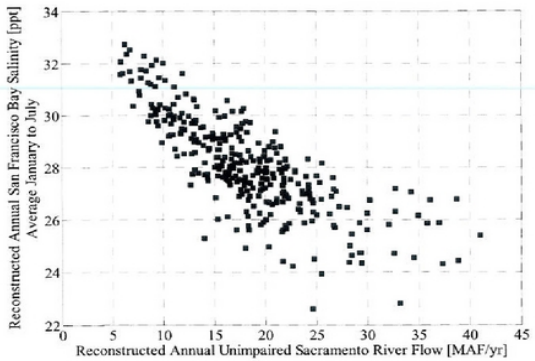

Figure 2-3 – Reconstructed salinity near the mouth of San Francisco Bay compares well with reconstructed unimpaired Sacramento River flow in the upper watershed
For each year from 1630 to 1952, the annual unimpaired Sacramento River flow (from Meko et al., 2001b) is plotted against the annual average salinity at Fort Point (from Stahle et al., 2001).

As shown in Figure 2-3, the salinity reconstruction by Stahle *et al.* (2001) compares well with the unimpaired flow reconstruction by Meko *et al.* (2001b). The data follow the expected inverse exponential relationship between flow and salinity. Over the period from

No comments

- n/a -

1630 to 1952, reconstructed salinity increases as reconstructed unimpaired Sacramento River flow decreases. The agreement is strongest in dry years. The increased scatter in wet years may reflect the limitations in the tree ring methods.

Stahle *et al.* (2001) identified an increasing divergence of observed salinity relative to predicted (reconstructed) salinity after 1952 (Figure 2-4) and suggested that the majority of differences are due to increased water diversions. During the calibration period (1922-1952), the observed salinity is typically within +/- 5% of the reconstructed salinity. However, from 1953-1994, the data show an increasing trend for observed salinity to be greater than predicted, exceeding reconstructed salinity by over 15% in 1978, 1979, 1991, and 1993. Since 1969, observed salinity has exceeded reconstructed salinity in all years except the extremely wet years of 1982 and 1983.

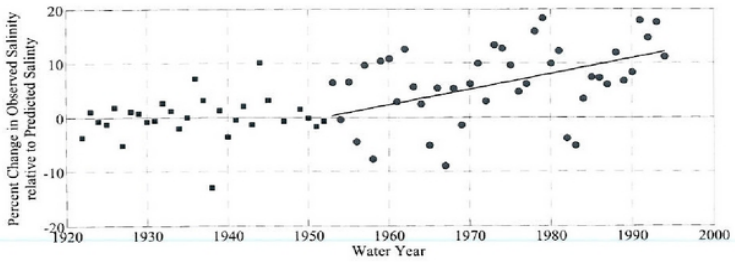

Figure 2-4 – Percent change in observed salinity relative to predicted (reconstructed) salinity for the period 1922 to 1994

The reconstructed salinity record by Stahle et al. (2001) overlaps with the observed salinity record from 1922 to 1994. During this period, the percent change of observed salinity relative to predicted salinity is determined as (observed salinity – reconstructed salinity) divided by reconstructed salinity, with positive values indicating when observed salinity exceeded the reconstructed salinity prediction. The calibration period is indicated with black squares, with the period outside the calibration window indicated by red circles. The straight red line is the linear trend in the post-calibration period, indicating observed salinity is increasingly diverging from predicted (reconstructed) salinity.

These data suggest that since the 1950's, water management operations have increased salinity, with an escalating effect over the period of record. In addition, it is worth noting that significant anthropogenic modifications to the landscape and water usage had already occurred prior to the 1922-1953 calibration period (see Figure 1-2 and Figure 1-3). Although this study is unable to evaluate the effect of anthropogenic modifications prior to 1953, the following section examines salinity prior to human interference at multiple sites in the Bay-Delta.

Tree ring reconstructions such as Meko *et al.* (2001a) and Stahle *et al.* (2001) have the advantage of providing high temporal resolution (i.e. annual) over approximately the last 1,000 years. However, a possible disadvantage of this method is the age of trees, limiting

No comments

- n/a -

high accuracy estimates to approximately the last 400 years. A second possible disadvantage of using tree ring reconstructions for paleosalinity is the remote location of the trees relative to the estuary. Paleosalinity estimates from tree rings in the upper basin necessarily assume that the precipitation patterns archived in the tree rings are representative of the quantity of water that reaches the estuary. However, as observed by Stahle *et al.*, anthropogenic water management affects the amount of water that flows through the estuary.

Sediment Core and Fossil Data

Because of uncertainties in estimates of precipitation and salinity derived from tree ring data, other paleosalinity methods that rely on local fossils to determine local salinity have also been explored. Organic deposits accumulated in the sediments contain signatures of the ambient conditions that can be used to infer the variations in salinity over geologic time scales. Although reconstructions from sediment cores have a coarser temporal resolution than tree rings, the variations in climate and landscape responses to change are better defined geographically because the evidence of localized climate change is preserved as a time series *in situ*, at the site of interest.

The San Francisco Bay-Delta has been the focus of several paleoclimatic reconstructions from sediment cores. Changes in wetland plant and algae communities are the dominant response in the Bay and Delta to climate change and associated fluctuations in temperature and precipitation. Proxies of plant and algae response to environmental conditions are preserved in the sediment cores and determined by:

- quantification and taxonomic identification of
  - (i) diatom frustules (Byrne *et al.*, 2001; Starratt, 2001; Starratt, 2004),
  - (ii) plant seeds and roots (Goman *et al.*, 2008),
  - (iii) plant pollen (May, 1999; Byrne *et al.*, 2001; Malamud-Roam and Ingram, 2004), and,
- measurement of peat carbon isotope ratios (Byrne *et al.*, 2001; Malamud-Roam and Ingram, 2004).

Results from plant pollen identification for three sites in the western Delta and Suisun Bay and Marsh are summarized below in Figure 2-5. The data indicate that Browns Island tidal marsh, near the confluence of the Sacramento and San Joaquin Rivers in the western Delta (Figure 2-5) was predominately a freshwater system for 2,500 years, even during century-long droughts. This condition prevailed until the early 1900's. The shading in Figure 2-5 corresponds to the nearly 300-year dry period identified in the reconstructions of annual unimpaired Sacramento River flow (Figure 2-1). Although salinity intrusion occurred during this period in Suisun Bay at Roe Island, and during earlier long drought periods, salinity did not affect the western Delta to the same degree. This suggests a change in spatial salinity gradient characteristics, and is possibly due to the effect on salinity intrusion of the vast tidal marshes that existed in the Delta until the early 20th Century.

No comments

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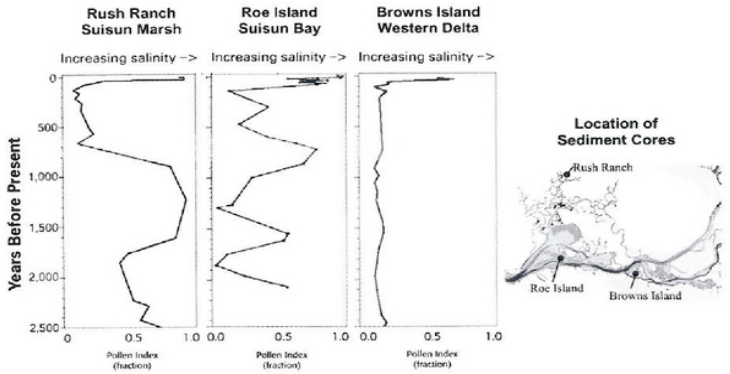

Figure 2-5 – Paleosalinity evidence derived from pollen data

Salinity variability over the last 2,500 years at Rush Ranch in Suisun Marsh (left panel), Roe Island in Suisun Bay (center panel), and Browns Island in the Western Delta (right panel). Data are reproduced from Malamud-Roam and Ingram (2004). Orange shading across each panel corresponds to the nearly 300-year dry period identified in the annual unimpaired Sacramento River flow reconstruction (see Section 2.2) Locations of each of the sediment cores are illustrated in the map on the right.

Malamud-Roam *et al.* (2006) attributed the differences between sites to a combination of methodological issues (such as sampling frequency and core chronology) and site-specific ecological differences (such as site elevation, location relative to channel and sedimentation rates over time). However, all of the paleosalinity reconstructions based on pollen, diatoms and carbon isotopes are in general agreement and suggest that salinity increased abruptly about 100 years ago, reaching or exceeding salinity levels at any other time in the 2,500 years of reconstructed records.

This increase in salinity may correspond to the reduction in unimpaired Sacramento River flow evidenced in the tree ring reconstructions by Meko *et al.* (2001a), which determined that the 1920's and 1930's experienced the worst droughts in the last 400 years. However, the droughts in the 1920's and 1930's do not appear to be as severe as the droughts between 1100 CE to 1400 CE (600 to 900 years ago), as categorized by unimpaired Sacramento River flow. Yet salinity in Suisun Bay and the western Delta appears to meet or exceed the level of the medieval droughts, indicating factors besides natural precipitation and runoff patterns have affected salinity in the last 100 years.

No comments

- n/a -

Conclusions

Reconstructions of salinity in the Bay and Delta indicate:

- Precipitation in the drainage basin for San Francisco Bay (as recorded in tree rings) is a good indicator of salinity near the mouth of the Bay for the period 1922-1953; however, since 1953, increased water diversions have increased observed salinity above the level predicted from precipitation estimates.
- The Delta was a predominately freshwater system for 2,500 years, until the early 1900's, even during century-long droughts.
- The multi-century dry period identified in unimpaired Sacramento River flow reconstruction is evident in Suisun Bay sediments but not in Delta sediments, indicating that salinity did not intrude as far into the Delta during past droughts as it has during the last 100 years.
- The evidence from most sites suggests that current salinity levels are as saline as, or more saline than, previous historical conditions.

No comments

- n/a -

3. Instrumental Observations of the Last 140 Years

Field measurements of rain and snow have far greater accuracy and resolution than the paleoclimate records of precipitation; similarly, field measurements of salinity have far greater accuracy and resolution than the paleosalinity records from sediment cores. These instrumental observations will be used to analyze in more detail the salinity increase identified in the paleoclimate records approximately 100 years ago and determine if the increase in salinity has persisted.

The first sub-section presents observations of precipitation and unimpaired runoff in the upper basin, indicating the natural climatic variability and amount of fresh water available within the Bay-Delta watershed. The second sub-section examines Net Delta Outflow (NDO), which is the amount of water flowing through the Delta into Suisun Bay, directly affecting the level of salinity intrusion into the Delta. NDO is analyzed under both unimpaired (without water diversions and reservoir storage and releases) and historical (actual) conditions; comparison between unimpaired and actual conditions reveals the effect of water management practices. The third sub-section presents field measurements and model-based estimates of salinity at various locations within the Delta and Suisun Bay.

3.1. Precipitation and Unimpaired Flow in the Upper Basin

Precipitation in the Bay-Delta watershed indicates the amount of water available within the system, which could ultimately reach the Bay and affect salinity conditions. However, since precipitation falls as both rain and snow, the timing of runoff to the river channels is often lagged a few months due to snow melt conditions. For this reason, estimates of unimpaired flow (runoff) are generally used to characterize hydrological variability. Unimpaired runoff represents the natural water production of a river basin, unaltered by water diversions, reservoir storage and operation, and export of water to or import of water from other basins.

Figure 3-1 illustrates the total annual precipitation at Quincy[7] in the northeastern Sierra, the total annual unimpaired Sacramento River flow[8] and total unimpaired San Joaquin River flow[9]. Figure 3-2 shows the locations of the eight precipitation stations in northern California used to compute the Sacramento eight-station precipitation index (left panel) and the measurement locations of eight flow gages used to calculate the Sacramento and San Joaquin unimpaired flow data (right panel). Additional information on the annual unimpaired flows is provided in Appendix C.

As discussed in Section 2.2, the total annual unimpaired Sacramento River flow exhibits strong variability between years, both in the reconstructed and observed data. Figure 3-1

[7] Precipitation data are from Menne *et al.* (2009)

[8] "Unimpaired Sacramento River flow" is defined as the sum of the "full natural flows" from the Sacramento River at Bend Bridge, Feather River inflow to Lake Oroville, Yuba River at Smartville, and the American River inflow to Folsom Lake. (http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)

[9] "Unimpaired San Joaquin River flow" is defined as the sum of the full natural flows from the Stanislaus River inflow to New Melones Lake, Tuolumne River inflow to New Don Pedro Reservoir, Merced River inflow to Lake McClure, and San Joaquin River inflow to Millerton Lake (http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST)

No comments

- n/a -

indicates that the trends revealed in the total annual unimpaired Sacramento River flow (middle panel) are also evident in the total annual precipitation at Quincy (top panel) and the total annual unimpaired San Joaquin River flow (bottom panel). Alternating periods of wet and dry conditions are evident in both river basins. These data indicate there were wetter than normal conditions in the late 1800's and early 1900's, followed by severe dry conditions in the 1920's and 1930's. These were then followed by generally wetter conditions until the mid-1970's.

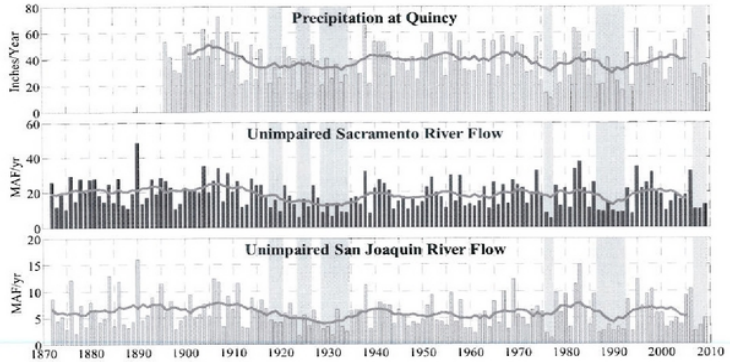

Figure 3-1 – Total annual precipitation and unimpaired flow in the upper Sacramento and San Joaquin River basins (1872-2009)

Total annual precipitation at Quincy in the northeastern Sierra (top panel), total annual unimpaired Sacramento River flow (middle panel), and total annual unimpaired San Joaquin River flow (bottom panel). Bar color on each panel indicates the regional location of the measurements, reflected in the remaining figures of this section (Figure 3-2, Figure 3-3 , and Figure 3-4). Grey line within each panel is the 10-year moving average for each parameter.

No comments

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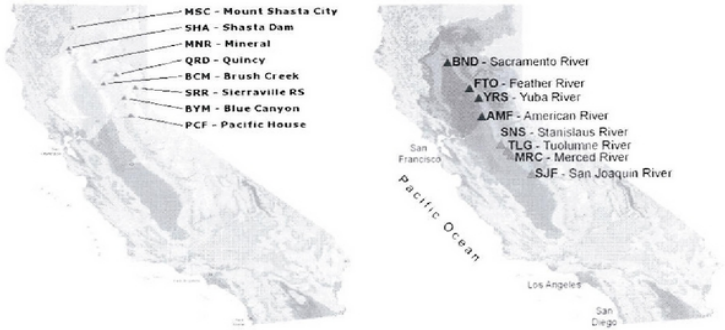

Figure 3-2 – Locations of Precipitation and Runoff Measurements

Location of stations used in the determination of the 8-station precipitation index for northern California (left map), including the location of Quincy (QRD), and the unimpaired Sacramento River flow (red stations, right map) and unimpaired San Joaquin River flow (orange stations, right map).

Knowles (2000) illustrated that the seasonal timing of runoff can significantly alter salinity intrusion without any change to the total annual runoff. For this reason, it is critical to examine the monthly variability in precipitation and unimpaired runoff. Monthly precipitation and unimpaired flow values are available for a shorter time period (generally 1921 to present) than the total annual values (generally 1870's to present).

The monthly distribution of the Sacramento eight-station precipitation index[10] indicates that most of the precipitation in northern California occurs during November through March (Figure 3-3). The variability between years, represented by the vertical bars and '+' marks, shows the distribution is positively skewed, i.e., excessively high precipitation occurs in relatively few years.

Figure 3-4 presents the monthly distribution of unimpaired flow for both the Sacramento and San Joaquin River basins. River flow lags precipitation by about two months because of storage of some precipitation in the form of snow and subsequent snowmelt in the spring. Most of the unimpaired inflow to the Delta originates from the Sacramento Basin, although the contributions from the two basins are approximately the same during the months of late-spring and early-summer snow melt, when unimpaired runoff from the San Joaquin Basin peaks.

[10] Data from 1921 through 2008, downloaded from http://cdec.water.ca.gov/cgi-progs/precip1/8STATIONHIST

No comments

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No comments

- n/a -

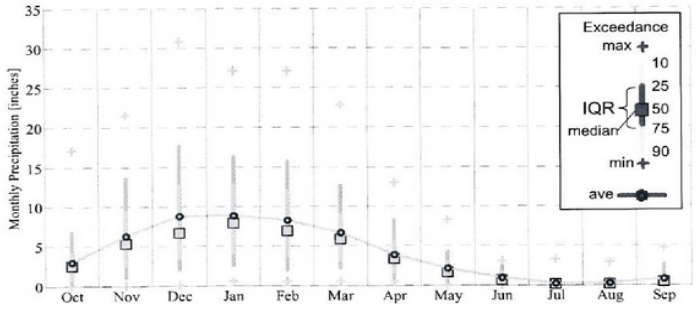

Figure 3-3 – Monthly Distribution of Precipitation in the Sacramento River Basin

Distribution of monthly precipitation for water years 1921 through 2008. Monthly averages are indicated by the blue line with black circles. Monthly median is given by the blue squares, while the interquartile range is indicated by the vertical blue line for each month and the vertical grey line extends to the 10th and 90th percentiles. Maximum and minimum values are indicated by '+' marks.

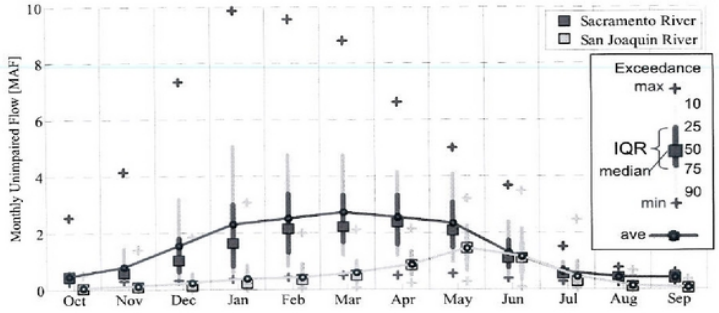

Figure 3-4 – Monthly distribution of unimpaired flow in the Sacramento and San Joaquin River basins

Distribution of monthly unimpaired flows for water years 1921 through 2008. Monthly averages are indicated by the lines with black circles. Monthly median is given by the squares, while the interquartile range is indicated by the vertical line for each month and the vertical grey line extends to the 10th and 90th percentiles. Maximum and minimum values are indicated by '+' marks.

Conclusions

The long-term observations of precipitation and unimpaired flow indicate:

- Relatively wet conditions occurred in the late 1880's to about 1917 in both the Sacramento and San Joaquin River watersheds prior to large-scale water management operations.
- Unusually dry conditions occurred from about 1918 through the late 1930's; these persistent dry conditions are not representative of the average conditions over the last 130 years.
- Precipitation in Sacramento River watershed peaks between December and March; the unimpaired river flow lags by about 1 to 2 months because of snow melt.

No comments

- n/a -

3.2. Net Delta Outflow

The quantity of water flowing from the Delta into Suisun Bay, defined as Net Delta Outflow (NDO), is the primary factor in determining salinity intrusion in Suisun Bay and the western Delta. Unimpaired NDO is calculated using unimpaired flow in the Sacramento and San Joaquin Rivers (Section 3.1) as well as contributions from other minor tributaries.[11] Unimpaired NDO is the hypothetical Delta outflow that would occur in the absence of any upstream diversion or storage, but with the existing Delta channel and upstream channel configuration.

Because the outflow from the Delta at the wide and deep entrance to Suisun Bay cannot be measured accurately, the parameter of historical (actual) NDO is estimated from a daily mass balance of the measured river inflows to the Delta, measurements of water diversions at major pumping plants in the Delta, and estimates of net within-Delta consumptive use (including Delta precipitation and evaporation).

The effect of anthropogenic water management on NDO is illustrated below by comparing monthly estimates of unimpaired NDO[12] and historical (actual) NDO[13] (Figure 3-5). Since unimpaired flow estimates also assume the existing Central Valley and Delta landscape (reclaimed islands, no natural upstream flood storage, current channel configuration, etc.), this comparison reveals the net effect of water management only. This analysis does not address the change due to physical modification to the landscape or sea level rise.

For the period of joint record, when both unimpaired and historical NDO values are available (water year 1930 through 2003), historical NDO decreased even though unimpaired NDO increased slightly. The long-term (74-year) linear trend in monthly unimpaired NDO (the black dashed line in top panel of Figure 3-5) increased on average 0.49 MAF/month; thus, by 2003, the average annual unimpaired NDO had increased 5.9 MAF/year since 1930. In contrast, the long-term linear trend in monthly historical NDO (the black dashed line in middle panel of Figure 3-5) decreased on average -0.29 MAF/month, totaling a decrease in historical (actual) NDO of -3.5 MAF/year. This corresponds to a net increase in diversion of 9.4 MAF/year of water from the Delta upstream watershed relative to the 1930 level[14].

Increased diversion and export of water have decreased historical NDO (middle panel of Figure 3-5), but this has been partially offset by a natural increase in unimpaired NDO (top panel). The difference between historical and unimpaired NDO (bottom panel) is due to the cumulative effects of upstream diversions, reservoir operations, in-Delta diversions, and

[11] Unimpaired NDO does not include water imported from the Trinity River system, which is outside the Delta watershed.

[12] Unimpaired NDO data was obtained from Ejeta (2009), which is an updated version of DWR (1987).

[13] Historical NDO data was obtained from the IEP's DAYFLOW program (http://www.iep.ca.gov/dayflow/index.html).

[14] This is consistent with current estimates of approximately 15 MAF/year total diversion from the system, which includes the 4-5 MAF/year diversions established prior to 1930 and approximately 1 MAF/year additional water supply imported from the Trinity River system.

No comments

- n/a -

south-of-Delta exports. During most months, water management practices have historically resulted in historical (actual) NDO that is less than unimpaired conditions, indicated by a negative value for the quantity (historical NDO – unimpaired NDO).

Because the difference between monthly historical and unimpaired NDO has become more negative over time, the periods of excess conditions (when historical NDO exceeds unimpaired NDO) have become very infrequent. The only occurrences are now following the wettest years, primarily due to releases from reservoirs in the fall to make room for winter flood control storage.

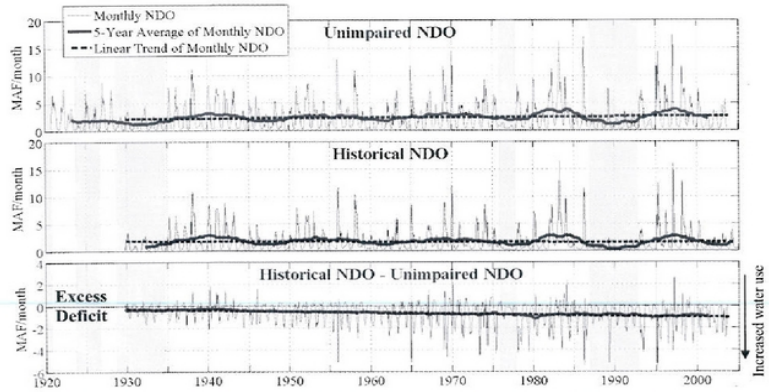

Figure 3-5 – Time series of Monthly Net Delta Outflow under unimpaired conditions and historical (actual) conditions

The thin color line on each panel indicates the monthly NDO, the thick color line indicates a running 5-year average of the monthly NDO, and the dashed black line indicates the linear long-term trend.

The monthly distribution (Figure 3-6) of unimpaired NDO and historical NDO for water years 1930 to 2003 reveals that for all months except September and October (when NDO is low), average unimpaired NDO is greater than average monthly historical NDO. The tendency in the average historical NDO toward greater flow in September and October is influenced strongly by the period prior to about 1975 when reservoir operations resulted in more flow in those months (see Figure 3-7 and related discussion below). On average from 1930-2003, water management practices reduced Delta outflows in the months of November through August (and in all months since about 1975, see Figure 3-7). The greatest reduction in Delta outflow relative to unimpaired conditions occurs in the months of March through June, when spring snow melt is captured in reservoirs and a portion of the river flow is diverted for direct use.

No comments

- n/a -

As also shown in Figure 3-6, water management practices also shift the peak flow periods to earlier in the year. The unimpaired NDO hydrograph peaks in May when snow melt contributes to high river flows, with at least 4.1 MAF in May in 50% of the years (averaging 4.2 MAF in May over all years). The historical NDO peaks in February with at least 2.9 MAF/month in 50% of the years (averaging 3.7 MAF/month over all years). The variability between years, represented by the vertical bars and '+' marks, indicates the distribution is positively skewed, which means a relatively few years have excessively high flows.

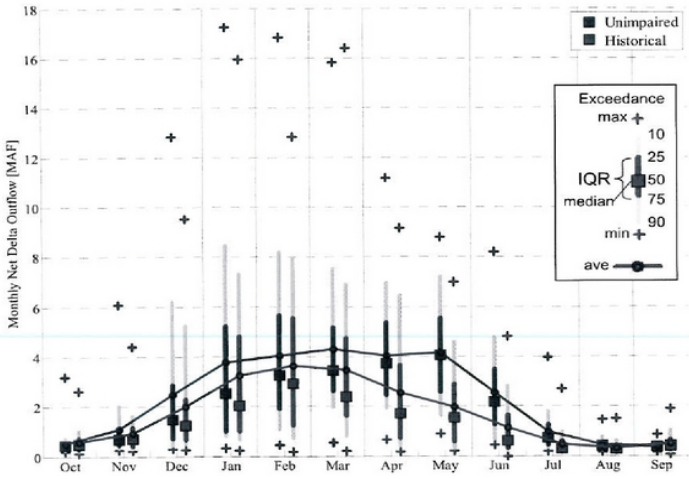

Figure 3-6 – Monthly distribution of Net Delta Outflow

Distribution of monthly NDO for water years 1930 through 2008. Monthly averages are indicated by the lines with black circles. Monthly median is given by the squares, while the interquartile range is indicated by the vertical line for each month and the vertical grey line extends to the 10th and 90th percentiles. Maximum and minimum values are indicated by '+' marks.

Figure 3-7 shows the long-term trends in the difference between historical (actual) monthly NDO and unimpaired monthly NDO. Increased water usage and increased diversion of water to storage has reduced historical NDO relative to unimpaired NDO in most months of the year. In July (and August, not shown in Figure 3-7), the deficit is reduced, likely due to reservoir releases which provide a portion of the water diverted by upstream users prior to reservoir construction. The 1994 Bay-Delta Accord called for higher minimum Delta outflows in July and August to protect Delta fish species, which should also serve to reduce the deficit. However, historical (actual) NDO still remains less than unimpaired NDO.

No comments

- n/a -

In September (and October, not shown in Figure 3-7), historical (actual) NDO exceeded unimpaired NDO from about 1945 to 1975, with an increasing trend in the percent change. Since 1975, the percent change has shown a downward trend with a deficit (historical NDO less than unimpaired NDO) during most years since 1975.

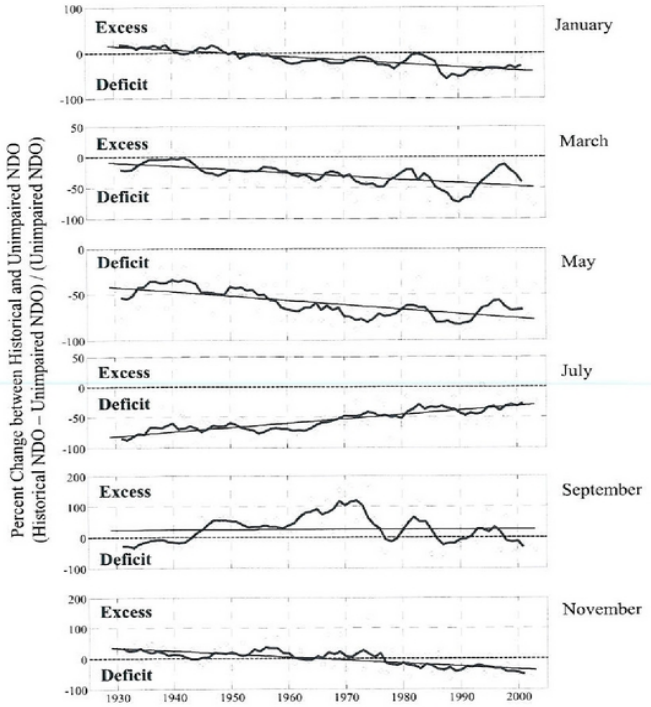

Figure 3-7 – Long-term trends in monthly NDO

Percent change of NDO relative to unimpaired conditions. Circles indicate the percent change for each month of the period of record. The red line indicates a moving 5-year average of the percent change, while the black line indicates the long-term linear trend over the entire period of record.

No comments

- n/a -

Conclusions

Anthropogenic water management practices have altered NDO in the following ways:

- Long-term data demonstrate that the difference between historical (actual) NDO and unimpaired NDO is increasing over time, indicating that water management actions have reduced Delta outflow significantly.
- During most months, water management practices have reduced Delta outflow relative to unimpaired conditions. From the mid-1940's to the mid-1980's, reservoir operations resulted in historical (actual) NDO slightly greater than unimpaired NDO slightly in a number of months, largely in the fall. However, since 1985, reservoir operations have resulted in increased NDO only in the wettest years, and NDO has declined in all other months.
- On average, water management practices have resulted in reduced Delta outflows in all months except September and October. The greatest reduction in Delta outflow relative to unimpaired conditions occurs in the months of March through June, when spring snow melt is captured in reservoirs and some of the remaining river flows are diverted for direct use.

No comments

- n/a -

3.3. Salinity in the Western Delta and Suisun Bay

Observations and model-based estimates can be used to examine historical variations in salinity in the western Delta and Suisun Bay. The observations examined in this section include records from the early 1900's from the California & Hawaiian Sugar Refining Corporation in Crockett (C&H) and long-term monitoring data published online by the Interagency Ecological Program (IEP). Estimates of salinity intrusion were obtained using the Kimmerer-Monismith equation describing X2 (Kimmerer and Monismith, 1992).

Section 3.3.1 addresses the importance of consistency among salinity comparisons. The spatial variability of a specific salinity level is examined in Section 3.3.2 and Section 3.3.3, while the temporal variability of salinity at specific fixed locations is explored in Section 3.3.4 and Section 3.3.5.

3.3.1. Importance of Consistency among Salinity Comparisons

Water salinity in this report is specified either as electrical conductivity (EC) or as a concentration of chloride in water. EC is a measure of the ability of an aqueous solution to carry an electric current and is expressed in units of microSiemens per centimeter (µS/cm)[15]. Chloride concentration is specified in units of milligrams of chloride per liter of water (mg/L). Conversion between EC and chloride concentration can be accomplished using site-specific empirical relationships such as those developed by Kamyar Guivetchi (DWR, 1986).

Previous studies have evaluated the level of salinity in the Bay and Delta, using a variety of salinity units (e.g. EC, chloride concentration, or concentration of total dissolved solids in water) and various salinity parameters (e.g. annual maximum location 1,000 µS/cm EC, monthly average location of 50 mg/L chloride, or daily average EC at a specific location). Therefore, when comparing studies, it is critical to use consistent salinity units, parameters, and timing, including the phase of tide and time of year. These concepts are discussed further in Appendix D.

3.3.2. Distance to Fresh Water from Crockett

The California & Hawaiian Sugar Refining Corporation (C&H) is located in Crockett, near the western boundary of Suisun Bay (see Figure 3-8). C&H either obtained its freshwater supply in Crockett, or, when fresh water was not available at Crockett, from barges that traveled upstream on the Sacramento and San Joaquin Rivers. The barges generally travelled upstream twice a day beginning in 1908 (DPW, 1931). C&H recorded both the distance traveled by its barges to reach fresh water and the quality of the water they obtained. This provides the most detailed quantitative salinity record available prior to the initiation of salinity monitoring by the State of California in 1920. The distance traveled by the C&H barges serves as a surrogate for the prevailing salinity conditions in the western Delta and

[15] The reported EC values are actually specific conductance, i.e., the electrical conductivity of the water solution at a reference temperature of 25° centigrade, as is standard practice.

No comments

- n/a -

Suisun Bay. Operations by C&H required water with less than 50 mg/L chloride concentration.[16] Additional detail on C&H operations and the detailed barge travel data are included in Appendix D.

Figure 3-8 – Map of Suisun Bay and Western Delta with locations of continuous monitoring stations

C&H barges traveled up estuary from Crockett (yellow star). Locations of IEP continuous monitoring stations are shown in red. Scale in miles is indicated in the upper left corner of the map.

[16] In comparison, the 50 mg/L concentration required for C&H operations is one-third the concentration of the industrial water quality standard under current conditions in the Delta.

No comments

- n/a -

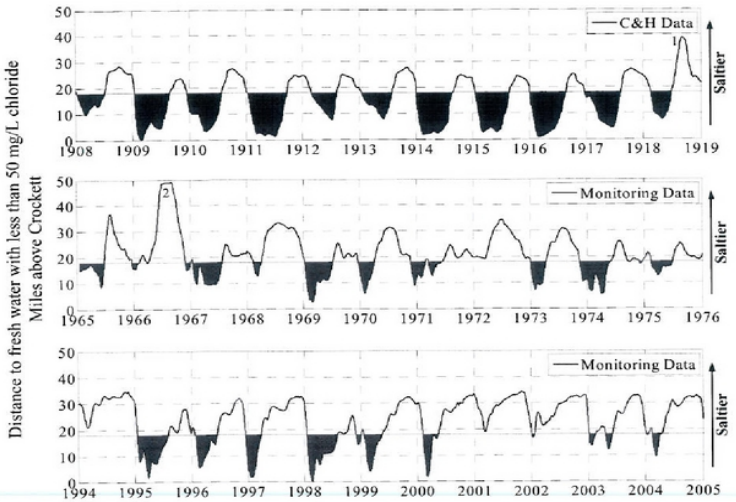

Figure 3-9 – Distance to fresh water from Crockett

"Distance to fresh water" is defined as the distance in miles upstream of Crockett to water with less than 50 mg/L chloride concentration. The horizontal line, at approximately 18 miles, is the distance from Crockett to the Delta. The shading represents the spatial extent and duration of the presence of fresh water within Suisun Bay, downstream of the Delta.

Data notes: (1) During August and September 1918, average water quality obtained by C&H exceeded 110 mg/L chlorides; (2) Salinity during 1966 is likely an overestimate due to relatively sparse spatial coverage of IEP monitoring stations. During 1966, salinity at Emmaton (28 miles from Crockett) exceeded 3,000 µS/cm; the nearest station upstream of Emmaton is near Courtland (58 miles from Crockett) and had a salinity of ~ 300 µS/cm. Location of 350 µS/cm isohaline based on data interpolation between these two stations (which are 30 miles apart) is not likely to be representative of the true location.

Figure 3-9 compares surface[17] salinity data from C&H with estimates derived from a network of continuous surface salinity monitoring stations (Figure 3-8) within Suisun Bay and the western Delta dating back to 1964. The monitoring data are published online by the Interagency Ecological Program (IEP, see http://iep.water.ca.gov/dss). The location of the 350 µS/cm EC isohaline, which approximately coincides with the C&H criterion of 50 mg/L chloride concentration, was estimated from the IEP measurements by linear interpolation between the average daily values at IEP monitoring stations.

[17] Due to the method of collection, C&H water samples are assumed to be from near the water surface.

No comments

- n/a -

As a cautionary note, depending on the source of information, the C&H barges are said to have traveled with the tide, indicating they either took water at high tide (moving up river on the flood and down on the ebb) or at low tide (traveling against the tide, but moving a shorter distance). Thus, the C&H records either represent the daily maximum or daily minimum distance traveled. In contrast, the distances to fresh water calculated from recent monitoring data are based on the average daily values of EC measured at fixed locations. The difference between daily average distance and daily minimum or maximum is approximately 2 to 3 miles. However, since the difference between the data from the early 1900's and the more recent time periods exceed this 2 to 3 mile uncertainty, the conclusions of this section remain unchanged regardless of the specific barge travel timing.

From 1908 through 1918, C&H was able to collect fresh water for a large portion of the year within Suisun Bay, without having to travel all the way from Crockett to the Delta. However, as can be seen in Figure 3-9, that would no longer be possible in many years (e.g., 2001-2004).

Figure 3-10 shows the monthly distribution of distance traveled by C&H barges during water years 1908 through 1917, and the equivalent distance from determined from observed data for water years 1966 through 1975 (top panel) and water years 1995 through 2004 (bottom panel). These two latter periods have similar hydrologic characteristics to the period of the C&H data.[18] The monthly distribution for each dataset illustrates the seasonal fluctuations of the salt field as well as the variability between years for each month.

During the early 1900's, the median distance traveled by C&H barges to procure fresh water was less than 8 miles in the spring (March-June) and about 25 miles (between Collinsville and Emmaton) in the fall (September-October). In contrast, due to water management conditions from 1995 to 2005, the equivalent distances would be 13 to 23 miles in the spring and up to 30 miles in the fall. It is worth noting that from 1966 to 1977, the distance to fresh water in the fall and early winter months (September through January) was generally less than the equivalent distance in the early 1900's, indicating that large-scale water management operations circa 1970 tended to reduce salinity in the fall and early winter. However, this trend has reversed in the more recent water management period (1995-2005), with salinity intrusion significantly increased over levels in the early 1900's during all months.

Figure 3-10 also shows that the range of the average annual distance from Crockett to fresh water from 1995 to 2005 was approximately 15 miles (from about 13 to 30 miles), while the range during the early 1900's was approximately 20 miles (from 6 to 25 miles). This analysis indicates that large-scale water management activities limit the fluctuating nature of the salt field by preventing fresh water from reaching as far downstream as it did in the early 1900's.

Finally, Figure 3-10 indicates that salinity intrusion in the Delta occurred later in the year (beginning in July) in the early 1900's than under more recent time period conditions (beginning in March).

[18] This similarity in hydrological characteristics between the periods was established by approximately matching the distribution of annual Sacramento River flow during these periods (see Appendix E).

No comments

- n/a -

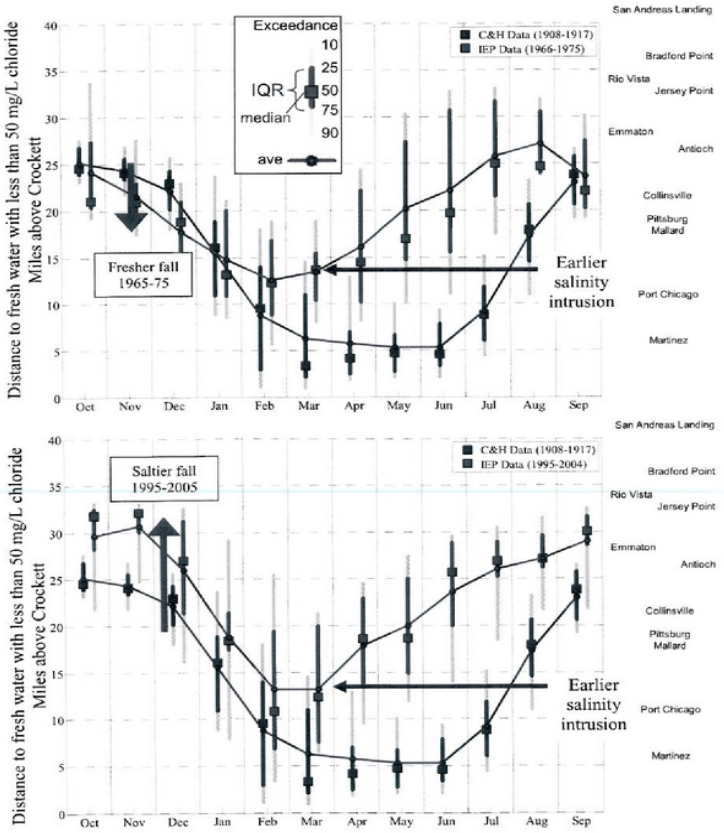

Figure 3-10 – Monthly distribution of distance to fresh water from Crockett

No comments

- n/a -

These comparisons (and other relevant comparisons in Appendix D) show that, on average, C&H barges would have had to travel up to 19 miles farther to procure fresh water under recent large-scale water management conditions than in the early 1900's. These comparisons also indicate that fresh water was present for significantly longer time periods, and over a larger area of the western Delta, in the early 1900's than during similar hydrological periods under current water management conditions. Abrupt changes in salinity just prior to 1920 caused C&H to abandon the Sacramento and San Joaquin Rivers and switch to a water supply contract with Marin County beginning in 1920 (Appendix D).

The distance to fresh water during individual wet years and during individual dry years is presented in Appendix D. The data in Appendix D also show that salinity has been generally higher in recent times than in the early 1900's and that water management has restricted the range in salinity experienced during a water year. The periods when fresh water is present at given locations have been reduced, or, in some cases, eliminated.

Conclusions

The records of the distance traveled upstream from Crockett by C&H barges to procure fresh water and estimates of this distance under large-scale water management conditions (reservoir operations and water diversions) show that:

- Fresh water was present farther downstream and persisted for longer periods of time in the western Delta in the early 1900's than under recent time periods with similar hydrologic conditions;
- Water management practices result in greater salinity intrusion in the western Delta for most months of the year; and,
- Salinity intrusion begins earlier in the year, extends farther upstream, and persists for a longer period each year.

No comments

- n/a -

3.3.3. X2 Variability

An often-used indicator of fresh water availability and fish habitat conditions in the Delta is a metric called X2. X2 is defined as the distance from the Golden Gate to the 2 part-per-thousand isohaline (equivalent to a salinity of 2 grams of salt per kilogram of water), measured near the channel bed along the axis of the San Francisco Estuary. Higher values of X2 indicate greater salinity intrusion. Monthly values of X2 are estimated in this report using the monthly regression equation from Kimmerer and Monismith (1992):

$$\text{Monthly} \quad X2(t) = 122.2 + 0.3278*X2(t-1) - 17.65*\log_{10}(NDO(t))$$

The K-M equation expresses X2 (in units of kilometers) in terms of Net Delta Outflow (NDO, see Section 3.2) during the current month and the X2 value from the previous month. The monthly K-M equation was based on a statistical regression of X2 values (interpolated from EC measurements at fixed locations) and estimates of NDO from IEP's DAYFLOW computer program. Hence, the K-M equation is only valid for the existing Delta channel configuration and existing sea level conditions.

The K-M equation can be used to transform unimpaired and historical NDO data into the corresponding X2 values for unimpaired (without reservoir operations or water diversions) and historical (with historical water management) conditions, respectively.

The seasonal and annual variations of X2 are dependent on the corresponding variations of NDO under both historical and unimpaired flow conditions (Figure 3-11). X2 under historical flow conditions is shifted landward relative to unimpaired conditions by approximately 5 km. During the 1930's, historical NDO was often negative, sometimes averaging approximately -3,000 cfs for several months. This was due to relatively low runoff and significant upstream water diversions. Unfortunately, the K-M equation, which includes the logarithm (base 10) of NDO, is unable to account for negative values of NDO. In the case of historical flow conditions, this results in high variability of X2 in the 1930's. The values of X2 under historical flow conditions during 1930's in Figure 3-11 are likely underestimated.

Figure 3-12 compares X2 under unimpaired and historical conditions for the period from 1945-2003, following initiation of the Central Valley Project (i.e., after the completion of the Shasta Reservoir of the CVP). Figure 3-12 shows that, compared to unimpaired conditions, X2 under historical conditions was higher by about 10 km during April-July and by about 5 km during the rest of the year.

Salinity intrusion under historical water management conditions is, therefore, greater (higher X2) than the intrusion that would occur under unimpaired conditions. Moreover, the switch from declining X2 values during fall and winter months to increasing X2 values (increasing salinity intrusion) occurs in March under historical water management conditions and in June under unimpaired conditions. Thus, recent water management practices have resulted in a saltier Delta with earlier occurrence of salinity intrusion in the year.

No comments

- n/a -

Although current water management practices operate to provide salinity control, both the extent and duration of salinity intrusion are greater under current water management practices than under historical conditions. Likewise, current water management practices have changed the overall annual range in salinity (i.e., the difference between the highest and lowest salinity values during the year).

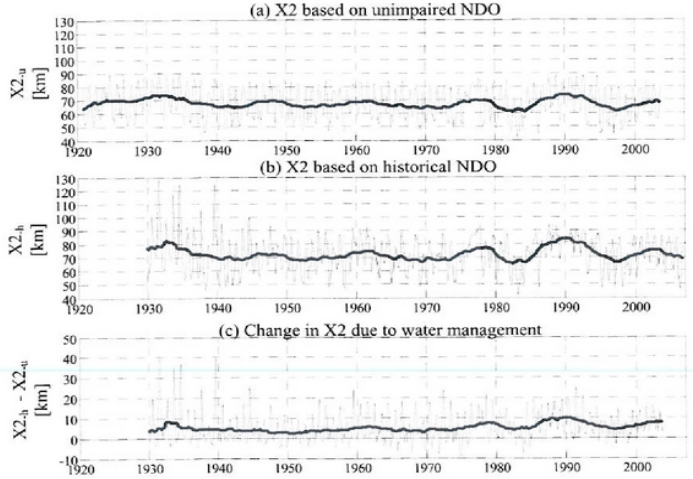

Figure 3-11 – Location of X2 under unimpaired and historical conditions
X2 has a strong seasonal and decadal variability under both unimpaired (top panel) and historical (middle panel) flow conditions reflecting the strong seasonal and decadal variability of NDO. The difference between historical and unimpaired conditions (bottom panel) illustrates the net effect of water management activities.

No comments

- n/a -

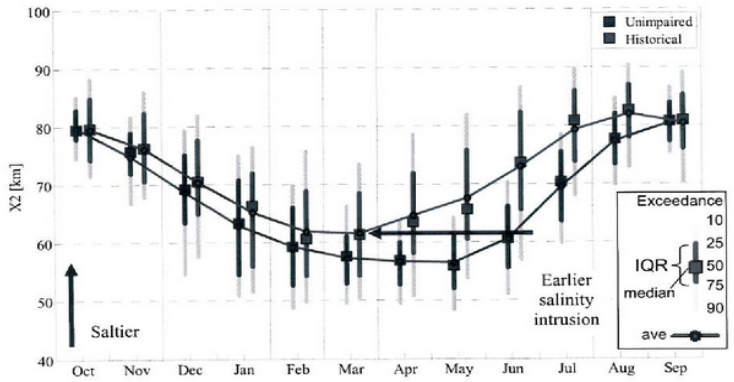

Figure 3-12 – Monthly distribution of X2 from 1945 through 2003

Figure 3-13 presents a comparison of unimpaired X2 and historical X2 during the 10 driest and the 10 wettest years of the CVP period (1945-2006).[19] During dry years (top panel), X2 is substantially greater under historical water management conditions than under unimpaired conditions (i.e., without water management); these effects are less dramatic but still occur during the wet years (bottom panel). Additionally, the annual range in salinity variability is significantly reduced under dry conditions (from approximately 22 km with unimpaired flows to 14 km with historical flows), but not wet conditions. The result of water management practices is a saltier Delta during both wet and dry years, with the greatest amount of salinity intrusion and reduced seasonal variability occurring in dry years.

Conclusions

The analysis of X2 (a measure of salinity intrusion in the Delta) shows that:

- Water management practices (reservoir operations and water diversions) result in a saltier Delta, with earlier salinity intrusion in the year.
- Water management practices result in a saltier Delta during both wet and dry years, but the effect is more pronounced in the dry years when the seasonal variability of salinity is also significantly reduced.

[19] Determination of the ten wettest and driest years is based on the total annual unimpaired Net Delta Outflow. The ten wettest years are 1952, 1956, 1958, 1969, 1974, 1982, 1983, 1986, 1995, and 1998. The ten driest years are 1947, 1976, 1977, 1987, 1988, 1990, 1991, 1992, 1994, and 2001.

No comments

- n/a -

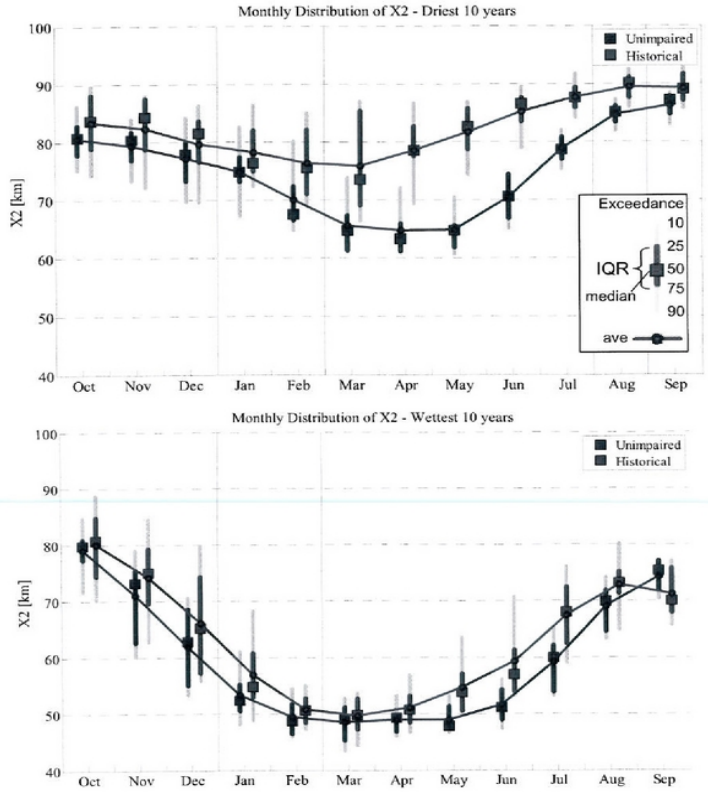

Figure 3-13 – Monthly X2 variability during wet and dry years (1945-2003)
Determination of the ten wettest and driest years is based on the total annual unimpaired Net Delta Outflow. The ten wettest years are 1952, 1956, 1958, 1969, 1974, 1982, 1983, 1986, 1995, and 1998. The ten driest years are 1947, 1976, 1977, 1987, 1988, 1990, 1991, 1992, 1994, and 2001.

No comments

- n/a -

No comments

- n/a -

3.3.4. Salinity at Collinsville

Collinsville, near the confluence of the Sacramento and San Joaquin Rivers, was one of the first long-term sampling locations implemented by the State of California. The Suisun Marsh Branch[20] of the DWR estimated monthly average salinity at Collinsville for the period 1920-2002, using a combination of 4-day TDS (total dissolved solids) grab samples from 1920-1971 and EC measurements from 1966-2002. Data from the overlap period of 5 years between the TDS grab samples and EC measurements were used in a statistical regression model, and the monthly averaged 4-day TDS samples were converted to monthly average EC (Enright, 2004). The result of this regression analysis was a time series of monthly EC values at Collinsville for the period of 1920-2002.

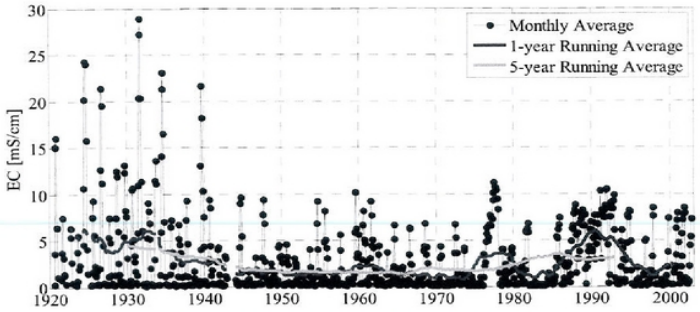

Figure 3-14 – Observed salinity at Collinsville

Monthly average salinity at Collinsville (black dots and black line), with the 12-month running average (red line) and 5-year running average (blue line).

Figure 3-14 shows the monthly average salinity at Collinsville for the period of 1920-2002, and Figure 3-15 shows the long-term trends in monthly salinity at Collinsville. Although the maximum values of salinity in the 1920's and 1930's far exceed subsequent salinity measurements at Collinsville, during the winters and springs of the 1920's and 1930's, the water at Collinsville freshened considerably. During the dry periods of 1920's and 1930's, monthly average salinity was below 350 µS/cm EC (approximately 50 mg/L chloride) for at least one month in every year. The one exception is 1924 which is inconclusive because no data were available from November through March. Monthly average EC data are missing for a portion of the winters and springs prior to 1926, and data for 1943 are missing entirely.

[20] Data provided by Chris Enright (DWR), personal communication, 2007.

No comments

- n/a -

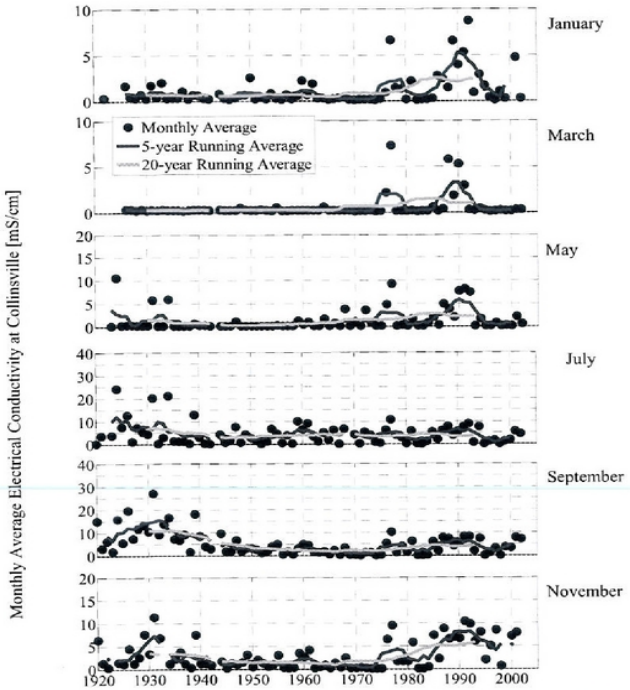

Figure 3-15 – Year-to-year trends in monthly-average salinity at Collinsville, 1920-2002
Monthly average salinity at Collinsville (black dots), with the 12-month running average (red line) and 5-year running average (blue line) for individual months.

Relatively fresh winters and springs during the 1920's are consistent with observations by C&H during that time period. However, monthly EC at Collinsville during the recent droughts (1976-1977 and 1987-1993) was always greater than 350 µS/cm EC, except for one month in both 1989 and 1992. These monthly observations of EC at Collinsville indicate that during the recent dry periods (1976-1977 and 1987-1993), EC at Collinsville was higher than that during similar dry periods in the 1920's and 1930's.

Enright and Culberson (2009) analyzed the trend in salinity variability at Collinsville from 1920-2006. They found increasing salinity variability in eleven of twelve months and

No comments

- n/a -

attributed it to water operations. In seven months (January-May, September-October) the increasing trend was significant ($p<0.05$).

Even in the six-year drought from 1928 to 1934, the Delta still freshened every winter (Figure 3-16). However, as shown in Figure 3-16, the Delta has not freshened during more recent droughts (1976-1977, 1987-1994, and 2007-2009). This indicates that the historical "flushing" of the Delta with fresh water is no longer occurring. This lack of flushing can also allow waste from urban and agricultural developments upstream of and within the Delta to accumulate. Contaminants and toxics have been identified as factors in the decline of the Delta ecosystem (Baxter *et al.* 2007). The data indicate the effect of managing to the X2 standard (implemented in 1995), as the salinity levels attained in the most recent drought are not as high as the 1976-77 and 1987-1992 droughts.

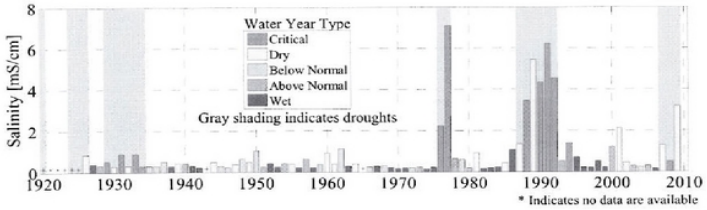

Figure 3-16 – Average Winter salinity at Collinsville

Annual average salinity during the winter (January through March) for water years 1927 to 2009. Bars are colored by water year type as defined by the Sacramento 40-30-30 index. Grey shading indicates multi-year droughts that include at least one critical water year.

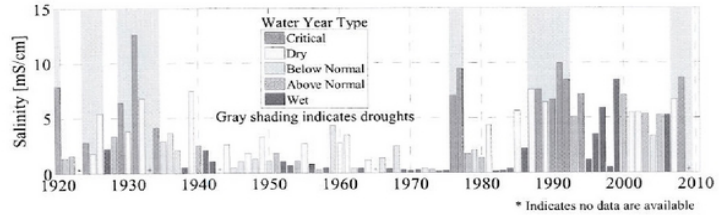

Figure 3-17 – Average Fall salinity at Collinsville

Annual average salinity during the fall months (October through December) for water years 1920 to 2009. Bars are colored by water year type as defined by the Sacramento 40-30-30 index. Grey shading indicates multi-year droughts that include at least one critical water year.

No comments

- n/a -

Figure 3-17 presents the variation in average fall salinity at Collinsville from 1920 to 2008 (October-December). Fall salinity is now high almost every year, while in the past, fall salinity was only high in dry and critical years. High salinity in the fall has been identified as a factor in the decline of the Delta ecosystem. Baxter *et al.* (2008) noted that "fall salinity has been relatively high during the POD years, with X2 positioned further [sic] upstream, despite moderate to high outflow conditions during the previous winter and spring of most years."

Conclusions

- In the 1920's and 1930's, the Delta freshened annually, even during droughts. In recent droughts, the Delta does not always freshen during the winter.
- Prior to 1976, fall salinity was high only in relatively dry years. Recently, fall salinity is high almost every year.

3.3.5. Salinity at Mallard Slough

A 1967 agreement between the Contra Costa Water District (CCWD) and the State of California requires the State to reimburse CCWD for the decrease in availability of usable river water, defined as water with less than 100 mg/L chlorides, at the Mallard Slough intake (CCWD, 1967). The 1967 agreement, and similar agreements between the State and other Delta water users, recognized the State Water Project (SWP) would increase salinity at Mallard Slough. The agreement defined a baseline of 142 days of usable water per year, based on the average number of days of usable water at the Mallard Slough intake from 1926-1967. Since 1967, the average number of days of usable water[21] (for the period 1967-2005) has declined to 122, indicating a 20-day (14%) reduction in the number of days of high quality water at Mallard Slough since the completion of the SWP.

[21] The data are from the USBR-CVO record of EC at Pittsburg, approximately 2 km upstream of Mallard Slough from 1967-2005. Since this station is located upstream of Mallard Slough, the number of days of usable water at Mallard Slough since the SWP was built may be overestimated.

No comments

- n/a -

No comments

- n/a -

4. Qualitative Observations of Historical Freshwater Flow and Salinity Conditions

In this section, qualitative observations of salinity conditions in the western Delta and Suisun Bay from the lawsuit filed by the Town of Antioch in 1920 and from various literature reports are discussed to provide a perspective of the salinity conditions prevailing in the late 1800's and early 1900's. Qualitative observations from early explorers and settlers are discussed in Appendix E.

4.1. Town of Antioch Injunction on Upstream Diverters

In 1920, the Town of Antioch filed a lawsuit (hereinafter referred to as the "Antioch Case") against upstream irrigation districts, alleging that upstream water diversions were causing increased salinity intrusion at Antioch. An overview of the Antioch Case is provided in Appendix E. The court decision, legal briefings, and petitions provide qualitative salinity observations from a number of witnesses. Although testimony in the Antioch Case is generally anecdotal, not quantitative, it provides a perspective of the salinity conditions prevailing in the early 1900's. Because the proceedings were adversarial in nature, this report focuses on the testimony of the upstream interests, who were trying to demonstrate that salinity intrusion was common near Antioch prior to their diverting water (prior to 1920). Consequently, the testimony may be biased in support of this "more saline" argument.

The upstream interests in the Antioch Case provided information on the operation of pumping plants along the San Joaquin River at Antioch for domestic water supply and the quality of water obtained from the pumping plants, summarized in Table 4-1.

Table 4-1 – Testimony regarding pumping plant operations and water quality in the 1920 Antioch Case

Time period of observation	Relevant information from the testimony
1866-1878	Mr. Dodge ran a pumping/delivery operation at Antioch ▪ Dodge pumped water into a small earthen reservoir at Antioch and then hauled the water to residents in a wagon. ▪ Cary Howard testified that while he was living in Antioch (1867-1876), the water became brackish one or two years in the fall, when they had to drive into the country to get water. This likely occurred during the drought of 1870-71.
1878-1880	Mr. Dahnken bought and operated the Dodge operation ▪ Dahnken testified that the water became brackish at high tide every year in the late summer, and remained brackish at high tide until it rained "in the mountains."

Time period of observation	Relevant information from the testimony
1880-1903	Belshaw Company provided water ▪ Dahnken testified that Belshaw Company pumped only at low tide.
1903-1920	Municipal Plant ▪ William E. Meek (resident since 1910) testified the water is brackish at high tide every year, for some months in the year. ▪ James P. Taylor testified that for at least the last 5 years, insufficient storage required the plant to pump nearly 24 hours per day, regardless of tidal phase. ▪ Dr. J. W. DeWitt testified that during October of most years between 1897 and 1918, the water was too brackish to drink. Even when the city only pumped at low tide, the water was occasionally so brackish that it would be harmful to irrigate the lawns.

This testimony suggests that, in the late 1800's, water at Antioch was known to be brackish at high tide during certain time periods, but Antioch was apparently able to pump fresh water at low tide year-round. A possible exception was the fall season during a few dry years. Water at Antioch was apparently fresh at low tide until at least around 1915. At that time, due to increased demand and inadequate storage, the pumping plants started pumping continuously, regardless of tidal stage. The window of time each year when Antioch is able to pump fresh water from the river has been substantially reduced in the last 125 years.

As shown in Appendix A, DWR (1960) estimated that water with a chloride concentration of 350 mg/L or less would be available about 85% of the time if there were no water management effects. DWR (1960) estimated that chloride concentrations at Antioch would be less than 350 mg/L about 80% of the time in 1900 and about 60% of the time by 1940. DWR also projected further deterioration of water quality by 1960 and beyond but did not include the effects of reservoir releases for salinity control.

Observations of salinity at Antioch during recent years indicate that salinity is strongly dependent on ocean tides, and the diurnal range in salinity can be as much as the seasonal and annual ranges in salinity. This is discussed in more detail in Appendices D and E. For instance, salinity at high tide can be more than five times the salinity at low tide (Figures D-1, D-2, and D-3), and the salinity during the course of a single day may vary up to 6,000 µS/cm EC (Figure D-1). Average daily salinity at low tide during the period of 1983-2002 exceeded 1,000 µS/cm[22] EC for about four and a half months of the year (Figure D-3). During the driest 5 years between 1983 and 2002, salinity at low tide was always greater than 1,000 µS/cm EC (i.e., no fresh water was available at any time of day) for about eight months of the year. Fresh water is currently available at Antioch far less frequently than prior to the 1920's.

[22] The current water quality criterion for municipal and industrial use is 250 mg/L, equivalent to about 1,000 µS/cm EC.

No comments

- n/a -

Available data and observations indicate that, prior to about 1918, fresh water was available at least at low tide during almost the entire year, in all but a few dry years. Around 1918, an abrupt change to higher salinity occurred. Although a prolonged and severe drought also began about this time, salinity conditions at Antioch did not return to pre-drought levels when the drought ended, indicating that water management activities (increased upstream diversions and later storage of water in upstream reservoirs) were the primary causes of this increased salinity.

4.2. Reports on Historical Freshwater Extent

Several literature reports discuss the spatial extent and duration of salinity conditions in the western Delta and Suisun Bay during the late 1800's and early 1900's. Salinity conditions at several key Delta locations are summarized below.

Location:	**Western Delta**
Source(s):	DPW (1931)
Quotation:	"*The dry years of 1917 to 1919, combined with increased upstream irrigation diversions, especially for rice culture in the Sacramento Valley, had already given rise to invasions of salinity into the upper bay and lower delta channels of greater extent and magnitude than had ever been known before.*" (DPW, 1931, pg. 22)
Quotation:	"*It is particularly important to note that the period 1917-1929 has been one of unusual dryness and subnormal stream flow and that this condition has been a most important contributing factor to the abnormal extent of saline invasion which has occurred during this same time.*" (DPW, 1931, pg. 66)
Summary:	Salinity intrusion into the Delta during the period 1917-1929 was much larger than experienced prior to that time.
Location:	**Pittsburg, CA**
Source(s):	Tolman and Poland (1935) and DPW (1931)
Quotation:	"*From 1880 to 1920, Pittsburg (formerly Black Diamond) obtained all or most of its domestic and municipal water supply from New York Slough offshore.*" (DPW, 1931, pg. 60)
Quotation:	"*There was an inexhaustible supply of river water available in the New York Slough* [near Pittsburg at the confluence of the Sacramento and San Joaquin Rivers]*, but in the summer of 1924 this river water showed a startling rise in salinity to 1,400 ppm of chlorine, the first time in many years that it had grown very brackish during the dry summer months.*" (Tolman and Poland, 1935, pg. 27)
Summary:	Prior to the 1920's, the water near the City of Pittsburg was sufficiently fresh for the City to obtain all or most of its fresh water directly from the river.
Location:	**Antioch, CA**
Source(s):	DPW (1931)

No comments

- n/a -

Quotation: "*From early days, Antioch has obtained all or most of its domestic and municipal water supply from the San Joaquin River immediately offshore from the city. This supply also has always been affected to some extent by saline invasion with the water becoming brackish during certain periods in the late summer and early fall months. However, conditions were fairly satisfactory in this respect until 1917, when the increased degree and duration of saline invasion began to result in the water becoming too brackish for domestic use during considerable periods in the summer and fall.*" (DPW, 1931, pg. 60)

Summary: Until 1917, the City of Antioch obtained all or most of its freshwater supplies directly from the San Joaquin River. Salinity intrusion has prevented domestic use of water at the Antioch intake in summer and fall after 1917.

Location: **Benicia, CA (Suisun Bay)**

Source(s): Dillon (1980) and Cowell (1963)

Quotation: "*In 1889, an artificial lake was constructed. This reservoir, filled with fresh water from Suisun Bay during the spring runoff of the Sierra snow melt water ...*" (Dillon, 1980, pg. 131)

Quotation: "*...in 1889, construction began on an artificial lake for the* [Benicia] *arsenal which would serve throughout its remaining history as a reservoir, being filled with fresh water pumped from Suisun Bay during spring runoffs of the Sacramento and San Joaquin Rivers which emptied into the bay a short distance north of the installation.*" (Cowell, 1963, pg. 31)

Summary: In the late 19th Century, fresh water was available in the Suisun Bay and Carquinez Straits for use by the City of Benicia.

The reported presence of relatively fresh water in the western Delta and the Suisun Bay during the late 1800's and early 1900's is consistent with the relatively fresh conditions observed in the paleoclimate records for this time period (Section 2.3) and the relatively wet conditions observed in the Sacramento River runoff and precipitation records (Section 3.1).

Additional observations between 1775 and 1841 are included in Appendix E. These qualitative observations indicated the presence of "*sweet*" water near the confluence of the Sacramento and San Joaquin Rivers in the vicinity of Collinsville in August 1775 (a period of average or above-average Sacramento River flow), and September 1776 (a period of below-average Sacramento River flow). The presence of "*very clear, fresh, sweet, and good*" water was reported in April 1776 (a dry year). Historical observations from 1796 and August 1841 (dry periods) indicated salinity "*far upstream*" at high tide and the presence of brackish (undrinkable) water in Threemile Slough. Current salinity controls and regulations put brackish water (averaged over 14 days) near Jersey Point and Emmaton, each about 2.5 miles below Threemile Slough, on a regular basis annually.

No comments

- n/a -

5. Conclusions

1. Measurements of ancient plant pollen, carbon isotope and tree ring data show that the Delta was predominately a freshwater marsh for the past 2,500 years, and that the Delta has become far more saline in the past 100 years because of human activity. Salinity intrusion during the last 100 years is comparable to the highest levels over the past 2,500 years.
2. Human activities during the last 150 years, including channelization of the Delta, elimination of tidal marsh, construction of deep water ship channels, and diversions of water, have resulted in increased salinity levels in the Delta. Today, salinity typically intrudes 3 to 15 miles farther into the Delta than it did in the early 20th Century.
3. Before the substantial increase in freshwater diversions in the 1940's, the Delta and Suisun Bay would freshen every winter, even during the extreme drought of the 1930's. However, that pattern has changed. During the most recent droughts (1976-1977, 1987-1994, and 2007-2009), the Delta did not always freshen in winter. Without seasonal freshening, contaminants and toxics can accumulate in the system and young aquatic species do not experience the same fresh conditions in the spring that occurred naturally.
4. While half of the past 25 years have been relatively wet, the fall salinity levels in 21 of those 25 years have resembled dry-year conditions. In terms of salinity, the Delta is now in a state of drought almost every fall because of human activity, including water diversions.
5. Seasonal and inter-annual variation in salinity has also been changed; however, this change is the result of reduced freshwater flows into the Delta. At any given location in the western Delta and Suisun Bay, the percentage of the year when fresh water is present has been greatly reduced or even eliminated.
6. The historical record and published studies show the Delta is far saltier now, even after the construction of reservoirs that have been used in part to meet State Water Resources Control Board water quality requirements in the Delta. Operation of reservoirs and water diversions for salinity management somewhat ameliorates the increased salinity intrusion, but the levels still exceed pre-1900 salinities.

No comments

- n/a -

No comments

- n/a -

6. Bibliography to the Main Report and the Appendices

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Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay

A summary of historical reviews, reports, analyses and measurements

Appendices

Water Resources Department

Contra Costa Water District

Concord, California

February 2010

Technical Memorandum WR10-001

Exhibit CCWD-6

No comments

- n/a -

No comments

- n/a -

Exhibit CCWD-6

Historical Fresh Water and Salinity Conditions in the Western Sacramento-San Joaquin Delta and Suisun Bay

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February 2010

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No comments

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No comments

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No comments

- n/a -

No comments

- n/a -

Appendix A. Factors Influencing Salinity Intrusion

Salinity intrusion in the Delta is the result of the interaction between tidally-driven saline water from the Pacific Ocean and fresh water from rivers flowing into the Delta. Regional climate change (e.g., sea level rise and change in precipitation regime), physical changes to the Central Valley landscape (e.g., creation of artificial channels and land use changes), and water management practices (e.g., reservoir storage, water diversions for agricultural and municipal and industrial use) affect this interaction between the ocean tides and the freshwater flow, in turn affecting salinity intrusion in the Delta (The Bay Institute (TBI), 1998, Department of Public Works (DPW), 1931, Nichols *et al.*, 1986, Conomos, 1979, and Knowles, 2000).

These factors are grouped into three categories (Table A-1) and discussed individually and qualitatively to provide context for observed salinity variability, which is necessarily due to the cumulative impact of all factors.

Table A-1 – Factors Affecting Salinity Intrusion into the Delta

Natural and artificial factors affect the salinity of the Delta. The factors are grouped into three categories: regional climate change, physical changes to the landscape, and water management practices.

Category	Factors affecting salinity intrusion and specific effect on Delta salinity
Regional Climate Change	• Precipitation regime o Long-term reduction of spring (April-July) snowmelt runoff may increase salinity in the spring, summer, and fall. o A shift to more intense winter runoff may not decrease salinity in the winter because outflows are typically already high during winter storms. • Ocean conditions o Added periodic variability to precipitation (via mechanisms such as the El Niño/Southern Oscillation (ENSO) or Pacific Decadal Oscillation (PDO)) • Sea level rise o Expected to increase salinity intrusion (DWR, 2006). Actual salinity response to rising sea level will depend upon actions taken to protect against flooding or overtopping (e.g., new tidal marsh vs. sea walls or dykes).
Physical Changes to the Landscape	• Deepening, widening, and straightening of Delta channels o Generally increase salinity, but response will depend upon location within the Delta (DWR, 2006)

No comments

- n/a -

Category	Factors affecting salinity intrusion and specific effect on Delta salinity
	• Separation of natural floodplains from valley rivers o Confining peak flows to river channels would reduce salinity during flood events. o Preventing floodplains from draining back into the main channel would increase salinity after floods (late spring and summer). • Reclamation of Delta islands o Varies (the effect on salinity depends on marsh vegetation, depth, and location), but marshes generally dampen tides, reducing salinity intrusion • Creation of canals and channel "cuts" o Generally creates more efficient routes for tidal flows to enter the Delta, thereby increasing salinity intrusion relative to native conditions • Deposition and erosion of sediments in Suisun Bay (Cappiella *et al.*, 1999) o Deposition of mining debris (occurred from 1860's to approximately 1887) reduced salinity in Suisun Bay and the western and central Delta (Enright, 2004, Enright and Culberson, 2009) o Erosion (occurring since 1887) increases salinity in Suisun Bay and the western and central Delta (Enright, 2004, Enright and Culberson, 2009)
Water Management Practices (reservoir operations, water diversions, and exports from the Delta)	• Decreasing Net Delta Outflow (NDO) by increasing upstream and in-Delta diversions as well as exports o Increases salinity • Increasing upstream storage capacity o Generally increases salinity when reservoirs are filling. Reservoir releases may decrease salinity if they increase outflow. Historically, this occurred when flood control or other releases were required in wetter years. However, as this study shows, this has generally been small and intermittent; salinity measurements indicate it occurred occasionally prior to 1985, and very seldom since. Increased early winter diversion of runoff to storage will maintain or increase high salinities in the winter.

No comments

- n/a -

No comments

- n/a -

A.1. Climatic Variability

Changes in precipitation regimes and sea levels, brought about by a changing climate, can affect the spatial and temporal salinity conditions in the Delta. Long-term variations in river runoff, precipitation and sea level are discussed below.

A.1.1. Regional Precipitation and Runoff

Precipitation in the Bay-Delta watershed sets the amount of water available within the system which could ultimately reach the Bay and affect salinity conditions. However, since precipitation falls as both rain and snow, runoff to river channels is spread over more months than the precipitation events themselves; any runoff from rain generally reaches the river channels within days of the precipitation event, but runoff resulting from snow is delayed until the spring snowmelt. For this reason, estimates of unimpaired flow (runoff), rather than precipitation, are generally used to characterize hydrological variability. Unimpaired runoff represents the natural water production of a river basin, unaltered by water diversions, reservoir storage and operation, and export of water to or import of water from other basins.

Knowles (2000) determined that variability in freshwater flows accounts for the majority of the Bay's salinity variability. The spatial distribution, seasonal timing, annual magnitude, decadal variability, and long-term trends of unimpaired flow all affect the hydrology and salinity transport in the Delta. Total annual unimpaired flow in the Sacramento and San Joaquin basins from 1872 through 2009 is presented in Section 3.1, with the seasonal distribution provided for 1921 through 2003.

The total annual unimpaired flow of the upper Sacramento Basin for water years 1906 through 2006 exhibits substantial year-to-year variability with a strong decadal oscillation in the 5-year running average (see Figure 3-1). On average, over the last 100 years, the total annual unimpaired Sacramento River flow is increasing by about 0.06% or 11 thousand-acre feet (TAF) each year. However, increased total annual unimpaired flow does not necessarily reduce salinity intrusion. Knowles (2000) illustrated that the seasonal timing of runoff can significantly alter salinity intrusion without any change to the total annual runoff.

Typically, most precipitation in California occurs during winter in the form of snow in the Sierra Nevada. The subsequent melting of this snow, beginning in the spring, feeds the rivers that flow into the Delta. The four months from April through July approximately span the spring season and represent the period of runoff due to snow melt. The long-term trend in spring (April-July) runoff decreased by approximately 1.3 MAF from 1906 to 2006 (Figure A-1). This effect is believed to be caused by climate change; as temperatures warm, more precipitation falls as rain instead of snow, and what snowpack that does accumulate tends to melt earlier in the year. This leads to higher runoff during winter months, but lower runoff in spring or summer, resulting in the potential for greater salinity intrusion. These observed changes in the magnitude and timing of spring runoff of the Sacramento River watershed are consistent with similar changes in spring runoff observed across river watersheds of the

western United States (e.g., Dettinger, 2005; Mote *et al.*, 2005; Stewart *et al.*, 2005). Note that, from 1920 to 2006, the long-term trend in spring runoff actually increased slightly (approximately 0.5 MAF).

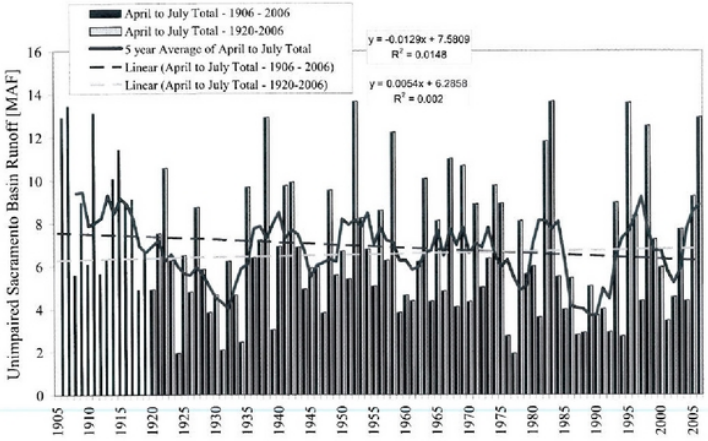

Figure A-1 – Unimpaired runoff from the Sacramento River basins from April to July
Data source: http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST.

Precipitation and runoff are influenced by regional events such as the Little Ice Age (about 1300 to 1850 CE) and the Medieval Warm Period (about 800 to about 1300 CE). During the Little Ice Age, the winter snowline in the Sierra was generally at a lower elevation, and spring and summer nighttime temperatures were significantly lower. This temperature pattern would allow the snowmelt to last further into the summer, providing a more uniform seasonal distribution of runoff such that significantly less salinity intrusion than occurs today would be expected. This expectation is borne out by paleosalinity studies (see Section 2.3).

At shorter time scales, oceanic conditions such as the Pacific Decadal Oscillation (PDO) and El Niño/Southern Oscillation (ENSO) also impact precipitation and runoff patterns. Runoff in the upper watershed is the primary factor that determines freshwater outflow from the Delta. Anthropogenic flow management (upstream diversions, reservoir operations, in-Delta diversions, and south-of-Delta exports) alters the amount and timing of flow from the upper watershed (see Section 2.3). Changes to the physical landscape further alter the amount and timing of flow (see Section 2.2).

No comments

- n/a -

A.1.2. Sea Level Rise

Sea level fluctuations resulting from the repeated glacial advance and retreat during the Pleistocene epoch (extending from 2 million years ago to 15,000 years ago) resulted in deposition of alternating layers of marine and alluvial sediments in the Delta (TBI, 1998). A warming trend starting about 15,000 years ago ended the last glacial advance and triggered rapid sea-level rise. At the end of this period (known as the "Holocene Transgression") approximately 6,000 years ago, sea level had risen sufficiently to inundate the Delta at high tide (Atwater *et al.*, 1979).

Sea level is estimated to have risen at an average rate of about 5 cm/century during the past 6,000 years and at an average rate of 1-2 cm/century during the past 3,000 years (Cayan *et al.*, 2008). Observations of sea level at the Golden Gate in San Francisco reveal that the mean sea level has risen at an average rate of 2.2 cm/decade (or 0.22 mm/yr) over the past 100 years (Cayan *et al.*, 2008). Future increases in sea level are expected to increase salinity intrusion into the Delta (DWR, 2006); actual salinity response to rising sea level will depend upon actions taken to protect against flooding or levee overtopping (e.g. new tidal marsh would generally reduce salinity intrusion, while construction of sea walls or dykes may further increase salinity).

A.2. Physical Changes to the Delta and Central Valley

Creation of artificial channels, reclamation of marshlands, land use changes and other physical changes to the landscape of the Delta and Central Valley have significantly altered water movement through the Delta and the intrusion of salinity into the Delta. Major physical changes to the Delta and Central Valley landscape have occurred over the last 150 years. As many of these physical changes were made prior to flow and salinity monitoring (which began in the 1920's), only a qualitative discussion is presented below.

A.2.1. Deepening, Widening, and Straightening Channels (early 1900's-present)

The lower Sacramento River was widened to 3,500 feet and straightened (creating Decker Island) around 1910 (Lund *et al.*, 2007). Progressive deepening of shipping channels began in the early 1900's. Original channel depths were less than 10 feet; channels were gradually dredged to depths exceeding 30 feet, and maintenance dredging continues today.

These changes to the river channels have increased salinity intrusion. Deepening the river channels increases the propagation speed of tidal waves, leading to increased salinity intrusion. Similarly, straightening the river channels provides a shorter path for the passage of the tidal waves and increases salinity intrusion. Widening of the river channels increases the tidal prism (the volume of water in the channels), resulting in further salinity intrusion. Larger cross-sections reduce velocities, lowering friction losses and maintaining more tidal energy, which is the driving force for dispersing salinity into the Delta.

No comments

- n/a -

A.2.2. Reclamation of Marshland (1850-1920)

In the Central Valley

The original natural floodplains captured large winter flows, gradually releasing the water back into the river channels throughout the spring and summer, resulting in a more uniform flow into the Delta (reduced peak flow and increased low flow) compared to current conditions. The increased surface area of water stored in these natural floodplains increased total evaporation and groundwater recharge, reducing total annual inflow into the Delta.

Even with less Delta inflow, the difference in the seasonal flow pattern may have limited salinity intrusion. The drainage of floodplains back into rivers during the spring and groundwater seepage back to the rivers in the summer and fall provided a delayed increase in river flows during the low flow period. Raising and strengthening natural levees in the Central Valley effectively disconnected the rivers from their floodplains, removing this natural water storage, increasing the peak flood flows and reducing the low flows. The net effect of these changes in the Central Valley was to reduce salinity during floods, when salinity is typically already low, and increase salinity during the following summers and falls, which is likely to have led to increased maximum annual salinity intrusion.

In the Delta

Reclamation of Delta marshland began around 1850. By 1920, almost all land within the legal Delta[1] had been diked and drained for agriculture (DPW, 1931). Before the levees were armored and the marshes were drained, the channels would have been shallower and longer (more sinuous), which would have slowed propagation of the tides into the Delta, reduced tidal energy and reduced salinity intrusion.

The natural marsh surface would have increased the tidal prism. However, the shallow marsh depth and native vegetation would have slowed the tidal wave progression. The combined effect on salinity intrusion depends on the location and depth of the marsh, the native vegetation distribution, and the dendritic channels that were removed from the tidally active system.

Figure A-2 shows the western, central, and southern portions of the Delta in 1869. For comparison, Figure A-3 shows the same area in 1992, with man-made channels highlighted grey.

A.2.3. Mining debris

Hydraulic mining in the Sierra Nevada began in the 1860's and produced large quantities of debris which traveled down the Sacramento River, through the Delta and into the Bay. Mining debris may have contributed to the extensive flooding reported in 1878 and 1881. Cappiella *et al.* (1999) estimate that, from 1867 to 1887, approximately 115 million cubic meters (Mm3) of sediment were deposited in Suisun Bay. This deposition was due to the inflow of hydraulic mining debris.

[1] The legal Delta is defined in California Water Code Section 12220.

No comments

- n/a -

Figure A-2 - Map of the Delta in 1869

Channels of the western, central, and southern Delta in 1869, prior to extensive reclamation efforts (Gibbes, 1869)

No comments

- n/a -

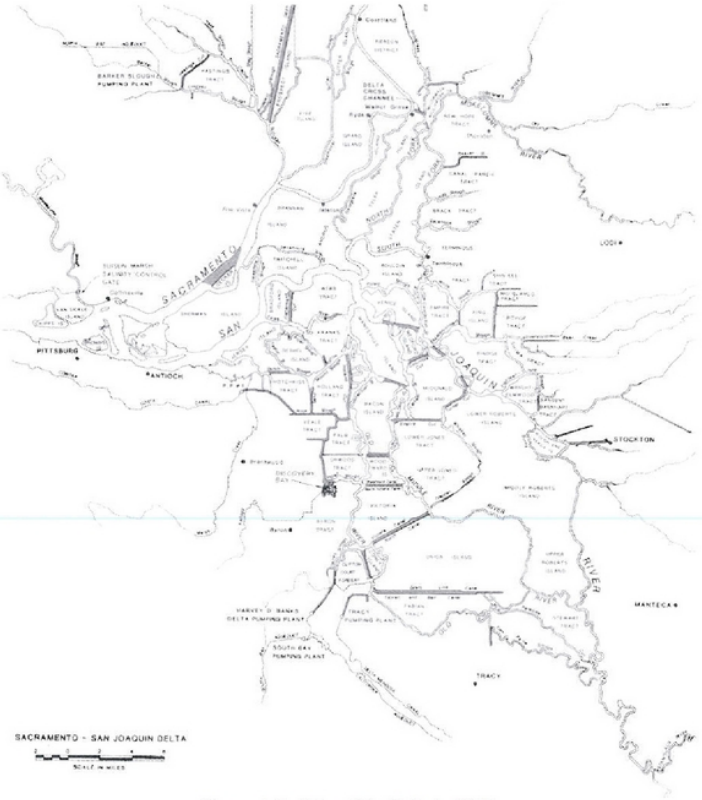

Figure A-3 – Map of the Delta in 1992

Channels of the western, central, and southern Delta from the Delta Atlas (DWR, 1992) Constructed waterways (highlighted in grey) generally create more efficient routes for tidal flows to enter the Delta, thereby increasing salinity intrusion relative to the native tidal marshes.

No comments

- n/a -

Cessation of hydraulic mining around 1884 resulted in erosion of Suisun Bay, which continues to erode even today. From 1887 to 1990, approximately 262 Mm3 of sediment were eroded from Suisun Bay. The net change in volume of sediment during 1867-1887 was 68 Mm3 (net deposition) and during 1887-1990 was -175 Mm3 (net erosion). As a result of these changes, the tidal flat of Suisun Bay increased from about 41 km^2 in 1867 to 52 km^2 in 1887, but decreased to 12 km^2 by 1990 (due to erosion subsequent to the cessation of hydraulic mining). Cappiella *et al.* (1999) attributed the change in the Suisun Bay area from being a largely depositional environment to an erosional environment not only to the hydraulic mining practices of the late 1800's but also to increased upstream water management practices. The Suisun Marsh Branch of the DWR estimated that erosion of Suisun Bay (modeled as a uniform change in depth of 0.75 meters) has increased salinity in Suisun Bay and the western Delta by as much as 20% (Enright, 2004; Enright and Culberson, 2009).

A.3. Water Management Practices

Extensive local, state, and federal projects have been built to move water around the state, altering the natural flow patterns throughout the Delta and in upstream watersheds. For clarity in the discussion that follows, definitions and discussions of actual flow and salinity, unimpaired flow and salinity, and natural flow and salinity, are given below.

Historical (actual) flow and salinity

Historical (or actual) flow and salinity refer to the flow and electrical conductivity, total dissolved solids concentration, or chloride concentration that occurred in the estuary. Historical conditions have been observed, measured, or estimated at various times and locations; they are now measured at monitoring stations throughout the estuary. Historical data are also used to estimate flow and water quality conditions at other locations with the following tools: the DAYFLOW program from IEP, the DSM2 model from the California Department of Water Resources, the X2[2] equation (Kimmerer and Monismith, 1992) and Contra Costa Water District's salinity outflow model (also referred to as the G-model) (Denton, 1993; Denton and Sullivan, 1993). The use of these tools to estimate flow and water quality is necessarily dependent upon the Delta configuration to which they were calibrated. Use of these tools in hypothetical configurations (such as pre-levee conditions, flooding of islands, etc) is subject to un-quantified error.

Unimpaired flow and salinity

Unimpaired flows are hypothetical flows that would have occurred in the absence of upstream diversions and storage, but with the existing Delta and tributary configuration. Unimpaired flows are estimated by the California Department of Water Resources (DWR) for the 24 basins of the Central Valley; the Delta is one of the 24 basins. Additionally, DWR estimates unimpaired in-Delta use and unimpaired net Delta outflow (NDO). Unimpaired NDO estimates can be used to estimate unimpaired water quality using a salinity-outflow relationship such as the X2 or G-model tools discussed above.

[2] X2 is defined as the distance from the Golden Gate to the 2 part-per-thousand isohaline (equivalent to a salinity of 2 grams of salt per kilogram of water), measured along the axis of the San Francisco Estuary. X2 is often used as an indicator of freshwater availability and fish habitat conditions in the Delta (Jassby *et al.*, 1995; Monismith, 1998).

No comments

- n/a -

Since unimpaired flows assume the existing Delta configuration, the use of these tools should not violate their basic assumptions. However, the results should be taken in context. Water quality based on unimpaired flows compared to water quality based on historical (actual) flows shows how water management activities affect water quality. Water quality based on unimpaired flows cannot be considered natural.

Natural flow and salinity

Natural flow and salinity reflect pre-European settlement conditions, with a virgin landscape in both the Central Valley and the Delta, native vegetation, and no diversions or constructed storage. As discussed above, the natural landscape included natural storage on the floodplains and extensive Delta marsh. Estimation of natural flow requires assumptions regarding the pre-European landscape and vegetation throughout the Central Valley. Estimation of natural salinity requires development of new models to account for pre-European Delta geometry, incorporating the estimates of natural flow. These assumptions induce an unknown level of error. For this reason, no attempt is made in this report to calculate natural flow or the resulting salinity. Instead, paleosalinity studies are examined to provide evidence of salinity in the pre-European era.

Water management practices have continually evolved since the mid-1850's. As discussed in Section 1.1, anthropogenic modification include diversion of water upstream and within the Delta, construction of reservoirs, and system operations to meet regulatory requirements.

The irrigated acreage in the Central Valley has been steadily increasing since 1880 (Figure 1-3), increasing the upstream diversions of water. There were two periods of rapid growth in irrigated acreage: from 1880 to 1920 and from 1940 to 1980. In-Delta diversions (Figure 1-3) began in 1869 with reclamation of Sherman Island; from 1869 to 1930, in-Delta diversions are assumed to have grown in proportion to the area of reclaimed marshland (from Atwater *et al.*, 1979).

Upstream diversions first became an issue with respect to Delta salinity around 1916 with the rapid growth of the rice cultivation industry (Antioch Case, Town of Antioch v. Williams Irrigation District, 1922, 188 Cal. 451; see Appendix E.2). These early "pre-project" diversions for irrigation had particularly large impacts because of the seasonality of water availability and water use. Diversions for agriculture typically start in the spring and continue through the early fall (when river flow is already low). These early irrigation practices, combined with the decrease in spring and summer flow due to the separation of rivers from their natural floodplains, resulted in a significant reduction of the spring and summer river flow, leading to increased salinity intrusion.

Figure A-4 shows the Department of Water Resources' estimates of the effects of upstream diversions and south-of-Delta exports on the salinity in the San Joaquin River at Antioch (DWR, 1960). DWR's 1960 report indicated that water with less than 350 mg/L chlorides would be present at Antioch approximately 88% of the time on average "naturally," and that availability decreased to approximately 62% by 1940 due to upstream diversions. This illustrates that upstream depletions had a significant effect on salinity at Antioch during 1900-1940, prior to the construction of large upstream reservoirs. (For reference, Shasta Dam was completed in 1945.)

No comments

- n/a -

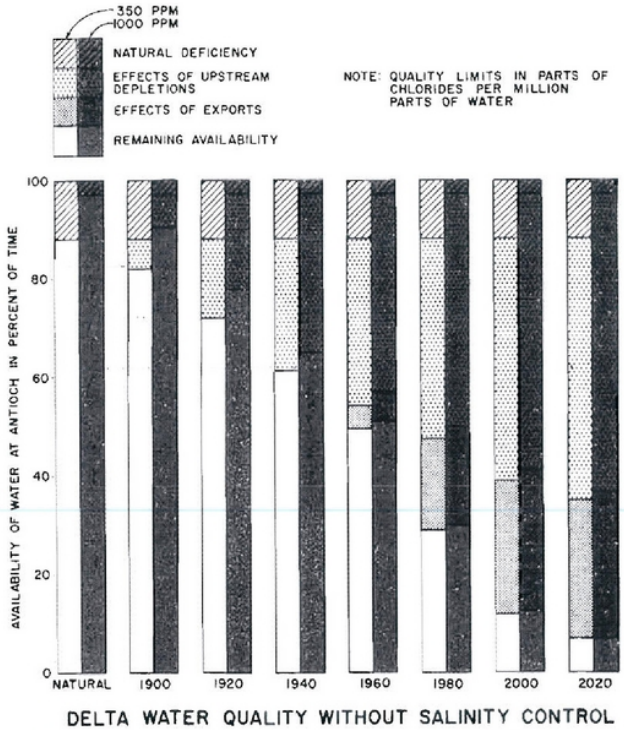

Figure A-4 - Salinity on the San Joaquin River at Antioch (DWR, 1960)

The Department of Water Resources examined the effects of upstream depletions and south-of-Delta exports on salinity in the San Joaquin River at Antioch, estimating the percent of time water that a certain quality of water (with less than 350 mg/L chlorides; or less than 1,000 mg/L chlorides) would be available in the river without reservoir releases to provide salinity control. The estimates for 1960, 1980, 2000, and 2020 assume the reservoirs do not make releases for salinity control and therefore underestimate the actual quality of water during these years.

Figure A-4 also shows estimates of the availability of water in 1960, 1980, 2000, and 2020, without reservoir releases to provide salinity control, demonstrating that upstream depletions and in-Delta exports would have continued to degrade water quality at Antioch.

No comments

- n/a -

Exports from the south Delta started in 1951 with the completion of the federal Central Valley Project pumping facility near Tracy, California. Exports from the State Water Project Banks Pumping Plant, just to the west of the federal facility, began in 1967. As shown in Figure 1-3, south-of-Delta exports increased rapidly from 1951 through the mid-1970s, and since then the combined exports have averaged more than 4 million acre-feet per year.

Construction of upstream reservoirs also altered natural patterns of flow into the Delta. Figure A-5 and Figure A-6 show the extent and rapid rise of constructed reservoirs in the upstream watersheds of the Delta (DWR, 1993). The location, year of completion and approximate storage capacities (in acre-feet, AF) are shown in Figure A-5. Figure A-6 shows the temporal development of reservoir capacity. Reservoir construction began in 1850. The major reservoirs of the Central Valley Project (CVP) and State Water Project (SWP) are the Shasta (4.5 MAF capacity) and Oroville (3.5 MAF) reservoirs, respectively. These reservoirs capture the flow in the wet season (reducing the flow into the Delta in the wet season) and release water for irrigation and diversions.

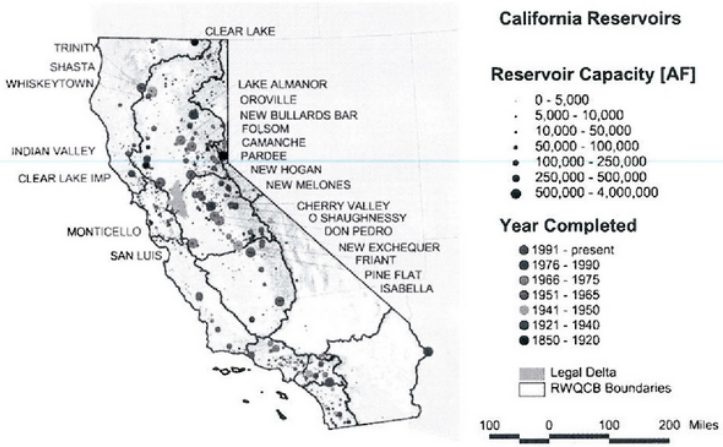

Figure A-5 – Storage reservoirs in California

Location of storage reservoirs within California. Reservoir capacity is indicated by the size of the circle, while the year construction was completed is indicated by color.

No comments

- n/a -

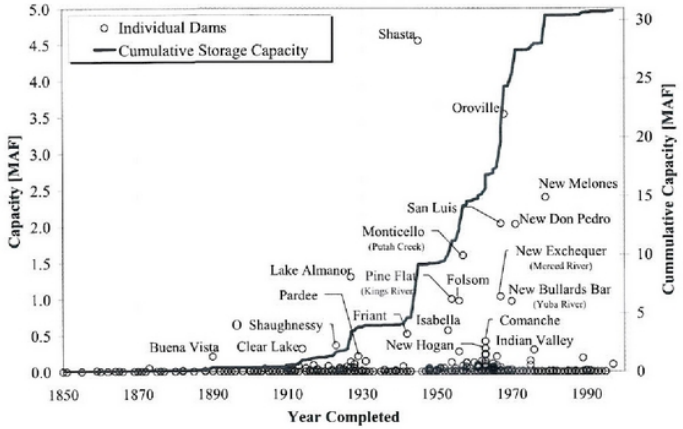

Figure A-6 – Surface Reservoir Capacity

Timeline of reservoir development in California. Individual reservoir capacity is indicated by the blue circles (left axis), while the cumulative capacity is indicated with the red line (right axis).

Water management practices have been altered by regulations that require maintenance of specified flow and salinity conditions at locations in the Bay-Delta region during certain periods of the year. The 1978 Water Quality Control Plan and State Water Resources Control Board (SWRCB) Decision 1485 established water quality standards to manage salinity to protect Delta agriculture and municipal and industrial (M&I) uses. The listing of delta smelt as a threatened species under the Endangered Species Act in 1993, followed by the Bay-Delta Accord in 1994 and the adoption of a new water quality control plan by the State Water Resources Control Board in 1995 changed the amount and timing of reservoir releases and south-of-Delta exports. California's Rice Straw Burning Act was enacted in 1992 to reduce air pollution by phasing out the burning of rice field stubble; by 1999, Sacramento Basin rice farmers were diverting additional water to flood harvested fields to decompose the stubble.

Changes in water diversions and reservoir operations have altered the magnitude and timing of river flows to the Delta, and anthropogenic modifications to the Delta landscape have altered the interaction of fresh water from the rivers with salt water from the ocean, thus changing patterns of salinity intrusion into the Delta.

No comments

- n/a -

No comments

- n/a -

No comments

- n/a -

Appendix B. Paleoclimatic Records of Hydrology and Salinity

This section presents paleoclimate records of hydrology (precipitation and unimpaired runoff) and salinity in the Bay-Delta region, in addition to those presented in Section 2 of the main report.

B.1. Methods of Paleoclimatic Reconstruction

The field of paleoclimatology aims to deduce climatological information from natural "archives" in order to reconstruct past global climate. These archives are created by such Earth processes as the formation of ice sheets, sediments, rocks, and forests. Examples of information sampled from such archives include atmospheric temperatures from ice cores and precipitation cycles from tree rings. When samples are dated, through radiometric or other methods, the data preserved therein become proxy indices, establishing a timeline of major events in the local environment of the sample. Multiple samples collected over larger spatial scales can be cross-dated to create regional climate and landscape process chronologies.

The material sampled for paleoclimatic reconstructions has limitations that decrease the resolution and confidence of data going back in time. Although paleoclimatic reconstructions have a coarser temporal resolution than modern measurements, the variations in climate and landscape responses to change are reliably described "in the first person" because the evidence of localized climate change is preserved as a time series *in situ*, absent of human influence.

The San Francisco Bay-Delta has been the focus of several paleoclimatic reconstructions. Surveys have sampled from Browns Island (Goman and Wells, 2000; May, 1999; Malamud-Roam and Ingram, 2004), Roe Island (May, 1999; Malamud-Roam and Ingram, 2004) Rush Ranch (Starratt, 2001; Byrne *et al.*, 2001; Starratt, 2004), and China Camp and Benicia State Parks (Malamud-Roam and Ingram, 2004).

Sediment cores are the predominate archive used to reconstruct Bay-Delta climate. Changes in wetland plant and algae communities are the dominant response in the Bay-Delta to climate change and associated fluctuations in temperature and precipitation. Proxies of plant and algae response to environmental conditions are preserved in the sediment cores and determined by quantification and taxonomic identification of diatom frustules (Byrne *et al.*, 2001; Starratt, 2001; Starratt, 2004), plant seeds and roots (Goman and Wells, 2000) and plant pollen (May, 1999; Byrne *et al.*, 2001; Malamud-Roam and Ingram, 2004) and measurement of peat carbon isotope ratios (Byrne *et al.*, 2001; Malamud-Roam and Ingram, 2004).

Plant communities in the Delta are characterized by salt tolerance. Salt-tolerant plant communities are dominated by pickleweed (*Salicornia* spp.) while freshwater plant

assemblages are dominated by tule (*Scirpus* spp.) and cattail (*Typha* spp.) (Atwater *et al.*, 1979). Plants contribute pollen, seeds, and vegetative tissue in the form of peat to the sediment archive. Plant material deposited to surface sediments are significantly correlated to the surrounding standing vegetation, and thus plant material preserved in sediment cores are considered autochthonous to the type of wetland existent at the time of sediment deposition, allowing reconstruction of the salinity conditions in the Delta over time.

Diatom taxa are classified according to their salinity preference expressed as the Diatom Salinity Index (DSI) (Eq 1) (Starratt, 2004). Starratt (2001) classified salinity preference as freshwater (F; 0-2‰), freshwater and brackish water (FB; 0-30‰), brackish (B; 2-30‰), brackish and marine (BM; 2-35‰), and marine (M; 30-35‰). Samples dominated by marine taxa have a DSI range of 0.00 to 0.30.

$$DSI = \frac{F + FB + 0.5B}{F + FB + B + BM + M} \quad (1)$$

Carbon-isotope ratios ($^{13}C/^{12}C$) (Eq 2) are measured by spectrometry and the δ notation calculated as

$$\delta^{13}C = \left[\left(\frac{^{13}C/^{12}C_{sample}}{^{13}C/^{12}C_{std}} \right) - 1 \right] \times 1000 \quad (2)$$

The $\delta^{13}C$ value of peat samples is a proxy for the composition of the plant assemblages contributing vegetation to the formation of the peat. Plants utilizing the C_4 mechanism have higher $\delta^{13}C$ values (~-14‰) than those utilizing the C_3 or CAM (~-27‰) (Table B-1). Using the $\delta^{13}C$ proxy can detect the presence of upland bunchgrasses such as *Spartina* and *Distichlis*.

Pollen can be classified to the taxonomic family level. *Chenopodiaceae (*now *Salicornioideae*) is representative of salt-tolerant *Salicornia*. *Cyperaceae* is representative of freshwater species including *Scirpus*. The ratio of *Chenopodiaceae* to the sum of *Chenopodiaceae* and *Cyperaceae* (Eq. 3) is a proxy of the percent relative abundance of salt-tolerant species (May, 1999).

$$\%ST = \frac{Chenopodiaceae}{Chenopodiaceae + Cyperaceae} \quad (3)$$

To establish chronologies for sediment archives, dates must be established for when material was deposited through the length of the sediment cores. Radiocarbon dating by Accelerator Mass Spectrometry (AMS) determines age by counting the ^{14}C content of plant seeds or carbonate shells calibrated against a northern hemisphere atmospheric carbon calibration curve (Malamud-Roam *et al.*, 2006). Radiocarbon dating is valid to about 40,000 years

No comments

- n/a -

before present (BP) [3], making it an ideal method for establishing dates through the period of interest for the Bay and Delta. When archived proxies are correlated with the sediment core chronology, a timeline is established reconstructing past climate and landscape response.

Table B-1 – Carbon Isotope Ratios ($\delta^{13}C$) of Plant Species in the San Francisco Estuary
(adapted from Byrne et al. 2001)

Species	Common Name	Photosynthetic Pathway	δ13C (‰)
Distichlis spicata	Saltgrass	C4	-13.5
Spartina foliosa	California cordgrass	C4	-12.7
Cuscuta salina	Salt-marsh dodder	C3	-29.8
Frankenia grandifolia	Alkali heath	C3	-30.2
Grindelia stricta	Gumplant	C3	-26.4
Jaumea carnosa	Marsh jaumea	C3	-27.2
Juncus balticus	Baltic rush	C3	-28.4
Lepidium latifolium	Perennial pepperweed	C3	-26.6
Scirpus californicus	California bulrush	C3	-27.5
Scirpus maritimus	Alkali bulrush	C3	-25.5
Typha latifolia	Cattail	C3	-27.8
Salicornia virginica	Pickleweed	CAM	-27.2

A large number of paleoclimatic reconstructions exist for California and the western U.S., but a complete discussion is beyond the scope of this report. These reconstructions are reviewed by Malamud-Roam *et al.* (2006; 2007) and provide important context to events in the Bay and Delta by recording major non-localized events and larger regional climate shifts. Important examples include: Central Valley oaks, Sierra Nevada giant sequoias, and White Mountain Bristlecone pines used to establish precipitation and temperature from the location of the tree line and tree rings; Mono Lake sediments and submerged tree stump rings for precipitation; and Sacramento and San Joaquin River floodplain deposits for flood events. These studies establish a record of environmental conditions in the Bay and Delta from their formation to the present.

B.2. Major Regional Climatic Events

Formation of the Sacramento-San Joaquin Delta

The Holocene epoch began approximately 8000 BCE at the end of Pleistocene glaciations (Malamud-Roam *et al.*, 2007). In the early Holocene, a general warming and drying period in California accompanied high orbitally driven insolation until insolation reached current values at approximately 6000 BCE. In the Sierra Nevada, western slopes were in the early stages of ecological succession following the retreat of glaciers. The modern river floodplain systems were forming in the Central Valley. Parts of the Delta and Bay were river valleys

[3] Before Present (BP) is a time scale, with the year 1950 as the origin, used in many scientific disciplines. Thus, 100 BP refers to the calendar year 1850.

No comments

- n/a -

prior to approximately 8000 to 6000 BCE, when rapidly rising sea level entered the Golden Gate and formed the early Bay estuary (Atwater *et al.*, 1979). A fringe of tidal marshes retreated from a spreading Bay until approximately 4000 BCE when the rate of submergence slowed to 1 to 2 cm per year, allowing the formation of extensive Delta marshes over the next 2000 years (Atwater *et al.*, 1979). Sedimentation from upstream sources kept up with subsidence from increasing sea-level rise.

2000 – 1 BCE

After 2000 BCE, information from archives indicates climate in the Bay and Delta was cooler with greater freshwater inflows. The Sierra Nevada became more moist and cooler during a period ca. 4000-3500 BP (Malamud-Roam *et al.*, 2006).

1 BCE - Present

The cooler and wetter period ended approximately 1 BCE, replaced by more arid conditions (Malamud-Roam, 2007). Major climatic events, known from other parts of the world, are captured in the regional paleoclimatic reconstructions and help to calibrate or correlate these reconstructions to global events. Unusually dry conditions prevailed during the Medieval Warm Period (approximately 800-1300 CE). Wetter and cooler conditions existed during the Little Ice Age (approximately 1400-1700 CE). These climate variations are reflected in variations in the plant communities.

Droughts

Two extreme droughts occurred in the region from about 900 to 1150 CE and from 1200 to 1350 CE. Low freshwater inflows to the Delta occurred during periods 1230-1150, 1400-1300, 2700-2600, and 3700-3450 B.P.

Flood Events

Periods of increase moisture occurred from 800-730 BP and 650-300 BP. Massive flooding inundated the Central Valley in the winter of 1861 (Malamud-Roam *et al.*, 2006). High periods of inflow occurred during 1180-1100, 2400-2200, 3400-3100, and 5100-3800 BP.

Sampling for paleoclimatic reconstructions captures the modern era, enabling a comparison of current conditions with conditions over the past several thousand years. The erratic nature of precipitation in California observed over the past century have been normal and small compared to natural variations over the past millennia.

Reconstructed River Flow and Precipitation Records

Meko *et al.* (2001a) used tree-ring chronologies in statistical regression models to reconstruct time series of annual unimpaired Sacramento River flow for approximately the past 1,100 years (see Section 2.1). Similarly, Graumlich (1987) used tree ring data from the Pacific Northwest to reconstruct precipitation records for the period of 1675-1975 (Figure B-1). Compared to the average observed precipitation from 1899 to 1975, the reconstructed record has above-average precipitation during the latter half of the nineteenth century (1850-1900) (Figure B-1). These relatively wet conditions during the late 1800's and the severe dry

No comments

- n/a -

conditions from the 1920's trough the 1930's in the reconstructed precipitation record are consistent with the annual unimpaired Sacramento River flow reconstruction from Meko *et al.* (2001) presented in Section 2.1.

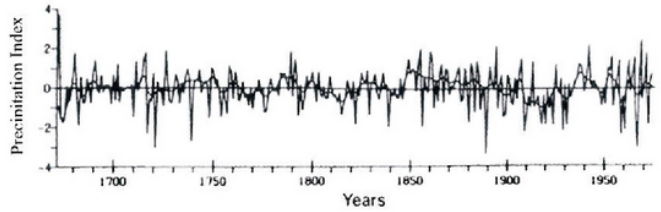

Figure B-1 – Reconstructed annual precipitation, 1675-1975
Data from Graumlich (1987). Precipitation index is presented in units of standard deviation from the 1899-1975 observed mean value.

Estimates of annual precipitation (Graumlich, 1987) and unimpaired runoff (Meko *et al.*, 2001a) from tree ring analysis are used in this study to provide hydrological context, indicating the relative hydrology (e.g. wet or dry) of a specific year and surrounding decade. The reconstructed hydrological data are not used to estimate salinity intrusion for two reasons. First, the seasonal distribution of hydrology is critical in determining salinity variability; two years with the same total annual flow could have significantly different salinity intrusion due to the timing of the flow (Knowles, 2000). Second, since 1850, anthropogenic modifications to the landscape and river flows alter the hydrodynamic response to freshwater flow, somewhat decoupling the unimpaired hydrology from the downstream response (i.e. salinity intrusion).

Malamud-Roam *et al.* (2005) and Goman *et al.* (2008) review paleoclimate as it relates to San Francisco Bay. Generally, they found that paleoclimatic studies showed that a wetter (and fresher) period existed from about 4000 BP to about 2000 BP. In the past 2,000 years, the climate has been cooling and becoming drier, with several extreme periods, including decades-long periods of very wet conditions and century-long periods of drought. As discussed in the next section, the century-long periods of drought are found in paleosalinity records in Suisun Bay and Rush Ranch in Suisun Marsh, but are much less evident in Browns Island, indicating a predominately freshwater marsh throughout the Delta. Citing Meko *et al.* (2001), they note that only one period had a six-year drought more severe than the 1928-1934 period: a seven-year drought ending in 984 CE. They also not the most extreme dry year was in 1580 CE, and state that it was almost certainly drier than 1977. On the whole, however, the last 600 years have been a generally wet period. This is reflected in the salinity records discussed in the next section.

No comments

- n/a -

B.3. Reconstructed Salinity in the Bay-Delta

Starratt (2001) reconstructed historical salinity variability at Rush Ranch, in the northwestern Suisun Marsh, over the last 3,000 years by examining diatoms from sediment cores. The taxa were classified according to their salinity preference: freshwater (< 2‰), freshwater and brackish water (0‰ to 30‰), brackish (2‰ to 30‰), brackish and marine (2‰ to > 30‰), and marine (> 30‰). Based on the composition of the diatom assemblages, Starrat identified centennial-scale salinity cycles (Table B-2).

Table B-2 – Salinity Intervals over the last 3,000 years at Rush Ranch
Salinity intervals determined from the diatom populations in a sediment core in northwestern Suisun Marsh.

Approximate Years	*Type of Interval* [a]
1850 CE – present	[not classified]
1250 CE – 1850 CE	fresh
250 CE – 1250 CE	brackish
500 BCE – 250 CE	fresh
1000 BCE – 500 BCE	brackish

[a] Classification according to Starratt (2001)

These results correspond well to other paleoclimatic reconstructions. The most recent broad-scale freshwater interval roughly corresponds to the Little Ice Age, and the most recent brackish interval corresponds to the Medieval Warm Period.

Starratt notes that the post-1850 interval indicates an increase in the percentage of diatoms that prefer brackish and marine salinities compared to the last freshwater interval, indicating an increase in salinity during the last 150 years, in comparison to the previous 600 years. During the post-1850 period, diatoms that prefer "marine" environments constitute as much as 50% of the total diatom population, a percentage that is at or above that of any other period. During the most recent years, "freshwater" assemblages constitute about 20% of the total population, a percentage that is only about 10% higher than the most recent *brackish* interval from 250 to 1250 CE.

Malamud-Roam *et al.* (2006) compared reconstructed salinity records for the past three thousand years from four locations (three tidal marsh locations and one location in the Bay) in the Bay-Delta region (Figure B-2(a)). Figure B-2(b) shows several periods with higher than average salinity (e.g., 1600-1300 and 1000-800 BP and 1900 CE to present) and several periods with lower than average salinity (e.g., 1300 to 1200 BP and 150 to 100 BP). These paleosalinity records are consistent with each other and with the paleoclimatic records of river flow and salinity presented in Section 2.

No comments

- n/a -

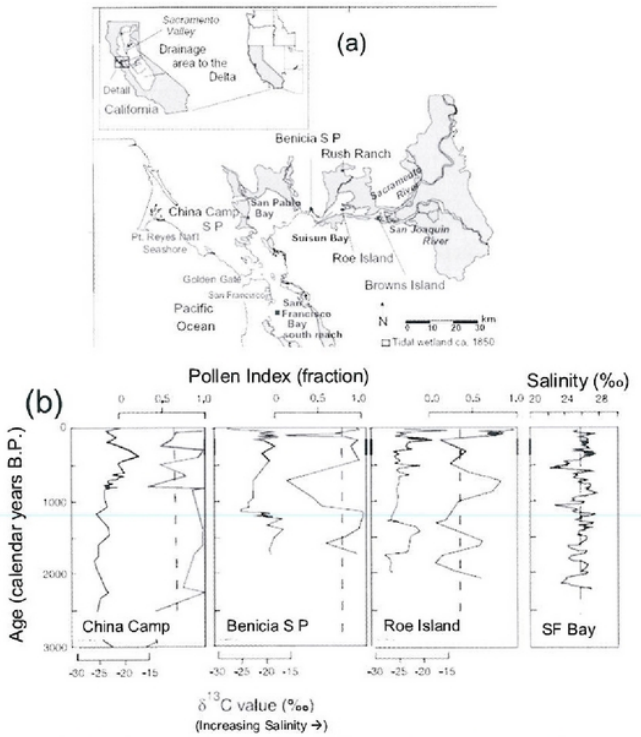

Figure B-2 – Paleosalinity records at selected sites in the San Francisco Estuary

(a) location of the three tidal marsh sites (China Camp, Benicia State Park and Roe Island) and one site in the Estuary (Oyster Point in San Francisco Bay) where sediment cores were obtained. (b) time series for the pollen index (ranging from 0 to 1, higher values corresponding to higher salinity) and the δ13C values at the tidal marsh sites; salinity at Oyster Point, San Francisco Bay (inferred from δ13O values) is also shown. The broken line shows the estimated mean pollen index prior to European disturbance. (modified from Malamud-Roam and Ingram (2004) and Malamud-Roam et al. (2006))

No comments

- n/a -

No comments

- n/a -

No comments

- n/a -

Appendix C. Quantitative Hydrological Observations

Long-term records of river runoff are useful in understanding hydroclimatic variations. Section 3.1 discusses the long-term variations of the unimpaired Sacramento River runoff and unimpaired San Joaquin River runoff. The estimates of these variables from early 1900's to the present are available on the internet . Estimates prior to the early 1900's (late 1800's to early 1900's) were obtained from a 1923 California Department of Public Works report (DPW, 1923). Table C-1 through Table C-4 present estimates of Sacramento River runoff and San Joaquin River runoff for the period of 1872-2008, obtained from DPW (1923) and http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST.

The unimpaired Sacramento River runoff is the sum of the flows from the Sacramento River at Bend Bridge, Feather River inflow to Lake Oroville, Yuba River at Smartville, and the American River inflow to Folsom Lake. The unimpaired San Joaquin River runoff is the sum of the flows from the Stanislaus River inflow to New Melones Lake, Tuolumne River inflow to New Don Pedro Reservoir, Merced River inflow to Lake McClure, and San Joaquin River inflow to Millerton Lake.

Table C-1 – Annual unimpaired Sacramento River runoff for 1872-1905
Data source: DPW (1923

Water Year	Sacramento River @ Bend Bridge	Feather River @ Lake Oroville	Yuba River @ Smartville	American River @ Folsom Lake	Sacramento River Runoff
	Acre-feet (AF)				Million acre-feet (MAF)
1872	10,200,000	7,254,000	4,352,000	4,215,600	**26.0**
1873	4,780,000	3,347,000	1,638,400	1,862,200	**11.6**
1874	7,300,000	5,571,000	3,340,800	3,079,800	**19.3**
1875	4,390,000	2,747,000	1,561,600	1,391,600	**10.1**
1876	14,500,000	6,867,000	3,594,000	4,450,900	**29.4**
1877	9,870,000	2,437,000	1,292,800	1,289,200	**14.9**
1878	17,800,000	4,836,000	2,528,000	2,721,700	**27.9**
1879	8,380,000	5,513,000	2,796,800	3,304,900	**20.0**
1880	12,300,000	7,061,000	3,641,600	4,502,100	**27.5**
1881	15,400,000	5,610,000	3,104,000	3,540,300	**27.7**
1882	8,000,000	4,797,000	2,150,400	3,264,000	**18.2**
1883	6,670,000	3,714,000	1,804,800	2,169,200	**14.4**
1884	11,400,000	6,190,000	3,104,000	4,103,000	**24.8**
1885	6,460,000	3,482,000	2,304,000	1,780,400	**14.0**
1886	14,400,000	6,384,000	3,174,400	3,918,900	**27.9**
1887	6,670,000	2,611,000	1,561,600	1,862,200	**12.7**
1888	5,430,000	2,669,000	998,400	1,575,700	**10.7**
1889	10,600,000	5,126,000	1,612,800	1,903,200	**19.2**
1890	22,700,000	12,090,000	6,176,000	7,725,200	**48.7**

Water Year	Sacramento River @ Bend Bridge	Feather River @ Lake Oroville	Yuba River @ Smartville	American River @ Folsom Lake	Sacramento River Runoff
1891	6,460,000	3,482,000	1,747,200	1,944,100	**13.6**
1892	7,250,000	5,416,000	1,945,600	2,568,200	**17.2**
1893	12,400,000	7,177,000	3,488,000	4,399,800	**27.5**
1894	8,640,000	4,410,000	2,432,000	3,304,900	**18.8**
1895	12,300,000	7,177,000	4,160,000	4,737,400	**28.4**
1896	11,343,200	7,738,000	3,641,600	3,857,500	**26.6**
1897	10,391,400	5,610,000	3,040,000	3,632,400	**22.7**
1898	5,135,800	2,805,000	1,184,000	1,186,900	**10.3**
1899	5,977,400	3,288,000	1,984,000	2,362,600	**13.6**
1900	8,712,500	6,500,000	2,956,800	3,683,500	**21.9**
1901	9,020,900	6,229,000	2,854,400	3,714,200	**21.8**
1902	11,380,600	4,468,000	2,432,000	3,079,800	**21.4**
1903	9,941,800	4,483,500	2,368,000	3,038,900	**19.8**
1904	16,095,800	9,377,000	4,101,800	5,249,000	**34.8**
1905	10,775,200	4,529,200	2,403,500	2,050,000	**19.8**

No comments

- n/a -

Table C-2 – Annual unimpaired Sacramento River runoff for 1906-2009
Data Source: http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST

Water Year	Sacramento River Runoff (MAF)	Water Year	Sacramento River Runoff (MAF)	Water Year	Sacramento River Runoff (MAF)	Water Year	Sacramento River Runoff (MAF)
1906	26.7	1936	17.4	1966	13.0	1996	22.3
1907	33.7	1937	13.3	1967	24.1	1997	25.4
1908	14.8	1938	31.8	1968	13.6	1998	31.4
1909	30.7	1939	8.2	1969	27.0	1999	21.2
1910	20.1	1940	22.4	1970	24.1	2000	18.9
1911	26.4	1941	27.1	1971	22.6	2001	9.8
1912	11.4	1942	25.2	1972	13.4	2002	14.6
1913	12.9	1943	21.1	1973	20.1	2003	19.3
1914	27.8	1944	10.4	1974	32.5	2004	16.0
1915	23.9	1945	15.1	1975	19.2	2005	18.6
1916	24.1	1946	17.6	1976	8.2	2006	32.1
1917	17.3	1947	10.4	1977	5.1	2007	10.3
1918	11.0	1948	15.8	1978	23.9	2008	10.3
1919	15.7	1949	12.0	1979	12.4	2009	12.9
1920	9.2	1950	14.4	1980	22.3		
1921	23.8	1951	23.0	1981	11.1		
1922	18.0	1952	28.6	1982	33.4		
1923	13.2	1953	20.1	1983	37.7		
1924	5.7	1954	17.4	1984	22.4		
1925	16.0	1955	11.0	1985	11.0		
1926	11.8	1956	29.9	1986	25.8		
1927	23.8	1957	14.9	1987	9.3		
1928	16.8	1958	29.7	1988	9.2		
1929	8.4	1959	12.1	1989	14.8		
1930	13.5	1960	13.1	1990	9.3		
1931	6.1	1961	12.0	1991	8.4		
1932	13.1	1962	15.1	1992	8.9		
1933	8.9	1963	23.0	1993	22.2		
1934	8.6	1964	10.9	1994	7.8		
1935	16.6	1965	25.6	1995	34.6		

No comments

- n/a -

Table C-3 – Annual unimpaired San Joaquin River runoff for 1872-1900
Data source: DPW (1923)

Water Year	Stanislaus River @ New Melones Lake	Tuolumne River @ New Don Pedro Reservoir	Merced River @ Lake McClure	San Joaquin River @ Millerton Lake	San Joaquin River Runoff
	units of acre-feet (AF)				units of million acre-feet (MAF)
1872	1,860,000	2,624,000	1,511,000	2,627,000	**8.6**
1873	959,000	1,543,000	769,000	1,122,000	**4.4**
1874	970,000	1,576,000	791,000	1,862,000	**5.2**
1875	482,000	982,000	439,000	887,000	**2.8**
1876	2,930,000	4,059,000	2,384,000	2,862,000	**12.2**
1877	408,900	561,000	220,000	809,000	**2.0**
1878	1,570,000	2,286,000	1,274,000	2,218,000	**7.3**
1879	823,000	1,353,000	659,000	470,000	**3.3**
1880	1,390,000	2,071,000	1,132,000	3,349,000	**7.9**
1881	970,000	1,576,000	791,000	2,740,000	**6.1**
1882	944,000	1,526,000	764,000	1,000,000	**4.2**
1883	1,020,000	1,600,000	813,000	1,392,000	**4.8**
1884	2,250,000	3,152,000	1,840,000	5,732,000	**13.0**
1885	582,000	1,097,000	505,000	1,218,000	**3.4**
1886	2,070,000	2,929,000	1,692,000	5,211,000	**11.9**
1887	619,000	1,139,000	538,000	1,479,000	**3.8**
1888	540,000	1,048,000	478,000	957,000	**3.0**
1889	718,000	1,262,000	599,000	1,574,000	**4.2**
1890	3,580,000	5,099,000	2,955,000	4,349,000	**16.0**
1891	959,000	1,543,000	769,000	1,227,000	**4.5**
1892	1,050,000	1,650,000	846,000	1,931,000	**5.5**
1893	2,150,000	3,036,000	1,758,000	1,914,000	**8.9**
1894	1,860,000	2,624,000	1,511,000	1,331,000	**7.3**
1895	2,700,000	3,795,000	2,236,000	2,786,700	**11.5**
1896	1,380,000	1,588,100	1,110,000	1,985,700	**6.1**
1897	1,920,000	2,437100	1,566,000	2,219,700	**8.1**
1898	498,000	960,500	450,000	922,300	**2.8**
1899	1,030,000	1,334,700	824,000	1,269,500	**4.5**
1900	1,350,000	1,628,100	1,099,000	1,343,000	**5.4**

No comments

- n/a -

Table C-4 – Annual unimpaired San Joaquin River runoff for 1901-2009
Data Source: http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST

Water Year	San Joaquin River Runoff (MAF)	Water Year	San Joaquin River Runoff (MAF)	Water Year	San Joaquin River Runoff (MAF)	Water Year	San Joaquin River Runoff (MAF)
1901	9.4	1931	1.7	1961	2.1	1991	3.2
1902	5.1	1932	6.6	1962	5.6	1992	2.6
1903	5.7	1933	3.3	1963	6.2	1993	8.4
1904	7.6	1934	2.3	1964	3.1	1994	2.5
1905	5.3	1935	6.4	1965	8.1	1995	12.3
1906	12.4	1936	6.5	1966	4.0	1996	7.2
1907	11.8	1937	6.5	1967	10.0	1997	9.5
1908	3.3	1938	11.2	1968	2.9	1998	10.4
1909	9.0	1939	2.9	1969	12.3	1999	5.9
1910	6.6	1940	6.6	1970	5.6	2000	5.9
1911	11.5	1941	7.9	1971	4.9	2001	3.2
1912	3.2	1942	7.4	1972	3.6	2002	4.1
1913	3.0	1943	7.3	1973	6.5	2003	4.9
1914	8.7	1944	3.9	1974	7.1	2004	3.8
1915	6.4	1945	6.6	1975	6.2	2005	9.2
1916	8.4	1946	5.7	1976	2.0	2006	10.4
1917	6.7	1947	3.4	1977	1.1	2007	2.5
1918	4.6	1948	4.2	1978	9.7	2008	3.5
1919	4.1	1949	3.8	1979	6.0	2009	5.0
1920	4.1	1950	4.7	1980	9.5		
1921	5.9	1951	7.3	1981	3.2		
1922	7.7	1952	9.3	1982	11.4		
1923	5.5	1953	4.4	1983	15.0		
1924	1.5	1954	4.3	1984	7.1		
1925	5.5	1955	3.5	1985	3.6		
1926	3.5	1956	9.7	1986	9.5		
1927	6.5	1957	4.3	1987	2.1		
1928	4.4	1958	8.4	1988	2.5		
1929	2.8	1959	3.0	1989	3.6		
1930	3.3	1960	3.0	1990	2.5		

No comments

- n/a -

No comments

- n/a -

No comments

- n/a -

Appendix D. Instrumental Observations of Salinity

In Section 3, historical variations in the net quantity of water flowing from the Delta to the Suisun Bay (called net Delta outflow or NDO) and salinity in the western Delta were discussed using available observations and a suite of commonly used modeling tools. This section presents additional information on the historical variations of NDO and salinity in the western Delta and Suisun Bay discussed in Section 3.

D.1. Introduction

D.1.1. Salinity Units

Salinity is specified in this report either as electrical conductivity (EC, in units of microSiemens per centimeter, or µS/cm) or as a concentration of chloride in water (in units of milligrams of chloride per liter of water, or mg/L). Conversion between EC and chloride concentration is accomplished using site-specific empirical relationships developed by Kamyar Guivetchi (DWR, 1986). Table D-1 presents a sample of typical EC concentrations and their approximate equivalent chloride concentrations.

Table D-1 – Typical electrical conductivity (EC) and equivalent chloride concentration

Electrical Conductivity (µS/cm)	Chloride (mg/L)
350	50
525	100
1,050	250
1,900	500
2,640	700
3,600	1,000

Qualitative terms such as "fresh" and "brackish" are often used to describe relative salinity. The quantitative thresholds of average chloride concentration that distinguish fresh water from brackish water and the averaging time period vary among studies. For instance, chloride concentrations of 1,000 mg/L, 700 mg/L, and 50 mg/L have been used by different studies (Table D-2).

D.1.2. Temporal and Spatial Variability of Salinity

The main variability in salinity along the length of the Bay-Delta system is due to the gradient from saline Pacific Ocean water (EC of approximately 50,000 µS/cm) to fresh water of the Central Valley rivers (EC of approximately 100 µS/cm). However, the salinity in the Bay-Delta varies both in space and time. It is important to clarify which time scales and measurement locations are being used when comparing and discussing salinity trends.

Table D-2 – Metrics used to distinguish between "fresh" and "brackish" water

Description	Sample timing or averaging	Salinity Value	
		Chloride (mg/L)	EC (µS/cm)
Isohalines in Delta Atlas (DWR, 1995)	Annual maximum of the daily maximum	1,000 mg/L	3,700 µS/cm
X2 position (Jassby *et al.*, 1995)	Daily average (or a 14-day average)	700 mg/L	2,640 µS/cm
Barge travel by C&H[4]	Monthly average of the daily maximum	50 mg/L	350 µS/cm

Salinity in the western Delta is strongly influenced by tides. The hourly or daily variability of salinity can be much larger than the seasonal or annual variability. For instance, during the fall of 1999 (following a relatively wet year[5]), hourly EC in the San Joaquin River at Antioch varied by about 6,000 µS/cm (from about 3,000 µS/cm to 9,000 µS/cm) while the daily-averaged EC for all of 1999 ranged from about 100 µS/cm to 6,000 µS/cm (Figure D-1).

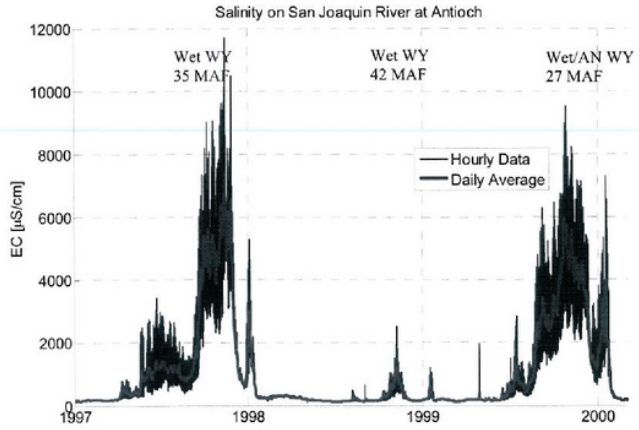

Figure D-1 – Hourly and daily salinity variability in the San Joaquin River at Antioch
Total annual unimpaired Sacramento River flow and water year type is indicated for each water year.
Data Source: IEP Data Vaults (http://www.iep.ca.gov/dss/)

[4] The California & Hawaiian Sugar Refining Corporation in Crockett (C&H) obtained its freshwater supply from barges traveling up the Sacramento and San Joaquin Rivers, generally twice a day beginning in 1908 (DPW, 1931).
[5] Water year 1999 was classified as wet using the Sacramento Valley 40-30-30 index and above-normal using the San Joaquin Valley 60-20-20 index; indices are defined in D-1641.

No comments

- n/a -

No comments

- n/a -

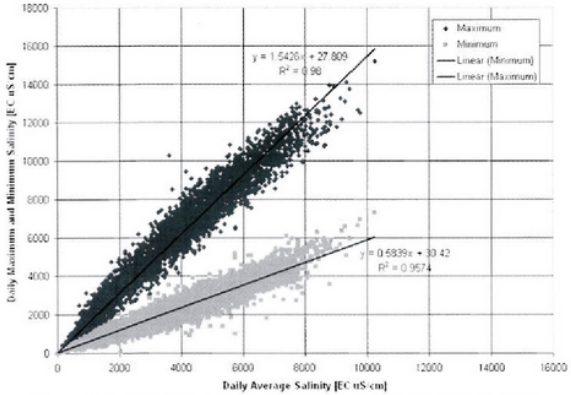

Figure D-2 – Tidal Variability in Salinity at Antioch (1967 to 1992)
Data Source: IEP Data Vaults (http://www.iep.ca.gov/dss/)

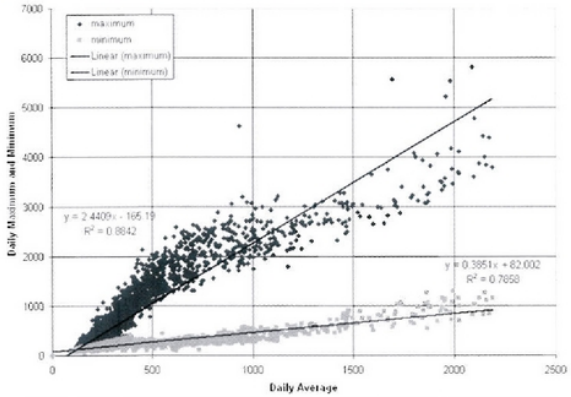

Figure D-3 – Tidal Variability in Salinity at Rio Vista (1967 to 1992)
Data Source: IEP Data Vaults (http://www.iep.ca.gov/dss/)

No comments

- n/a -

The high tide maximum, low tide minimum, and daily-averaged salinity at a given location are very different. As shown in Figure D-2, the daily maximum salinity in the San Joaquin River at Antioch can be double the daily-averaged salinity. Because of the large tidal variability in salinity, any comparisons of salinity observations should be at the same phase of the tide, or at least take into account tidal variability.

Similarly, as shown in Figure D-3, the daily maximum salinity in the Sacramento River at Rio Vista can be 170-400% of the daily average salinity. The daily minimum at Rio Vista may be 10-65% of the daily average.

D.2. Variations in the Spatial Salinity Distribution

Observations examined in this section and Section 3.3 include records from the early 1900's from the California & Hawaiian Sugar Refining Corporation in Crockett (C&H) and the long-term monitoring data from the Interagency Ecological Program (IEP). Estimates of salinity at specific locations of interest were obtained from DWR's DSM2 model and Contra Costa Water District's salinity-outflow model (also known as the G-model) (Denton, 1993). Estimates of salinity intrusion were obtained using the K-M equation (Kimmerer and Monismith, 1992).

D.2.1. Distance to Freshwater from Crockett

The California & Hawaiian Sugar Refining Corporation in Crockett (C&H) obtained its freshwater supply from barges traveling up the Sacramento and San Joaquin Rivers, generally twice a day beginning in 1905 through 1929 or later (DPW, 1931). The salinity information recorded by C&H is the most detailed salinity record available prior to the intensive salinity monitoring by the State of California, which started in 1920. This section presents a comparison of the salinity observations of C&H with recent monitoring data and modeling results to determine how the managed salinity regime of the late 20th Century compares to the salinity regime of the early 1900's.

Data Sources and Methods

C&H data: C&H operations required water with less than 50 mg/L chloride concentration. According to DPW (1931), the C&H barges typically traveled up the river on flood tide and returned downstream on ebb tide. Since the maximum daily salinity for a given location in the river channel typically occurs about one to two hours after high slack tide, the distance traveled by the C&H barges represents approximately the daily maximum distance to 50 mg/L water from Crockett. The monthly minimum, average, and maximum distance traveled by C&H barges are shown in Figure D-4 and Figure D-5. For the following analysis, monthly averages of the C&H daily maximum distances were extracted from Figure D-5 for the period of 1908-1918 (after 1917, extensive salinity intrusion was reported and agricultural diversions reportedly started affecting flows into the Delta).

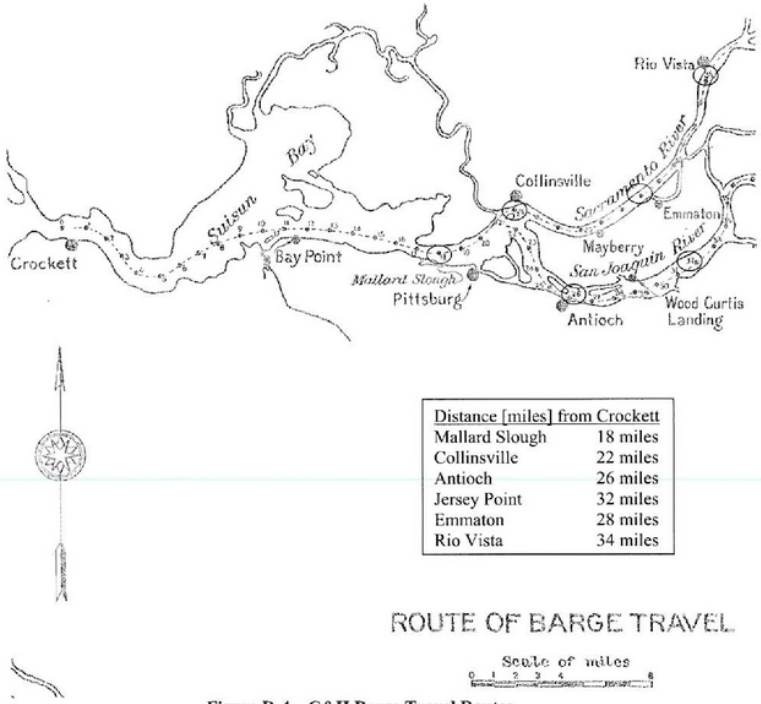

Figure D-4 – C&H Barge Travel Routes

Map adapted from DPW (1931). Red circles indicate locations of landmarks, with distance from Crockett listed in the inset box.

No comments

- n/a -

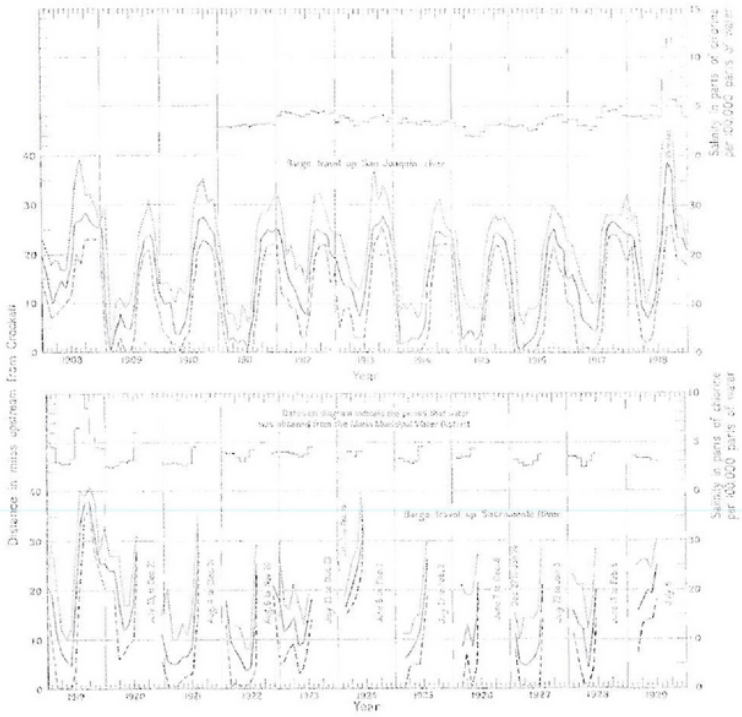

Figure D-5 – C&H Barge Travel and Quality of Water obtained

C&H barge travel up the San Joaquin River (1908 through 1918, top panel) and Sacramento River (1919 through 1929, bottom panel). The lower three lines on each panel (reference to the left axes) indicate the monthly minimum (dashed line), monthly maximum (dotted line), and monthly average (solid line) distance traveled by C&H barges to obtain their fresh water supply. The uppermost solid line on each panel (reference to the right axes) indicates the average monthly salinity of the water obtained by the barges. Figure adapted from DPW (1931)

From 1908 through 1917, C&H was able to obtain water with less than 50 mg/L chlorides within 30 miles of Crockett on average (below Jersey Point on the San Joaquin River). In 1918, the salinity of the water obtained by C&H barges had increased due to a combination of a lack of precipitation and upstream diversions (especially for newly introduced rice cultivation) (DPW, 1931). During August and September 1918, salinity exceeded 60 mg/L chloride, and the C&H barges traveled farther upstream than any time previously recorded.

No comments

- n/a -

In 1919, a wetter year than 1918, salinity was high for an even longer period of time, most likely due to increased upstream diversions for irrigation. Salinity exceeded 60 mg/L chloride during July, August, and September. Beginning in 1920, C&H abandoned the Sacramento and San Joaquin Rivers during the summer and fall seasons, replacing the water supply with a contract from Marin County. However, even during the driest years of the 1920's, C&H obtained water with less than 50 mg/L chloride below the confluence of the Sacramento and San Joaquin Rivers during a portion of every year.

Salinity observations from the Interagency Ecological Program (IEP): Long-term monitoring of electrical conductivity (EC) at multiple stations within the Bay and Delta began around 1964. Publicly-available daily-averaged data were obtained for this analysis from the Interagency Ecological Program (IEP) data vaults (Table D-3).

Table D-3 – Overview of long-term salinity observation records from IEP
(see http://www.iep.ca.gov/dss/)

Location	*Station*	*Source*	*Data*
Selby	RSAC045	USGS-BAY	Historical
Martinez	RSAC054	CDEC	Real-time
Benicia Bridge	RSAC056	USBR-CVO	Historical
Port Chicago	RSAC064	USBR-CVO	Historical
Mallard	RSAC075	CDEC	Real-time
Pittsburg	RSAC077	USBR-CVO	Historical
Collinsville	RSAC081	USBR-CVO	Historical
Emmaton	RSAC092	USBR-CVO	Historical
Rio Vista	RSAC101	USBR-CVO	Historical
		DWR-ESO-D1485C	Historical
Georgiana Slough	RSAC123	DWR-CD-SURFWATER	Historical
Greens Landing	RSAC139	USBR-CVO	Historical
Antioch	RSAN008	USBR-CVO	Historical
Jersey Pont	RSAN018	USBR-CVO	Historical
Bradford Point	RSAN024	USBR-CVO	Historical
San Andreas Landing	RSAN032	USBR-CVO	Historical

Delta Simulation Model (DSM2) Historical Simulation: The DSM2 historical simulation (1989-2006) was used to provide estimates of water quality to complement the limited field data from IEP. Because DSM2 has a very detailed spatial computational network covering the Delta and Suisun Bay, DSM2 can output much more detailed spatial and temporal salinity information than just the water quality at the IEP monitoring stations. DSM2 results include the daily-averaged EC at each model node along the lower Sacramento and San Joaquin Rivers. The location of the 350 µS/cm EC isohaline (corresponding to 50 mg/L chloride) was identified from the DSM2 results and compared with the equivalent C&H and IEP data.

No comments

- n/a -

Analysis time frame: The first decade of C&H barge travel (1908-1917) was a relatively wet period compared to the entire period of record (1906-2006) (Figure D-6). To compare conditions under similar hydrological conditions, specific recent decades (Figure D-6(a)) and select recent years (Figure D-6(b)) were selected that have comparable or slightly wetter hydrology than the C&H years. The periods 1966-1975 and 1995-2004 have similar annual unimpaired Sacramento River flow to the C&H data period (1908-1917) (see Figure D-6(a)). In addition, two wet years (1911 and 1916) and two dry years (1913 and 1918) selected from the C&H time period were compared with two wet years (1969 and 1998) and two dry years (1968 and 2002) from the IEP record.

Limitations of the analysis: The C&H data approximately represent the maximum daily salinity at a given location, whereas recent conditions (IEP or DSM2 data) are represented by the daily-averaged salinity. The estimates of the distance that must be traveled to reach fresh water under current conditions are, therefore, underestimated.

In addition, the C&H barges traveled up the San Joaquin River from 1908 through 1917, yet the equivalent travel distance for C&H barges under current conditions are estimated for the Sacramento River, and not the San Joaquin River. Under present-day conditions, the upstream distance to fresh water on the San Joaquin River is greater than for the Sacramento River, so this approach will also serve to underestimate the actual distance that C&H barges would have to travel under present-day conditions.

No comments

- n/a -

No comments

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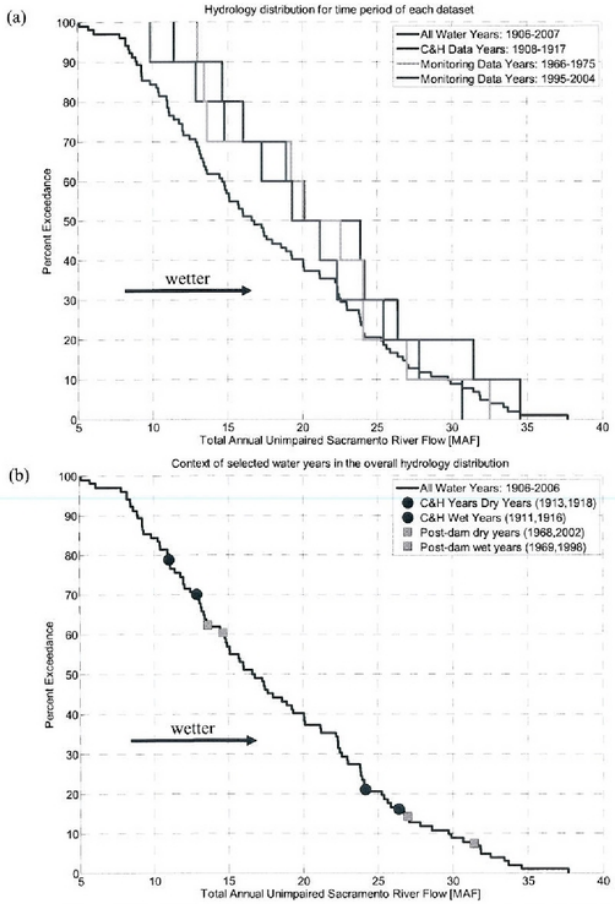


Figure D-6 – Hydrologic Context for Analysis of Distance to Fresh Water

(a) Hydrology distribution for water years 1906 to 2007, and select decades.

(b) Hydrology distribution for water years 1906 to 2007, with select water years shown for context.

Results and Discussion

Selected Wet Years

As shown in Figure D-7, the salinity patterns during the two selected C&H-era wet years, 1911 and 1916, are similar to each other. During these wet years, the location of 50 mg/L chloride water is west of Martinez for about 4-5 months (late February to early August in 1911 and from early February to late June in 1916). In contrast, during recent wet years 1969 and 1998, water with 50 mg/L chlorides or less was west of Martinez for only about 6 weeks in February and March. This comparison shows that in 1969 and 1998 the western Delta was saltier in the fall and spring than it was in 1911 and 1916, and salinity intrusion occurred much earlier in 1969 and 1998.

If barges were still traveling up the Sacramento River today to find fresh water, they would have to travel farther during the fall, spring, and summer than the C&H barges traveled during similar wet years. In 1916, fresh water retreated upstream about one month earlier than in 1911, possibly influenced by the increasing upstream diversions during 1911-1916 (see Figure 1-3). In recent years with even greater unimpaired runoff, fresh water retreats two to three months earlier than in 1916. Additionally, fresh water reaches Martinez for a much shorter period of time, about less than one month in recent years compared to four and five months during 1916 and 1911, respectively.

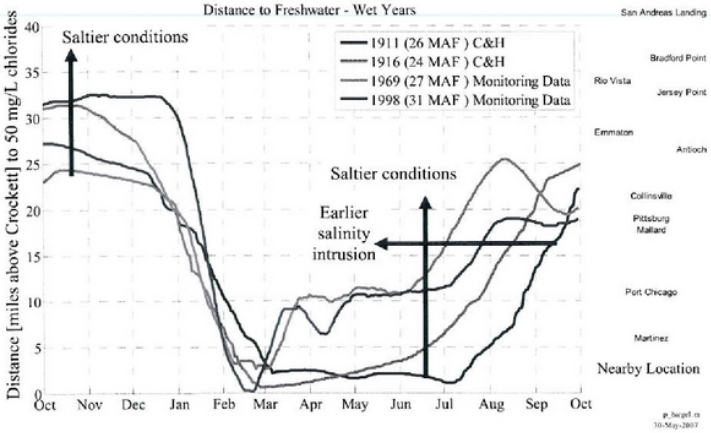


Figure D-7 – Distance to Fresh Water in Select Wet Years

No comments

- n/a -

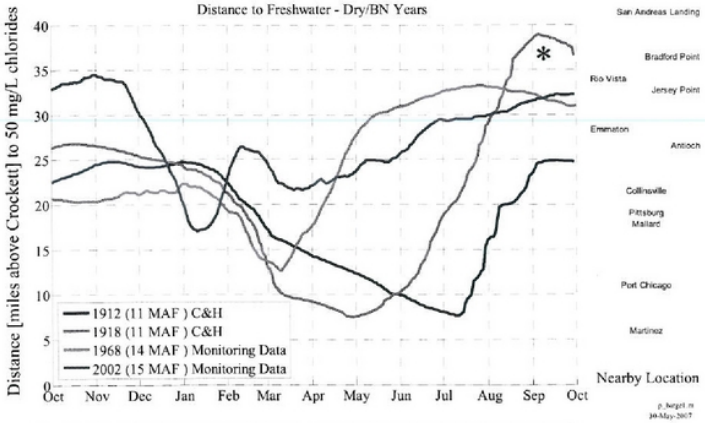
No comments

- n/a -

Selected Dry Years

Figure D-8 shows that the most visible difference between the distance to fresh water in dry years of the early 1900's and more recent dry years is the substantial increase in distance to fresh water, particularly from April through June. This indicates the spring was much fresher during the dry years of the early 1900's, before large upstream reservoirs were built to capture the spring runoff. In dry and below-normal water years under today's conditions, barges would have to travel farther during spring, summer and fall than they traveled in the early 20th Century.

The C&H barge travel distance in the dry years of 1913 and 1918 are quite different, especially the additional 10 miles of distance to fresh water traveled in August and September of 1918. C&H recorded relatively high salinity (greater than 110 mg/L chlorides) above Bradford Point on the San Joaquin in 1918, which is greater than observed salinity on the Sacramento River near Rio Vista in similar water years. This may be partially explained by the development of the rice cultivation industry around 1912 (DPW, 1931) and increased upstream diversions when seasonal river flows were already low.



* During August and September 1918, average water quality obtained by C&H exceeded 110 mg/L chlorides

Figure D-8 – Distance to Fresh water in Select Dry or Below Normal Years

Figure D-9 shows the exceedance probabilities for distance traveled up the Sacramento River for different salinity levels. During 1908-1917, on a monthly-averaged basis, C&H barges had to travel above the confluence of the Sacramento and San Joaquin Rivers (approximately 22 miles above Crockett) about 26% of this time period to reach water with salinity less than

350 µS/cm EC (about 50 mg/L chlorides). In contrast, from 1995-2006, DSM2 simulations suggest that barges would have to travel above the confluence approximately 56% of the time to reach water with salinity of 350 µS/cm EC.

The location of the 50 mg/L chloride isohaline during 1908-1917 approximately corresponds to the location of X2 (2,640 µS/cm EC, or 700 mg/L chlorides) during 1995-2006 (Figure D-9). This is equivalent to more than a 7-fold increase in salinity from the early 1900's to the present day.

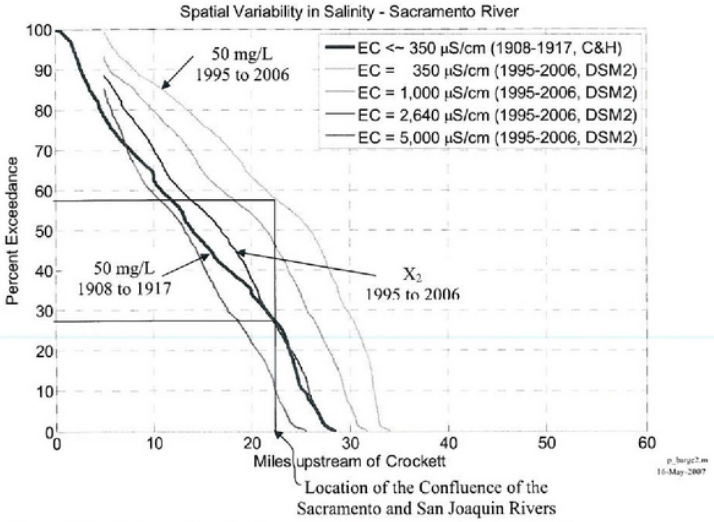


Figure D-9 – Distance along the Sacramento River to Specific Salinity Values

No comments

- n/a -

D.2.2. Maximum Annual Salinity Intrusion Before and After Large-scale Reservoir Construction

Figure D-10 shows maximum salinity intrusion during 1921-1943 (pre-CVP period), prior to the completion of the Shasta Dam of the Central Valley Project in 1945. Salinity intrusion is presented in terms of contours of 1,000 mg/L chlorides. Figure D-11 shows the maximum salinity intrusion during the post-CVP period of 1944-1990. These figures indicate the pre-CVP period experienced greater salinity intrusion than the post-CVP period, with seawater intruding farther into the Delta during 6 of the 24 pre-CVP years (1920, 1924, 1926, 1931, 1934, and 1939) than in any of the 47 years in the post-CVP period (1944-1990).

The extreme salinity intrusion during the pre-CVP period was due, in part, to relatively low runoff during these years. Meko *et al.* (2001a) determined that the period from 1917 through 1936 was the driest 20-year period in the past 400 years; this long-term drought encompassed 16 of the 24 years in the pre-CVP period. In addition, estimates of unimpaired runoff from the Sacramento River (obtained from http://cdec.water.ca.gov/cgi-progs/iodir/WSIHIST) indicate that the Sacramento River had 6 critical water years during the 24-year period of 1920-1943, whereas, the Sacramento River had only 4 critical water years during the 47-year period of 1944-1990.

Figure D-12 shows that the peak salinity intrusion during the pre-CVP period occurred between mid-August and mid-September, while peak salinity intrusion during the first portion of the the post-CVP period (1944-1960) occurred between late-July and late-August. Salinity intrusion during the pre-CVP period was not only affected by relatively low runoff, but also by extensive upstream diversions (DPW, 1931).

The salinity investigations of the pre-CVP era found that the extreme salinity intrusion was larger than any previous intrusions known to local residents and concluded the intrusion was due, in part, to the extensive upstream diversions. As observed in DPW (1931):

> "Under conditions of natural stream flow before upstream irrigation and storage developments occurred, the extent of saline invasion and the degree of salinity reached was much smaller than during the last ten to fifteen years." (DPW, 1931, page 15)
>
> "Beginning in 1917, there has been an almost unbroken succession of subnormal years of precipitation and stream flow which, in combination with increased irrigation and storage diversions from the upper Sacramento and San Joaquin River systems, has resulted in a degree and extent of saline invasion greater than has occurred ever before as far as known." (DPW, 1931, page 15)
>
> "The abnormal degree and extent of saline invasion into the delta during recent years since 1917 have been due chiefly to: first, subnormal precipitation and run-off with a subnormal amount of stream flow naturally available to the delta, and second, increased upstream diversions

No comments

- n/a -

for irrigation and storage on the Sacramento and San Joaquin River systems, reducing the inflow naturally available to the delta. It is probable that the degree of salinity in the lower channels of the delta and the extent of saline invasion above the confluence of the Sacramento and San Joaquin rivers have been about doubled by reason of the second factor." (DPW, 1931, page 42)

Conclusions from DPW (1931) and similar investigations have been corroborated by paleosalinty studies (see Section 2.3), which indicate that Browns Island in the western Delta was a freshwater marsh for approximately 2,500 years until salinity intruded in the early 20th Century.

No comments

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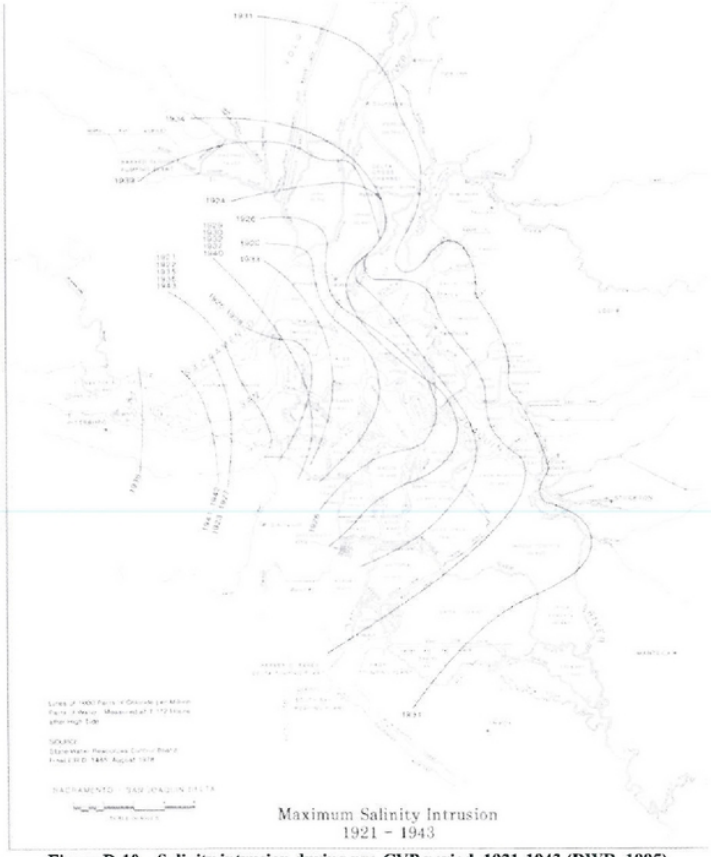

Figure D-10 – Salinity intrusion during pre-CVP period, 1921-1943 (DWR, 1995)

No comments

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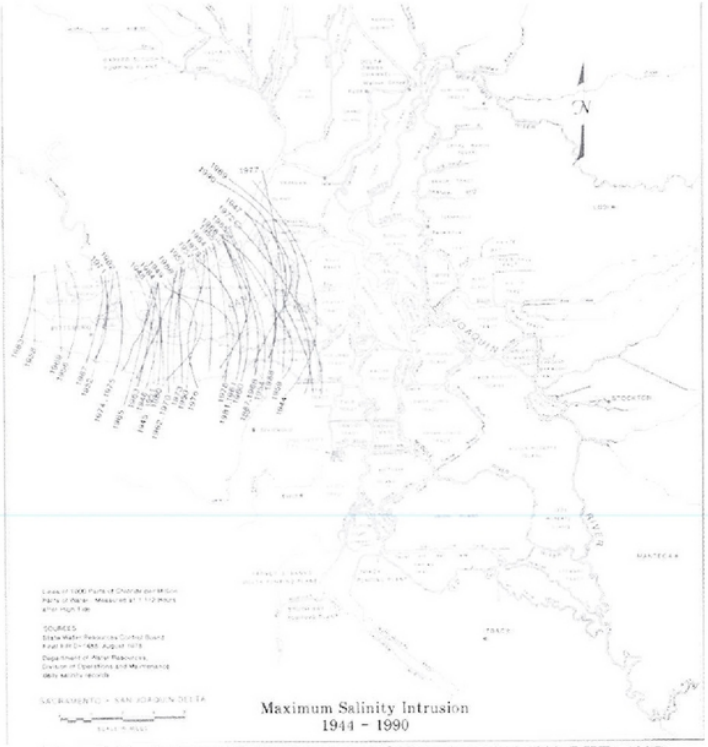

Figure D-11 – Salinity intrusion during post-CVP period, 1944-1990 (DWR, 1995)

No comments

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No comments

- n/a -

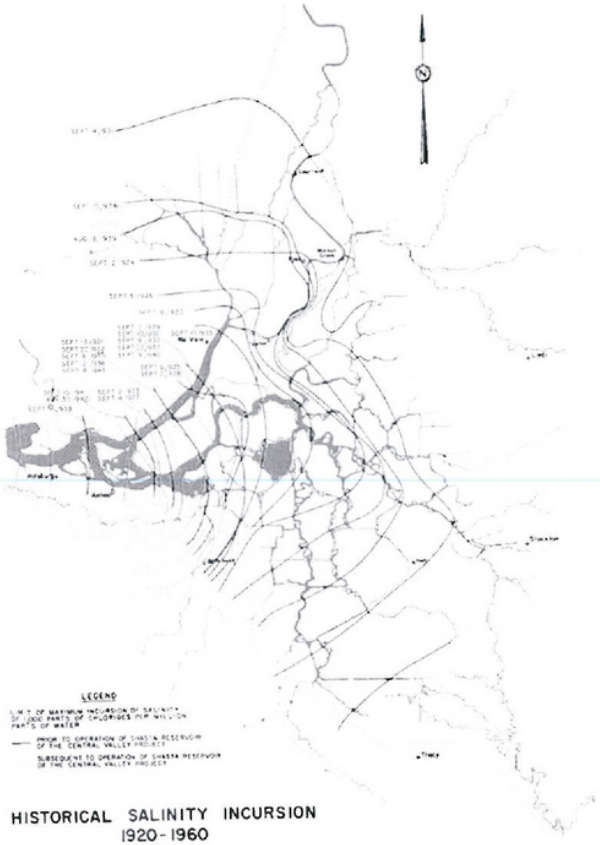

Figure D-12 – Salinity intrusion during 1920-1960 (DWR, 1960)

Figure D-13 illustrates the maximum annual salinity intrusion for comparable dry years[6]. Water year 1913 experienced the least extent of intrusion, most likely because upstream diversions were significantly less than in later years. Water years 1926 and 1932 were subject to extensive upstream agricultural diversions, while water years 1979 and 2002 had the benefit of the CVP and SWP to provide "salinity control". The CVP and SWP operations now regulate the amount of freshwater flowing through the Delta in order to prevent extreme salinity intrusions such as those observed during the 1920's and 1930's.

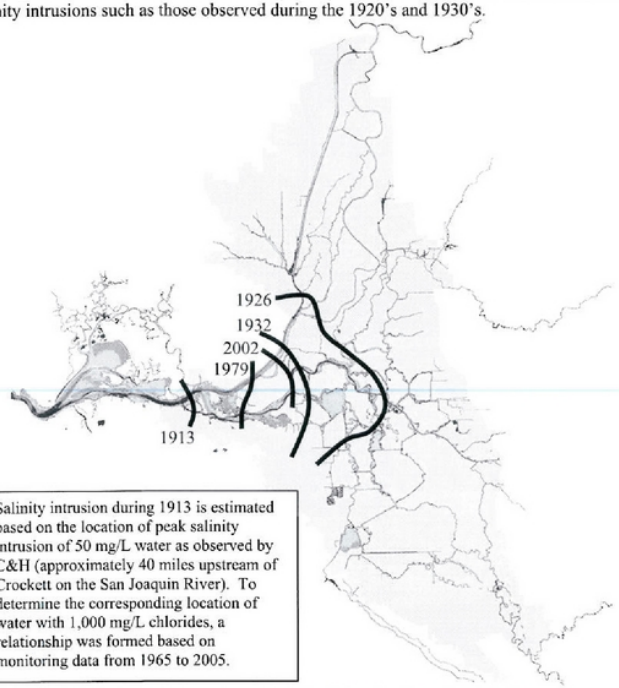

Figure D-13 – Annual Maximum Salinity Intrusion for relatively dry years
Salinity intrusion for relatively dry water years with similar total annual unimpaired runoff, using 1,000 mg/L chloride concentration to distinguish the extent of intrusion.

[6] Hydrological metrics from http://cdec.water.ca.gov/cgi-progs/iodir/wsihist for comparison: total unimpaired Sacramento River and San Joaquin River flow for water years 1913, 1926, 1932, 1979, and 2002 was 15.9 MAF, 15.3 MAF, 19.8 MAF, 18.4 MAF, and 18.7 MAF, respectively; Sacramento River water year type index for water years 1913, 1926, 1932, 1979, and 2002 was 6.24, 5.75, 5.48, 6.67, and 6.35, respectively; and San Joaquin River water year type index for water years 1913, 1979, and 2002 was 2.00, 2.30, 3.41, 3.67, and 2.34, respectively.

No comments

- n/a -

D.3. Temporal Variability of Salinity in the Western Delta

D.3.1. Seasonal Salinity at Collinsville

Collinsville, near the confluence of the Sacramento and San Joaquin Rivers, was one of the first long-term sampling locations implemented by the State of California. The Suisun Marsh Branch[7] of the DWR estimated monthly average salinity at Collinsville for the period 1920-2002, using a combination of 4-day TDS (total dissolved solids) grab samples from 1920-1971 and EC measurements from 1966-2002. Data from the overlap period of 5 years between the TDS grab samples and EC measurements were used in a statistical regression model, and the monthly averaged 4-day TDS samples were converted to monthly average EC (Enright, 2004). The result of this regression analysis was a time series of monthly EC values at Collinsville for the period of 1920-2002.

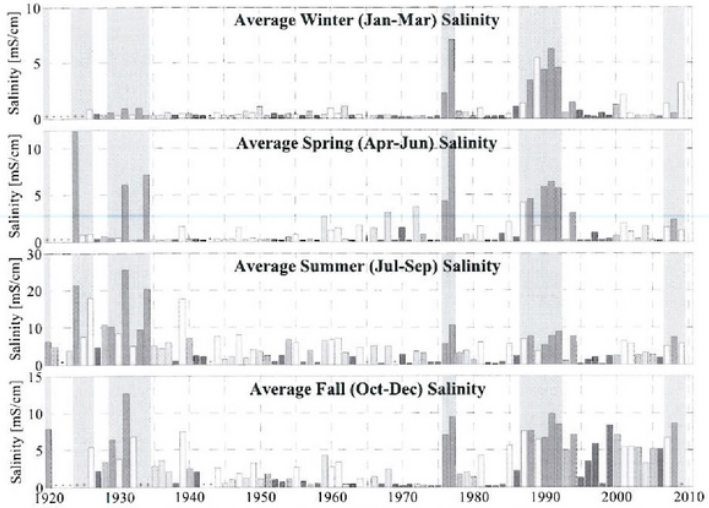

Figure D-14 – Average Seasonal Salinity at Collinsville

[7] Data provided by Chris Enright (DWR), personal communication, 2007.

No comments

- n/a -

D.3.2. Effects of Water Management on Salinity at Collinsville

In order to compare the effects of water management on salinity at Collinsville, an empirical model of salinity transport (Denton (1993), Denton and Sullivan (1993)) was used in the following analyses. Contra Costa Water District's salinity-outflow model (also known as the G-model) estimates salinity in the western Delta as a function of NDO. Estimates of salinity at Collinsville were derived for both actual historical flow (1930-2008) and unimpaired flow (1922-2003) conditions.

Figure D-15 shows the estimated monthly-averaged salinity at Collinsville under unimpaired and actual historical flow conditions. The predicted seasonal and annual variations of EC at Collinsville are dependent on corresponding variations of NDO under both unimpaired and actual flow conditions. Water management practices have a significant effect on the seasonal variability of salinity at Collinsville, particularly during dry years (1930's, 1976-1977 and 1987-1993), when Collinsville experiences a much greater range of monthly-averaged salinity under actual historical conditions than would be the case under unimpaired conditions.

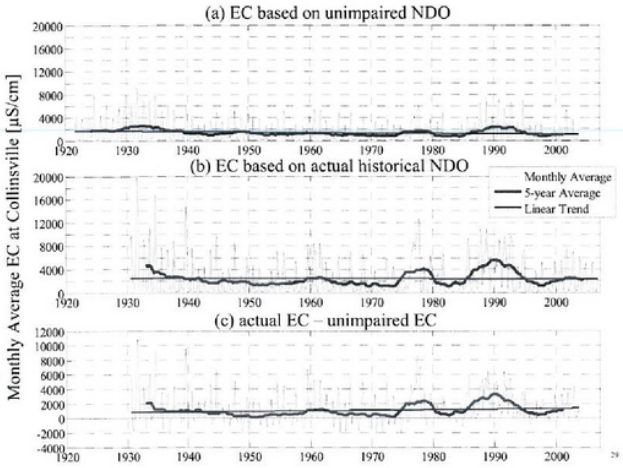

Figure D-15 – Estimates of Collinsville salinity using the G-model for unimpaired and actual historical flow conditions

Historical (actual) NDO during the 1930's was relatively low, sometimes averaging about -3,000 cfs for several months under actual conditions. The low values of NDO result in the high variability of estimated salinity in the 1930's under actual historical conditions.

No comments

- n/a -

The effects of water management on salinity at Collinsville are highlighted in Figure D-16, which shows the estimated salinity under actual historical conditions as a percent change from the unimpaired conditions. The data in Figure D-16 are the change in G-model estimates of salinity at Collinsville for the period of 1956-2003, computed as the difference between actual and unimpaired salinity as a percent change from the unimpaired salinity. Positive values indicate an increase in salinity under actual conditions and negative values indicate a decrease in salinity (freshening).

From April through August, estimated median salinity under actual historical conditions is substantially greater (more than a 100% increase) than median salinity under unimpaired conditions (Figure D-16). For the remainder of the year, there are no substantial differences between the estimates of median salinity under unimpaired and actual conditions. These distributions of estimated salinity indicate that water management practices result in significant increase in salinity throughout the year at Collinsville.

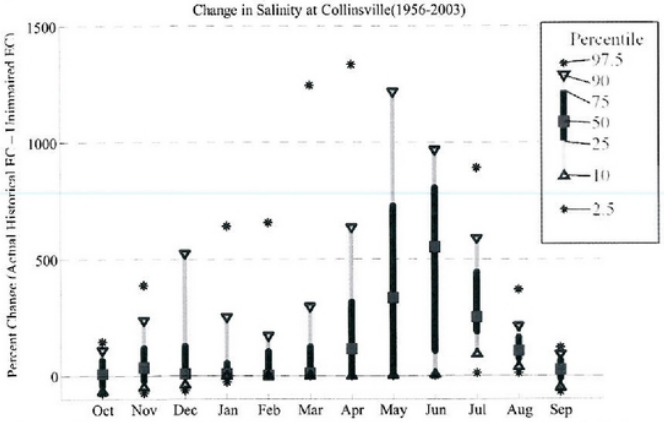

Figure D-16 – Estimated change in salinity at Collinsville under actual historical conditions, as a percent change from unimpaired conditions, 1956-2003

Figure D-17 shows the estimated salinities at Collinsville under actual historical and unimpaired conditions for just the more recent years (1994-2003). Positive values again indicate an increase in salinity under actual conditions and negative values indicate a decrease in salinity. The effects of water management on fall salinity are greater during this recent period 1994-2003 than during the longer period (1956-2003), but the effects during the recent period in the spring and early summer are smaller. This response reflects implementation of the X2 regulatory requirements agreed upon in the 1994 Bay-Delta Accord and regulated by the subsequent 1995 Water Quality Control Plan.

No comments

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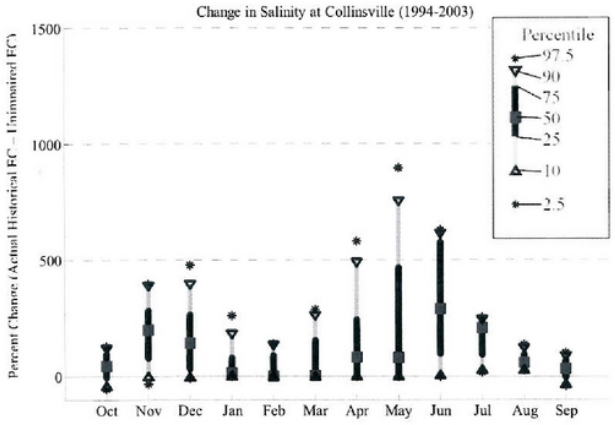

Figure D-17 – Estimated change in salinity at Collinsville under actual historical conditions, as a percent change from unimpaired conditions, 1994-2003

D.3.3. Fall Salinity in the Western Delta

Figure D-18 shows the average fall salinity (October-December) at three stations in Suisun Bay and the western Delta (Chipps Island, Collinsville, and Jersey Point). The fall salinity data categorized according to the pre-Endangered Species Act (ESA) period of 1964-1992 and the post-ESA period (1993-2006)[8]. Figure D-18 illustrates that there has been a noticeable increase in fall salinity since the release of the ESA biological opinions for winter-run salmon and Delta smelt in 1993. These increases occur during normal water years, when total annual runoff ranges from 15 to 30 MAF. During very wet years, there are large Delta outflows and the ESA limits do not affect water operations. Similarly, during very dry years, the biological opinions do not have a large effect on water operations because upstream reservoir storage is low and exports from the south Delta are already small.

[8] In 1993, delta smelt and winter-run salmon were listed under the California ESA, triggering new water management regulations.

No comments

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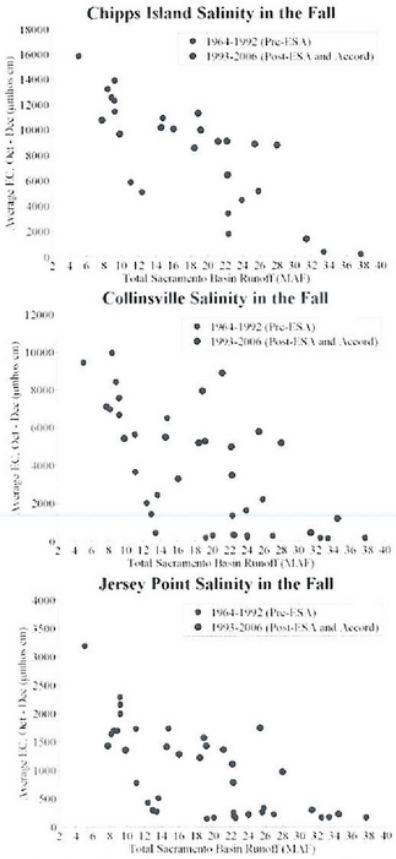

Figure D-18 – Post-ESA salinity in the Suisun Bay and western Delta

Figure D-19 shows the observed salinity at Chipps Island during the fall (October-December) for the period of 1976-1992 (pre-ESA) and 1993-2005 (post-ESA). Fall salinity at Chipps

No comments

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Island during normal years is now comparable to fall salinity during dry and critical years prior to 1994.

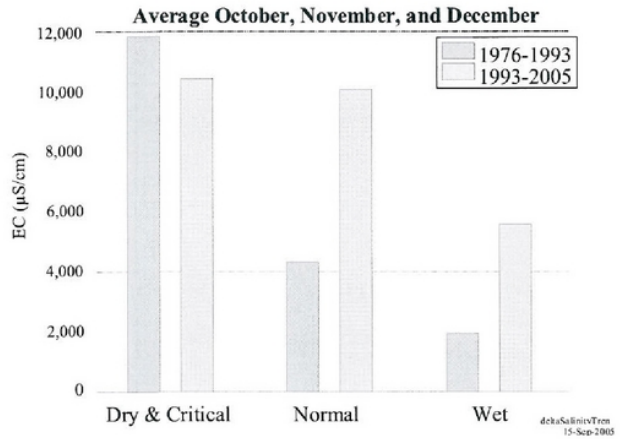

Figure D-19 – Increase in Fall Salinity at Chipps Island

D.4. General conceptual overview of salinity changes

Observed changes in seasonal salinity with time

The salinity regime in the western Delta has changed as the level of development has increased and water project operations have changed due to regulatory requirements. The comparison of three decades with similar hydrology in Figure D-20 presents a conceptual illustration of the changing salinity regime in Suisun Bay and the western Delta.

Monthly-averaged salinity in the spring and summer was substantially greater from 1966 through 1975 than during the early 1900's. However, fall and early winter salinity was lower than the early 1900's. This reduction in salinity in the fall and early winter was likely due in part to CVP and SWP reservoir releases for flood control purposes in the fall, which freshened the Delta. Flood control releases during this period were large because CVP and SWP diversions and exports were not fully developed and upstream reservoirs were often above flood control maximum storage levels in the fall, entering the wet season.

Salinity during 1995 through 2004, however, exceeded the salinities in the early 1900's during all months, for years with similar hydrologic conditions. The dramatic increase in fall

No comments

- n/a -

salinity relative to observed levels from 1966 to 1975 is accompanied by a slight decrease in spring and summer salinity. This is likely due to minimum flow and X2 requirements imposed by the State Water Resources Board in 1995. However, spring and summer salinities remain much greater relative to salinity in the early 1900's.

The range of seasonal variability during 1966-1975 was greatly reduced because the Delta did not get as fresh as it did in the early 1900's. During the last decade, seasonal variability has increased such that the range of salinity observed in the Delta over the course of a year is similar to that in the early 1900's. However, salinity intrusion has moved inland relative to the early 1900's, resulting in saltier conditions in the Suisun Bay and western Delta and a reduction in the period when fresher water is available.

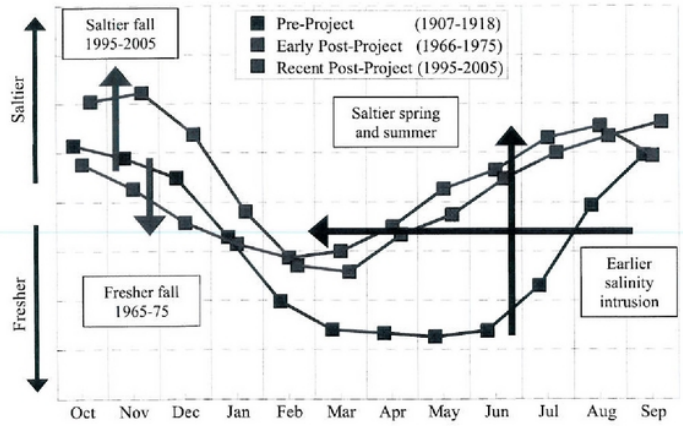

Figure D-20 – Conceptual plot of seasonal variability of salinity in Suisun Bay and the western Delta during different water management eras

The effect of water management for wet and dry years

Water management has the largest effect during dry years when the Delta stays relatively salty throughout the year with limited seasonal variability compared to unimpaired conditions. As shown conceptually in Figure D-21, during wet years the Delta freshens as much as it would under unimpaired conditions, but the Delta does not stay fresh for as long.

No comments

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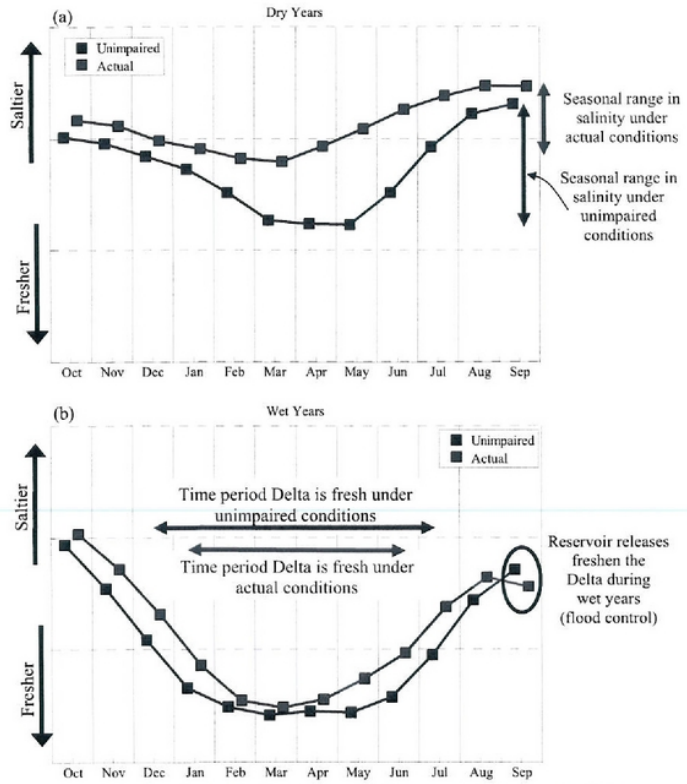

Figure D-21 – Conceptual plot of seasonal salinity variations in the Delta under actual historical conditions compared to unimpaired conditions in (a) dry years and (b) wet years

No comments

- n/a -

Appendix E. Qualitative Salinity Observations

The earliest written accounts of explorers were often concerned with adequate drinking water, and salinity was generally described in qualitative terms, such as "brackish," "fresh," or "sweet." For the purposes of comparing the present-day water quality with the historical conditions, these qualitative observations need to be quantified.

Testimony from Antioch Case (Town of Antioch v. Williams Irrigation District, 188 Cal. 451) indicated early settlers required water with less than 100 mg/L of chloride (approximately 525 µS/cm EC) for municipal use.[9] Similarly, DPW (1931) indicated that a "noticeable" level of salinity was 100 mg/L chloride. The current secondary water quality standard for municipal and industrial use is 250 mg/L chloride (1,000 µS/cm EC) (SWRCB 2006; US EPA 2003). This report assumes a value of 250 mg/L chloride (equivalent to 1000 µS/cm EC) to be the demarcation between "fresh" (or "sweet") water and "brackish" water.

E.1. Observations from Early Explorers

Table E-1 summarizes some reported observations of water quality made by early explorers and settlers. These observations were qualitative and were most likely only a glimpse of the ambient conditions and may not completely represent true historical water quality conditions. Moreover, these observations were from a time period when anthropogenic effects on this region were minimal and this region was close to natural conditions.

Table E-1 also lists the reconstructed Sacramento River annual flow (MAF) from Meko *et al.* (2001b) for the year of observation and for the previous year. For reference, the average Sacramento River flow from Meko *et al.* (2001b) for the period 1860-1977 is 18 MAF/yr.

Table E-1 – Qualitative salinity observations from early explorers

Date	Location	Description	Year / Reconstructed Flow [MAF]	Observer	Reference
1775 August	near the Sacramento-San Joaquin confluence	sweet, the same as in a lake	1774 / 25 1775 / 19	Canizares	Britton, 1987 in Fox, 1987b
1776 April	near Antioch (San Joaquin River)	very clear, fresh, sweet, and good	1775 / 19 1776 / 9	Font	Britton, 1987 in Fox, 1987b
1776 September	near the Sacramento-San Joaquin confluence	sweet	1775 / 19 1776 / 9	Canizares	Britton, 1987 in Fox, 1987b

[9] Supplement to Respondent's Answering Brief, p. 10.

No comments

- n/a -

Date	Location	Description	Year / Reconstructed Flow [MAF]	Observer	Reference
1796	unknown	salinity "far upstream" at high tide	1795 / 6 1796 / 10	Hermengildo Sal	Cook, 1960 in TBI, 1998
1811 October	near the Sacramento-San Joaquin confluence	sweet	1810 / 19 1811 / 23	Abella	Britton, 1987 in Fox, 1987b
1841 August	Three Mile Slough north of Emmaton	brackish (undrinkable)	1840 / 16 1841 / 6	Wilkes	Britton, 1987 in Fox 1987b

E.1.1. Fresh Conditions

Table E-1 indicates that some early explorers observed "sweet" water near the confluence of the Sacramento and San Joaquin Rivers both in relatively wet years (August of 1775 and October of 1811, reconstructed runoff about 19 MAF/yr) and in relatively dry years (September of 1776, reconstructed runoff about 9 MAF/yr). Except as noted, it is unknown whether these observations were made at high tide or low tide.

In order to provide a context for these anecdotal observations, present-day observed monthly salinity (EC) conditions at Collinsville (located near the confluence of Sacramento and San Joaquin Rivers) are plotted against unimpaired annual Sacramento River flow in Figure E-1. The observed data are monthly-averaged salinity (µS/cm) during August-October for the period 1965-2005. The data for the post-ESA years (1994-2005) are shown as shaded circles. Note that the anecdotal observations in Table E-1 are likely "one-time" observations, while those shown in Figure E-1 are average monthly values.

No comments

- n/a -

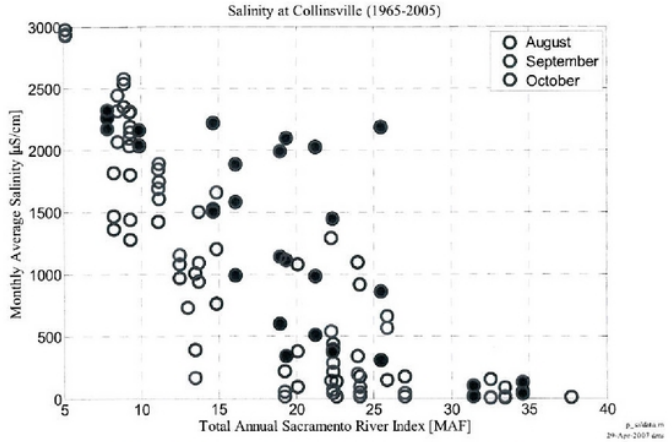

Figure E-1 – Observed salinity at Collinsville, 1965-2005

Under current management conditions, the monthly average salinity at Collinsville from August through October is only less than 1,000 µS/cm EC (the interpretation of the "sweet" threshold for drinking water) when the unimpaired runoff is greater than about 20 to 25 MAF/yr (Figure E-1). This suggests either the "sweet" threshold used in this report is too small, or salinity at Collinsville is higher today than it was in the late 18th and early 19th centuries.

If the definition of the "sweet" threshold is changed to 1,300 µS/cm EC and the post-ESA years (1994-2005) are excluded, then the monthly-averaged salinity at Collinsville during August-October is "fresh" (less than 1,300 µS/cm EC) when runoff is greater than 16 MAF/yr. This corresponds better to the anecdotal observations, discussed above, but suggests a recent increase in salinity at Collinsville during moderately wet years (with runoff between 14 and 26 MAF/yr). In 5 of the 12 post-ESA years (1997, 1999, 2000, 2003 and 2004), the water at Collinsville in October would not be considered "sweet" even under the relaxed criterion of 1,300 µS/cm EC, suggesting that October salinity under present conditions could be greater than it was in 1811.

E.1.2. Brackish Conditions

The qualitative observations of high salinity intrusion in Table E-1 are less specific about location. However, some of these observations have been interpreted by others (Cook, 1960, in TBI, 1998; Fox, 1987b) to indicate intrusion as far upstream as Rio Vista. The drought periods of 1976-1977 and 1987-1992 are similar to these periods when these qualitative

No comments

- n/a -

observations were made. During 1976-1977, daily average salinity at Rio Vista exceeded 1,000 µS/cm for approximately six months of the year. During 1987-1992, salinity at Rio Vista at high tide often exceeded 2,000 µS/cm, particularly during the fall. This is consistent with the anecdotal observations made in 1796 and 1841, which report salt water extending into the western Delta.

Summary: Interpretation of the above observations in the context of the reconstructed Sacramento River flows shows that the Delta is generally saltier than the historical levels for equivalent runoff conditions and does not support the hypothesis that the present-day Delta is managed as a freshwater system in comparison with its historical salinity regime. Moreover, this analysis indicates that salinity in the western Delta has increased during September and October in the recent years (post-1994 period).

E.2. Observations from early settlers in the Western Delta

Observations from early settlers in the western Delta provide a more complete description of salinity in the late 1800's and early 1900's than the observations from early explorers discussed earlier. Assuming the early settlers inhabited a particular region for longer time periods than the early explorers, observations from the early settlers capture the temporal variability better than those from the early explorers.

E.2.1. Town of Antioch Injunction on Upstream Diverters

In 1920, the Town of Antioch filed a lawsuit against upstream irrigation districts alleging that the upstream diversions were causing increased salinity intrusion at Antioch. The court decision, legal briefings, and petitions provide salinity observations from a variety of witnesses. Although anecdotal testimony summarized in these legal briefs is far from scientific evidence, it provides a perspective of the salinity conditions prevailing in the early 1900's. Because the proceedings were adversarial in nature, this report focuses on the testimony of the upstream interests, who were trying to demonstrate that salinity intrusion was common near Antioch prior to their diverting water (prior to 1920). Consequently, the testimony may be biased in support of this "more saline" argument. Nonetheless, these anecdotal testimonies indicate that the western Delta was less salty in the past than it is today. Analyses of some of the testimonies are presented below.

Case History

On July 2, 1920, the Town of Antioch filed suit in the Superior Court of the State of California (hereinafter referred to as the "Antioch Case") against upstream diverters on the Sacramento River and Yuba River. A hearing for a temporary injunction began on July 26, 1920, and lasted approximately three months. On January 7, 1921, Judge A. F. St. Sure granted a temporary injunction, restraining the defendants "from diverting so much water from the said Sacramento River and its tributaries, to non-riparian lands, that the amount of water flowing past the City of Sacramento, in the County of Sacramento, State of California, shall be less than 3500 cubic feet per second" (Town of Antioch v. Williams Irrigation District, Supplement to Appellants' Opening Brief, p. 13).

No comments

- n/a -

The defendants appealed to the Supreme Court of the State of California, which issued its opinion on March 23, 1922. The Supreme Court reversed the lower court and withdrew the injunction, declaring "[i]t is evident from all these considerations that to allow an appropriator of fresh water near the outlet of these two rivers to stop diversions above so as to maintain sufficient volume in the stream to hold the tide water below his place of diversion and secure him fresh water from the stream at that point, under the circumstances existing in this state, would be extremely unreasonable and unjust to the inhabitants of the valleys above and highly detrimental to the public interests besides."

The Supreme Court did not make any comment whatsoever on the evidence of salinity intrusion prior to the upstream diversions in question. The Court indicated that their decision was based on a "policy of our law, which undoubtedly favors in every possible manner the use of the waters of the streams for the purpose of irrigating the lands of the state to render them fertile and productive, and discourages and forbids every kind of unnecessary waste thereof." (Town of Antioch v. Williams Irrigation District (1922) 188 Cal. 451). The Court concluded that allowing 3,500 cubic feet per second (cfs) to "waste" into the Bay to provide less than 1 cfs of adequate quality water for the Town of Antioch would constitute unreasonable use of California's limited supply of water.

The court did not base their decision on historical salinity observations at Antioch, which indicate that Antioch was able to divert freshwater at low tide at all times from 1866 to 1918, except possibly for some fall months during some dry years (Section 3.1).

E.2.2. Salinity at Antioch – then and now

In the present day, the City of Antioch maintains a municipal water intake on the San Joaquin River at Antioch. As a general operating rule, the City of Antioch pumps water from the river when salinity at the intake is less than 1,000 µS/cm EC. Salinity varies substantially with the tide; generally the greatest salinity is observed near high tide and the lowest salinity is observed at low tide. Figure E-2 shows that salinity in the San Joaquin River at Antioch is highly variable and is dependent on tidal conditions and season. Figure E-2 indicates that for water year 2000 (an above-normal water year) the City of Antioch could pump water all day for about four and half months (early February through mid-June) and could pump for a portion of the day at low tide for another three and half months (mid-June through September). For the remaining four months (October-January), water at Antioch's intakes exceeded 1,000 µS/cm EC for the entire day, regardless of tidal phase.

Testimony from multiple witnesses in the Antioch Case indicates that fresh water was always available in the San Joaquin River at Antioch at low tide until just prior to 1920. Antioch's legal position was that fresh water was always available before upstream development. In cross-examination of Antioch's witnesses, the upstream irrigators demonstrated that brackish conditions did occasionally exist at high tide.

No comments

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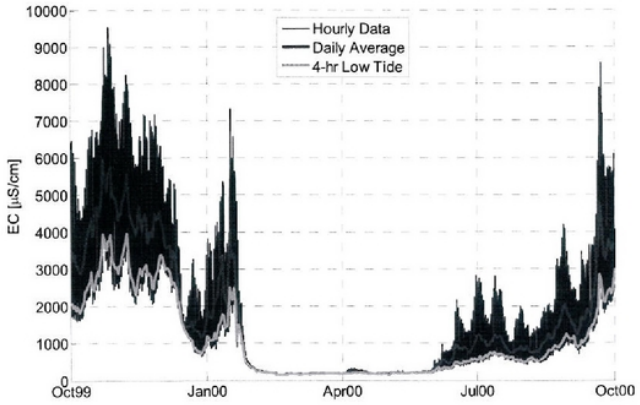

Figure E-2 – Salinity variations in the San Joaquin River at Antioch, water year 2000

Figure E-3 shows the distribution of low tide salinity (salinity during the freshest 4 hours of each day) for the period of May 1, 1983 through September 30, 2002.[10] These data indicate that, on average (in 50% of the water years), low tide salinity exceeds 1,000 µS/cm EC from late-August through December. The data in Figure E-3 provide context for the qualitative observations from the Antioch Case. During the driest 25% of the years (5 out of 20 years), low tide salinity exceeds 1,000 µS/cm EC from June through January, leaving the Antioch intake with no fresh water for eight months of the year.

Under average conditions corresponding to the period 1983-2002, Antioch would have to stop pumping from late August to late December in 10 of the 20 years; i.e., they would have an average of eight months of low-tide pumping per year, compared to the pre-1915 average of twelve months per year (based on the anecdotal information filed by the Appellants (upstream diverters) in the Antioch Case).

[10] Data Source: Interagency Ecological Program, HEC-DSS Time-Series Databases. Station RSAN007. Agency: DWR-ESO-D1485C. Measurement: 1-hour EC. Time Range: May 1, 1983 through September 30, 2002

No comments

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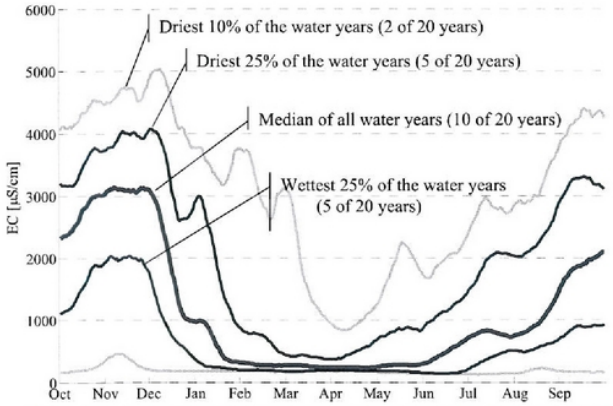

Figure E-3 – Seasonal Distribution of low-tide salinity at Antioch, 1983-2002

Conclusions

- The window, when Antioch is able to pump water with salinity less than 1,000 µS/cm EC, has substantially narrowed in the last 125 years.
- Antioch was apparently able to pump fresh water at low tide year-round in the late 1800's, with the possible exception of the fall season during one or two dry years.
- During 10 of the 20 years between 1983 and 2002, salinity was less than 1,000 µS/cm EC at low tide for only about eight months of the year.
- During the driest 5 years between 1983 and 2002, salinity was less than 1,000 µS/cm for only about four months per year; i.e., no fresh water was available at any time of the day for about eight months of the year.

E.2.3. Salinity at Kentucky Point on Twitchell Island – then and now

The appellants in the Antioch Case, representing the upstream diverters, identified one resident of Twitchell Island who reported the water at Kentucky Landing was brackish on "one or two occasions" between 1870 and 1875 during August and September. During this time, he had to travel up the San Joaquin River to Seven Mile Slough (the eastern boundary of Twitchell Island) and sailed as far as the mouth of the Mokelumne River (approximately 2

No comments

- n/a -

miles further up the San Joaquin River than the Seven Mile Slough junction) to obtain fresh drinking water.

For comparison, we look at salinity monitoring data in that region for 1981 and 2002 to see the location of potable water.[11] The source document (Town of Antioch v. Williams Irrigation District, 188 Cal. 451) for the 1870's drought uses up to 100 mg/L chloride concentration as the threshold for a potable water supply. Monitoring data from 1981 shows similar salinity intrusion as described by the Twitchell Island resident; salinity along the San Joaquin River at Bradford Island (about 1.5 miles upstream of Three Mile Slough) exceeded 1,000 µS/cm EC (about 250 mg/L Cl) during August and September. During the same time period, salinity was around 400 µS/cm EC (about 64 mg/L Cl) approximately 5 miles upstream on the San Joaquin River between Seven Mile Slough and the Mokelumne River. This comparison indicates that the extent of salinity intrusion in 1981 is similar to that which occurred in 1870 and 1871.

Similarly, in September 2002, the salinity in the San Joaquin River at San Andreas landing (less than 2 miles downstream of the Mokelumne River mouth) peaked at 977 µS/cm EC, which corresponds to approximately 225 mg/L chloride concentration. Therefore, if the observer was to travel upriver for potable water in 2002, they would have likely traveled up to the mouth of the Mokelumne River as they did in 1870. Salinity intrusion in critically dry years is even farther into the Delta than was found in 2002.

In conclusion, salinity intrusion up the San Joaquin River during the dry years of 1870 and 1871 as described by a Twitchell Island resident is consistent with salinity intrusion in 1981 and 2002 under similar hydrological conditions. There is no evidence that salinity intrusion during the drought of 1870-71 was more extensive than salinity intrusion during similar water years in the current salinity regime.

[11] 1981 and 2002 were both dry water years in the Sacramento River basin as defined in D-1641 with similar annual unimpaired Sacramento River flow to the years 1870 and 1871. Annual unimpaired Sacramento River flow in 1870, 1871, 1981, and 2002 was 11 MAF, 10 MAF, 11 MAF, and 14 MAF, respectively.

No comments

- n/a -

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January 11, 2012

Cindy Messer
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: Exhibits referred to in Comments on Recirculated Draft Programmatic Environmental Impact Report (RDPEIR)

Dear Ms. Messer and Council Members:

Please include the attached three documents in the Administrative Record in your CEQA proceedings on the Final Draft Delta Plan and RDPEIR. These three documents have been or are being referred to in the written comments of the Environmental Water Caucus and/or Friends of the River and are as follows:

Release and Report in Brief, National Academy of Sciences, A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan (May 5, 2011);

Eberhardt School of Business Forecasting Center, Benefit-Cost Analysis of Delta Water Conveyance Tunnels (July 12, 2012);

California Natural Resources Agency, Gov. Brown and Obama Administration Outline Path Forward for Bay Delta Conservation Plan, "The elements of a preferred proposal include the construction of water intake facilities with a

No comments

- n/a -

total capacity of 9000 cubic feet per second. . . and a conveyance designed to use gravity flow. . ." (July 25, 2012).

Sincerely,

E. Robert Wright
Senior Counsel
Friends of the River

No comments

- n/a -

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Date: May 5, 2011

FOR IMMEDIATE RELEASE

CALIFORNIA'S DRAFT BAY DELTA CONSERVATION PLAN INCOMPLETE; NEEDS BETTER INTEGRATION TO BE MORE SCIENTIFICALLY CREDIBLE

WASHINGTON — A draft plan to conserve habitat for endangered and threatened fishes in the California Bay-Delta while continuing to divert water for agricultural and personal use in central and southern California has critical missing components, including clearly defined goals and a scientific analysis of the proposed project's potential impacts on delta species, says a new report from the National Research Council. In addition, the scientific information in the plan is fragmented and presented in an unconnected manner, making its meaning difficult to understand.

The delta region receives fresh water from the Sacramento and San Joaquin rivers and their tributaries, and water from the delta ultimately flows into the San Francisco Bay and the Pacific Ocean. Pumping stations divert water from the delta, primarily to supply Central Valley agriculture and southern California metropolitan areas. The effects of an increasing population and the operation of the engineered water-control system have substantially altered the delta ecosystem, including its fish species.

The November 2010 draft of the Bay Delta Conservation Plan (BDCP) aims to gain authorization under the federal Endangered Species Act and companion California legislation for a proposed water diversion project, such as a canal or tunnel that would take water from the northern part of the delta directly to the south while protecting the region's ecosystems. To date approximately $150 million has been spent in developing the BDCP, which is being prepared by a steering committee of federal, state, and local agencies, environmental organizations, and other interest groups. The plan is slated for completion by 2013 and would be implemented over the next 50 years.

The draft BDCP states that the principal component of a habitat conservation plan is an "effects analysis," which the plan defines as "a systematic, scientific look at the potential impacts of a proposed project on those species and how those species would benefit from conservation actions." However, the effects analysis is still being prepared and was not included in the BDCP, resulting in a critical gap in the science. Without this analysis, it is hard to evaluate alternative mitigation and conservation actions.

The BDCP lacks clarity in its purpose, which makes it difficult to properly understand, interpret, and review the science that underlies the plan, stated the panel that wrote the report. Specifically, it is unclear whether the BDCP is exclusively a habitat conservation plan to be used as an application to "take" -- meaning to injure, harass, or kill -- listed species incidentally or whether it is intended to be a plan that achieves the co-equal goals of providing reliable water supply and protecting and enhancing the delta ecosystem. If it is the latter, a more logical sequence would be to select alternative projects or operation regimes only after the effects analysis is completed.

Furthermore, the draft BDCP combines a catalog of overwhelming detail with qualitative analyses of many separate actions that often appear disconnected and poorly integrated, the panel said. There are many scientific elements, but the science is not drawn together in an integrated fashion to support the restoration activities. The panel noted that a systematic and comprehensive restoration plan needs a clearly stated strategic view of what each scientific component is intended to accomplish and how this will be done.

"There is a strong body of solid science to support some of the actions discussed in the BDCP, but because the science is not well-integrated, we are getting less from the science than we could," said panel chair Henry Vaux, professor emeritus of resource economics at the University of California in Berkeley and Riverside. "As our report concludes, a stronger and more complete BDCP -- and the panel identified several areas for improvement -- could contribute importantly to solving the problems that beset the delta."

The study was sponsored by the U.S. departments of the Interior and Commerce. The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies. They are independent, nonprofit institutions that provide science, technology, and health policy advice under an 1863 congressional charter. Panel members, who serve pro bono as volunteers, are chosen by the Academies for each study based on their expertise and experience and must satisfy the Academies' conflict-of-interest standards. The resulting consensus reports undergo external peer review before completion. For more information, visit http://national-academies.org/study-committeeprocess.pdf. A panel roster follows.

Contacts:
Jennifer Walsh, Media Relations Officer
Shaquanna Shields, Media Relations Assistant

No comments

- n/a -

Office of News and Public Information
202-334-2138; e-mail news@nas.edu

Additional Resource:
Report in Brief

Pre-publication copies of *A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan* are available from the National Academies Press; tel. 202-334-3313 or 1-800-624-6242 or on the Internet at http://www.nap.edu. Reporters may obtain a copy from the Office of News and Public Information (contacts listed above).

# # #

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Panel to Review California's Draft Bay-Delta Conservation Plan

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No comments

- n/a -

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REPORT IN BRIEF

A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan

California's draft Bay Delta Conservation Plan—a draft plan to conserve habitat for endangered and threatened species, while continuing to divert water to agriculture and domestic water users in central and southern California—is incomplete and contains critical scientific gaps. The Bay Delta is a large, complex ecosystem that supplies water from the state's wetter northern regions to the drier southern regions, and also serves as habitat for many species. The Bay Delta Conservation Plan describes a proposal to construct a tunnel or canal to divert water from the northern Delta to the south, thus reducing the need to convey water through the Delta. This report reviews the use of science and adaptive management in the draft Bay Delta Conservation Plan and identifies opportunities to develop a more successful plan.

Credit: California Department of Water Resources

Encompassing the deltas of the Sacramento and San Joaquin Rivers, and the eastern margins of the San Francisco Bay, the San Francisco Bay Delta Estuary was once a great tidal freshwater marsh. But over the last century and a half, the land has been drained, cleared, and used for agricultural and residential purposes. Today, the Delta is a maze of canals and waterways flowing around more than 60 islands of farmland and occupying an area of 1,150 square miles.

The modified Delta plays an integral role in the water delivery system of California. Water flows into the Delta from the watersheds of the Sacramento and San Joaquin rivers, and is transported through a network of engineered canals to supply water to the drier southern regions of the state. This water helps irrigate millions of acres of arid and semi-arid farmlands, and supplies municipal water to approximately 25 million Californians.

Several other forces of change, including land subsidence, sea level rise, and increased urbanization, have also shaped the Delta, making it one of the most modified deltaic systems in the world—and this transformation has come at a cost. The Delta has supported a diverse array of fish, birds, other animals, and plants, but now, some of these species are listed as threatened or endangered. Restrictions on water exports to protect those species during some periods, together with the effects of several dry years, have exacerbated tensions over water allocation, spurring the development of a variety of plans to provide reliable water supplies and protect the ecosystem.

One of those plans is the Bay Delta Conservation Plan, currently under development by a consortium of federal, state, and local agencies; water supply entities; environmental organizations; and other parties. The plan is intended to support authorization, under both state and federal endangered species statutes, for a proposed "isolated conveyance facility," a mechanism to take water from the northern part of the Delta to the south, thus reducing the need to convey water through the Delta. At the request of the U.S. Secretaries of the Interior and Commerce, the National Research Council

No comments

- n/a -

The Bay Delta Conservation Plan is a Habitat Conservation Plan—a plan that developers must submit to the U.S. Fish and Wildlife Service before undertaking an activity or project that could incidentally take* species listed as threatened or endangered under the federal Endangered Species Act. These plans must outline actions that will be taken to protect the habitat of threatened or endangered species in order to compensate for incidental take. Similarly, the Bay Delta Conservation Plan is a Natural Community Conservation Plan under California's Natural Community Conservation Planning Act. These plans aim, among other things, to help the recovery of the species.

* "Take" includes actions that "harm" wildlife, including habitat modification that actually kills or injures wildlife by impairing breeding, feeding, or sheltering behaviors. For further clarification, please see the full report.

convened a panel of experts to review the use of science and adaptive management in a working draft of the Bay Delta Conservation Plan.

The draft Bay Delta Conservation Plan is incomplete in a number of important areas. For example, at the outset of its review, the panel found that although the Bay Delta Conservation Plan aims to address management and restoration of the San Francisco Bay Delta estuary, it omits any analyses of the potential impacts of the plan's efforts on the San Francisco Bay itself (aside from Suisun Bay). Furthermore, the report identifies other key scientific and structural gaps in the draft plan that, if addressed, could lead to a more successful and comprehensive final Bay Delta Conservation Plan.

The Lack of an Effects Analysis

The Bay Delta Conservation Plan describes an effects analysis as a systematic, scientific look at the potential impacts of a proposed project on the species that the project will potentially affect, and at how those species would benefit from various conservation actions. Clearly, such an effects analysis is intended to be the basis for the choice and details of those conservation actions. However, the effects analysis for the Bay Delta Conservation Plan is still in preparation, and was therefore absent from this draft of the plan, representing a critical gap in the science underlying the plan and the corresponding conservation actions.

The panel noted that a successful effects analysis should include an integrated description of the components of the system and how they relate to each other, a synthesis of the available science, and a representation of the dynamic response of the system.

The Lack of Clarity as to the Bay Delta Conservation Plan's Purpose

The legal framework surrounding the Bay Delta Conservation Plan is complex. In attempting to comply with all the relevant laws and regulations, the authors of the Bay Delta Conservation Plan have undertaken to develop a conservation plan of great importance, scope, and difficulty. The panel recognized these challenges, and also acknowledged that the Bay Delta Conservation Plan it reviewed is a work in progress. However, the panel found that the purpose of the Bay Delta Conservation Plan is not clear, making it difficult to properly understand, interpret, and review the science that underlies the plan.

The central issue is that although the plan states it is an application for the incidental take of listed species as a result of the proposed water diversion project, it also sets out the goals of providing a more reliable water supply for the state of California and protecting the Delta ecosystem. Because different processes would be used to fulfill these different purposes, the panel concluded that it would be difficult to evaluate the Bay Delta Conservation Plan without clarification of the plan's goals.

To obtain an incidental take permit, developers would design conservation methods to minimize and mitigate the adverse effects of a specific project or operation. However, if the Bay Delta Conservation Plan were a broader conservation plan that aims to protect the ecosystem and provide a reliable water supply, then it would be more logical to carry out an effects analysis, and then identify several alternative projects to reach the two goals. Under the latter scenario, choosing the alternative project before evaluating alternative ways to reach a preferred outcome would be post hoc rationalization—in other words, putting the cart before the horse. Scientific reasons for not considering alternative actions are not presented in the plan.

The Use of Science and Synthesis in the Bay Delta Conservation Plan

Many scientific studies have sought to understand the hydrologic, geologic, and ecological interactions in the Delta, efforts that constitute the

No comments

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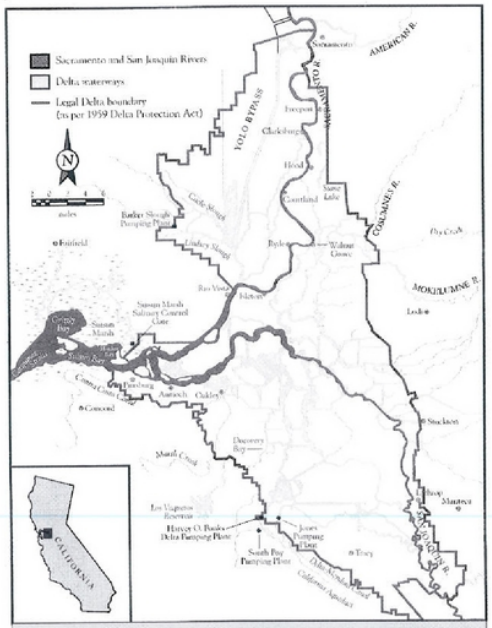

The San Francisco Bay/Sacramento–San Joaquin Delta in California.
Credit: Lund, et al. (2002)/Public Policy Institute of California

scientific foundation of the Bay Delta Conservation Plan. However, it is not clear how the authors of the Bay Delta Conservation Plan synthesized this material and incorporated it into the decision-making process that led to the plan's conservation actions. For example, it is not clear whether the analyses carried out by the numerous other Delta conservation plans and scientific assessments were used in the draft Bay Delta Conservation Plan.

Quantitative evaluation of the environmental stressors that impact species of interest, ideally using life-cycle models, would strengthen the Bay Delta Conservation Plan. For example, much of the analysis of the decline of smelt and salmonids in the Delta has focused on water operations, in particular the pumping of water at the south of the Delta for export to other regions. However, a variety of other environmental factors have potentially large effects on these fishes; and considerable uncertainties remain about the impact that different aspects of flow management in the Delta, especially management of the salinity of the water, have on their survival.

The lack of clarity concerning the volume of water to be diverted through the proposed isolated conveyance facility is another major shortcoming of the Bay Delta Conservation Plan. Without a clear specification of the volume of water deliveries, the expected impacts to the ecosystem cannot be assessed. Overall, the panel concluded that the Bay Delta Conservation Plan is little more than a list of ecosystem restoration tactics and scientific efforts, with no coordinated strategy for reaching the goals of the plan.

Adaptive Management

Numerous attempts have been made to develop and implement adaptive management strategies in environmental management, but many of them have failed for reasons such as a lack of resources, the high cost of implementation, or the inherent variability of natural ecosystems. Despite these challenges, there often is no better option for implementing environmental management regimes, and therefore the panel

Adaptive management is a formal, systematic, and rigorous program of learning from the outcomes of management actions and using this information to inform the next steps of the plan. Predicting the outcomes of management alternatives in natural systems is difficult, due to the many uncertainties involved. Adaptive management, at least in theory, can provide resource managers with iterative strategies to deal with uncertainties and use science, with a heavy emphasis on monitoring, for planning, implementation, and assessment of restoration efforts.

No comments

- n/a -

concluded that the use of adaptive management is appropriate for the Bay Delta Conservation Plan, although adaptive management applied to a large-scale problem such as the California Bay Delta will not be easy, quick, or inexpensive. These considerations further emphasize the need for clear goals.

Adaptive management programs cannot be fully described in advance, because the program must evolve as it is implemented. However, some aspects of the program could be laid out more clearly than they were in the draft Bay Delta Conservation Plan, the panel found. The plan developers would benefit from experience with adaptive management efforts in other large-scale ecosystem restoration projects, such as the Comprehensive Everglades Restoration Program.

Management Fragmentation and a Lack of Coherence

The management of any science-based process has a profound impact on the use of science and adaptive management in that process. The absence of scientific synthesis in the draft Bay Delta Conservation Plan draws attention to the fragmented system of management under which the plan was prepared, lacking coordination and accountability. No single public agency, stakeholder group, or individual was made accountable for the coherence, thoroughness, and scientific integrity of the final product. Rather, the Bay Delta Conservation Plan reflects the differing perspectives of the federal, state, and local agencies, and the many stakeholder groups involved. Unless the management structure is made more coherent and unified, the final product may continue to suffer from a lack of integration, in an attempt to satisfy all discrete interests and, as a result, fail to achieve its goals. Development and implementation of large restoration and conservation programs such as the Bay Delta Conservation Plan often require a complex structure to incorporate technical, political, and legal realities and the evolving dynamics of both the physical and organizational environments. The panel suggests the agencies responsible for implementing the plan review other examples of large scale restoration programs that have been developed and implemented. In conclusion, the panel underscores the importance of a credible and a robust Bay Delta Conservation Plan in addressing the various water management problems that beset the Delta.

Read or purchase this report and locate information on related reports at http://dels.nas.edu/wstb

Panel to Review California's Draft Bay Delta Conservation Plan: Henry J. Vaux, Jr. (*Chair*), Professor Emeritus, University of California; **Michael E. Campana**, Oregon State University; **Jerome B. Gilbert**, Private consultant, Orinda, CA; **Albert E. Giorgi**, BioAnalysts, Inc., Redmond, WA; **Robert J. Huggett**, Professor Emeritus, College of William and Mary, Seaford, VA; **Christine A. Klein**, University of Florida College of Law, Gainesville; **Samuel N. Luoma**, U.S. Geological Survey, Emeritus, Menlo Park, CA; **Thomas Miller**, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, Solomons; **Stephen G. Monismith**, Stanford University; **Jayantha Obeysekera**, South Florida Water Management District, West Palm Beach; **Hans W. Paerl**, University of North Carolina, Chapel Hill; **Max J. Pfeffer**, Cornell University; **Desiree D. Tullos**, Oregon State University; **Laura J. Helsabeck** (Study Director), **David Policansky** (Scholar), **Stephen D. Parker** (Water Science and Technology Board Director), **Susan Roberts** (Ocean Studies Board Director), **Ellen de Guzman** (Research Associate), **Sarah Brennan** (Senior Program Assistant), **National Research Council**.

The National Academies appointed the above committee of experts to address the specific task requested by the U.S. Department of the Interior. The members volunteered their time for this activity; their report is peer-reviewed and the final product signed off by both the committee members and the National Academies. This report brief was prepared by the National Research Council based on the committee's report.

EXPERT CONSENSUS REPORT

For more information, contact the Water Science and Technology Board at (202) 334-3422 or visit http://dels.nas.edu/wstb. Copies of *A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan* are available from the National Academies Press, 500 Fifth Street, NW, Washington, D.C. 20001; (800) 624-6242; www.nap.edu.

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No comments

- n/a -

EBERHARDT SCHOOL OF BUSINESS

Business Forecasting Center

Benefit – Cost Analysis of Delta Water Conveyance Tunnels

July 12, 2012

Summary

This report updates an initial benefit-cost analysis of the water conveyance tunnels at the center of the Bay Delta Conservation Plan (BDCP). We find the tunnels are not economically justified, because the costs of the tunnels are roughly 2.5 times larger than their benefits. The economic benefits of the tunnels include water supply, water quality, and earthquake risk reduction to areas served by export water agencies. The economic costs include capital costs, operating and maintenance costs, and the costs to in-Delta and upstream water users.

Benefit-cost analysis is an essential and normal part of assessment and planning of large infrastructure projects such as the $13 billion water conveyance tunnel proposal, but has not been part of the BDCP. This report fills an important information gap for policy makers and water ratepayers who will ultimately bear the multi-billion dollar costs of the project.

This is a revision of an earlier white paper dated June 14, 2012. This version has been updated to reflect new project and economic information from BDCP, and some minor technical and editorial changes.

The principal author of this report is Dr. Jeffrey Michael, Director of the Business Forecasting Center (BFC) at the University of the Pacific. The BFC is among the most recognized economic research centers in California, and is known for its expertise on the Central Valley economy, growth resource issues facing the region. On water issues, the BFC is known for being the only academic or government entity to accurately assess employment impacts during the 2009 drought, and recently led the development of the Economic Sustainability Plan for the Delta Protection Commission. This report is part of the Center's mission of independent research and analysis of economic issues and trends in the state and region.

No funding was solicited or received to support this report.

No comments

- n/a -

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No comments

- n/a -

Benefit – Cost Analysis of Delta Water Conveyance Tunnels

A pair of large water conveyance tunnels is being considered as the centerpiece of the Bay Delta Conservation Plan (BDCP). The tunnels would divert water from the Sacramento River and convey it around the Delta to state and federal water projects serving southern California rather than continuing to convey the fresh water through Delta channels. The construction cost of the tunnels is estimated at $13 billion. Essentially, the project is an updated version of the peripheral canal defeated by California voters in 1982.

This report updates an initial comprehensive economic benefit-cost analysis of the proposed tunnel with the latest information from the BDCP. Primarily using the results of the BDCP's own economic benefit and cost studies, we find benefit-cost ratios ranging from 0.3 to 0.5, meaning that there are between $1.90 and $3.36 of costs for every $1 in economic benefits. When these very low benefit-cost ratios are considered alongside the inconsistent and incomplete financial plans, it is clear that the Delta water conveyance tunnels proposed in the draft BDCP are not justified on an economic or financial basis.

The BDCP is considering a variety of sizes and operating criteria for the water conveyance tunnel. This analysis focuses on a scenario that is reported to be the preferred alternative emerging in BDCP negotiations.[1] Two large tunnels will be built to convey water below the Delta along with three intakes on the Sacramento river that can divert 9,000 cfs (cubic feet per second) from the river. The project would result in average annual water exports in a range between 4.3 maf (million acre feet) and 5.5 maf. The level of water exports through the tunnel depends on a 15-year decision-tree process based upon scientific studies of the effectiveness of the BDCP's habitat investments in recovering endangered fish populations. The studies and decision-tree process would be concurrent to the tunnel construction, so the water yield of the tunnels would not be known until after they are built.

This assessment examines a favorable water supply scenario for the water agencies that would finance the tunnels, average water exports of 5.3 maf, near the maximum level. This analysis looks only at the water conveyance proposal in the BDCP, and does not evaluate habitat creation proposals that provide their own benefits and would have several billion dollars in additional construction costs that would be primarily financed by the water bond recently moved to the 2014 ballot. As noted in a later section, this separate analysis of water conveyance infrastructure and habitat is consistent with Department of Water Resources' economic analysis guidelines.

This preliminary benefit-cost assessment can be updated with new information as it becomes available. Our intention is to motivate public agencies and others to conduct comprehensive benefit-cost analysis, and to provide appropriate economic justification of the project. Given the poor performance of the tunnel in this initial benefit-cost analysis with several assumptions favorable to tunnel construction, we believe it is highly unlikely that any subsequent benefit-cost analysis will find that the project is economically justified.

[1] For example, see "Gov. Jerry Brown's delta fix is not much of a plan." *San Francisco Chronicle*, July 9, 2012, and presentations at the June 20, 2012 meeting of the Bay Delta Conservation Plan.

No comments

- n/a -

Benefit-Cost Analysis

Benefit-cost analysis of large infrastructure projects is common practice, and broadly considered to be an essential part of good public policy analysis of large capital projects. For example, high-speed rail, the other California mega-project in the news, has included multiple benefit-cost assessments as the plan has evolved. The most recent accompanied the revised business plan and found most scenarios had about $2 in expected benefits for every $1 in expected costs.[2] The benefit-cost ratio of high-speed rail is five times higher than the benefit-cost ratio we have calculated for the Delta water conveyance tunnel.

Benefit-cost analysis of the tunnel conveyance has been called for in numerous reports and reviews of the BDCP, but still has not been appropriately conducted by any state agencies or published in any independent academic studies before this report. The Department of Water Resources (DWR) has an Economic Analysis Guidebook that provides a comprehensive description of DWR's approach to benefit-cost analysis.[3]

The DWR Economic Analysis Guidebook states the importance of benefit-cost analysis well,

> Economic analysis is a critical element of the water resources planning processes because it not only evaluates the economic justification of alternative plans but it can assist in plan formulation. (p. 1)
>
> The economic analysis should answer questions such as, Should the project be built at all? Should it be built now?, Should it be built to a different configuration or size? Will the project have a net positive social value for Californians irrespective of to whom the costs and benefits accrue? (p. 5)
>
> Benefit-cost analysis is the procedure where the different benefits and costs of proposed projects are identified and measured (usually in monetary terms) and then compared with each other to determine if the benefits of the project exceed its costs. Benefit-cost analysis is the primary method used to determine if a project is economically justified. A project is justified when:
>
> - estimated total benefits exceed total estimated economic costs;
> - each separable purpose (for example, water supply, hydropower, flood damage reduction, ecosystem restoration, etc.) provides benefits at least equal to its costs;[4]
> - the scale of development provides maximum net benefits; and

[2] The April 2012 high-speed rail benefit-cost analysis can be downloaded from http://www.cahighspeedrail.ca.gov/assets/0/152/431/6515fa4a-a098-4b88-9f19-19f0e1475e19.pdf. The business plan and benefit-cost analysis of high-speed rail have been criticized for optimistic ridership projections, but this debate has strengthened the policy and planning process for the high-speed rail project. Many of the economic benefits of high-speed rail are health related such as reduced traffic fatalities and air pollution from reduced highway travel and the benefit-cost analysis attached monetary values to health and environmental benefits.

[3] The DWR Economic Analysis Guidebook is on the web at http://www.water.ca.gov/pubs/planning/economic_analysis_guidebook/econguidebook.pdf

[4] This bullet point is critically important to the BDCP which some argue can only be evaluated as a package of water conveyance and habitat improvement projects. The DWR economic analysis guidebook is correct in stating that water supply and habitat projects should be evaluated separately.

No comments

- n/a -

- there are no more-economical means of accomplishing the same purpose. (p. 13)

The benefits and costs of an investment occur at different points in time, and can extend for very long time horizons. Benefit-cost analysis examines a full stream of costs and benefits over the expected life of the project. For this analysis, we examined 50 years after the expected completion of the tunnels in 2025.

The long streams of benefits and costs are compared using a present discounted value in current dollars. A discount rate, comparable to an interest rate, is used to account for the time value of money or the opportunity costs of using funds for a public investment. Public investment has opportunity costs, because it competes with and crowds out funding for private consumption, investment or alternative public investments.

Benefit-cost results can be sensitive to the level of the discount rate, and the choice of discount rate is sometimes controversial in benefit cost analysis. Federal government guidelines recommend the use of a 7% discount rate.[5] The DWR Economic Analysis Guidebook endorses a 6% discount rate. Many economists recommend a lower discount rate, such as 3%, when looking at long-lived investments or regulations to combat long-run, global issues such as climate change. This analysis uses scenarios with a 3% and 6% discount rate.

Benefit-cost analysis is not just a pass/fail test to be taken after an investment proposal is finalized. It should be conducted and refined throughout a planning process as it yields valuable insights about a projects strengths, weaknesses, and overall merit. The absence of benefit-cost analysis throughout the BDCP process is a significant weakness that has left policy makers poorly informed to make a decision about a very costly investment with far ranging economic effects.

The objective of this report is to fill an important information void, and to challenge tunnel proponents to make their economic case using an accepted and established benefit-cost framework. Most of the values for benefits and costs in this report are taken directly or clearly derived from BDCP documents or reports sponsored or cited by tunnel proponents. Most assumptions required to derive values are made in ways that favor building the tunnel. The detailed sources and discussion of study assumptions are in the sections that follow.

Benefits of a Delta Water Supply Tunnel

The delta water supply tunnels would provide four types of potential benefits: higher export water supply, improved export water quality, earthquake risk reduction for water exports, and possible environmental benefits for endangered fish species. There is a trade-off between increasing water supply from the tunnels and their potential benefits for fish.

[5] See Office of Management and Budget, Circular No A-94. http://www.whitehouse.gov/omb/circulars_a094#7

No comments

- n/a -

The California Department of Water Resources has recently contracted with the Brattle Group to conduct an Economic Benefit Analysis of the BDCP led by Dr. David Sunding.[6] The quantification of economic benefits in this section follows the framework in the scope of work in the "Benefits Analysis," and the values used in this report are taken directly from the preliminary results presented by Dr. Sunding at the BDCP public meeting on June 20, 2012.[7] The benefits in the Brattle presentation are for the period of 2022 to 2050, whereas this analysis assumes the tunnels would open in 2025 and considers benefits from fifty years of operation, 2025 to 2074. To make the adjustment, we calculated the average annual benefit in the 29 years of the Brattle analysis, and assumed it was constant over the fifty year period from 2025 to 2074.[8]

The Brattle analysis is not a comprehensive statewide benefit-cost analysis, but has a more narrow purpose to "assess whether the benefits of BDCP are sufficient to justify the costs to the agencies receiving project water supplies." In addition to providing reliable, current estimates for several components of benefit-cost analysis, the Brattle "Benefits Analysis" raises some additional considerations for financial feasibility that are discussed later in this report.

Export Water Supply:

The Brattle group estimates the present value of water supply benefits from 2022 to 2050 at $1.898 billion for urban users and $1.138 billion for agricultural exporters using a 3% discount rate. This equates to average annual operating benefits of about $361 per acre foot, averaged across both agricultural and urban water exports. The average annual benefit of $136 million for urban agencies and $81 million for agricultural agencies creates a present value of export water supply benefits of $3.916 billion using a 3% discount rate and $1.700 billion using a 6% discount rate when this annual benefit of the tunnels is extended over the 50 year period beginning in 2025.

Export Water Quality Benefits:

Improved export water quality is a significant benefit of the proposed Delta tunnel. The Brattle group estimates the present value of water quality benefits from 2022 to 2050 at $1.802 billion

[6] The Economic Benefit Scope of Work is available at http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Economics_Benefit_Scope_of_Work.sflb.ashx

[7] Dr. Sunding's presentation from the meeting is available on the BDCP website, http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/June_2012_Public_Meeting_Presentation_6-20-12.sflb.ashx. Some minor adjustments to the Brattle results have been made to reflect two differences in the scenario analyzed in this report. We assume the tunnel begins operation in 2025 as stated in BDCP documents, not the more optimistic 2022 used in the Brattle modeling. Also, we analyze benefits and costs out to 2075, 50 years of operation, rather than the 2050 end date in the Brattle analysis by assuming benefits continue at a constant annual rate beyond 2050. This assumption may understate total benefits somewhat, but by a much smaller amount than cutting the analysis off in 2050.

[8] This simplifying assumption may somewhat understate benefits since the benefits of the tunnel grow slowly over time and are likely to be somewhat higher in the post 2050 period than the pre-2050 period. However, it may also overstate benefits in the early years that are less affected by discounting. Overall, it has little effect on the results. An alternative option to ignore years after 2050 would result in much lower benefit estimates and significantly bias the analysis against the tunnels.

No comments

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for all water exporters using a 3% discount rate. This equates to average annual benefits of $129 million after the tunnels are operating. If this annual benefit is extended over a 50 year period beginning in 2025, the present value of export water quality benefits are $2.328 billion using a 3% discount rate and $1.010 billion using a 6% discount rate.

When considering water quality benefits, it is important to note that the tunnel itself does not do anything to purify water supplies. It improves export water quality, because the tunnel moves Delta water exporters' diversion points to a stretch of the Sacramento River between Clarksburg and Courtland where water quality is better. The new intake would be upstream of the existing diversions of Sacramento River water by most Delta farmers, the Contra Costa Water District, and the cities of Stockton and Antioch, whereas the current intakes are downstream of these users. Thus, any water quality benefits received to the export projects will be at least partially offset by a degradation of water quality to those water users who will now be downstream of the massive intakes of the new tunnel. Many of these offsetting costs have not been thoroughly analyzed, but are at the root of much of the opposition to the proposed Delta tunnels. Some of these potential costs are included in the In-Delta and Upstream Impacts section in the cost assessment that follows.

Earthquake Risk Reduction:

A massive earthquake that floods Delta islands and disrupts water conveyance is frequently cited as the most important economic justification for an isolated water conveyance facility around the Delta. This is inaccurate. The Delta tunnels are often incorrectly portrayed as the only way to protect the economy from a catastrophic earthquake risk, and economic risks of water supply disruption are often inflated by including non-water supply economic losses. In this section, we first assess the economic benefit from the tunnels' earthquake protection assuming that there are no seismic upgrades to the Delta levee system. We use these values in the benefit-cost analysis. Second, we discuss alternative options for reducing seismic risk that protect against a broader set of economic risks at lower cost than the tunnels.

The scope of work for the BDCP "Economic Benefit" analysis described a correct approach for an economic assessment of seismic risks, "After developing estimates of the probability of various outage scenarios, Contractor will calculate expected losses and characterize the risk inherent to the current system." In the June 20 presentation at the BDCP meeting, the Brattle analysis did not include probabilities of outage scenarios or calculate expected losses. It only showed losses from a scenario when a massive earthquake occurs on the first year the tunnels are operating. However, it is straight forward to use these results to derive the expected annual losses called for in the scope of work.

The length of seismic outages that are currently being discussed as likely, especially in light of recent and planned responses to the levee and emergency response system and the effect of freshwater flushing out the Delta, is on the order of 6 to 12 months. According to the June 20 presentation by the Brattle Group, the estimated present value cost of an outage occurring in 2022 as $722 million for 6 months, and $2.093 billion for a 12 month water supply outage. The effect of discounting needs to be eliminated to calculate an expected annual loss. The undiscounted cost of a 6 to 12 month outage in 2022 is $970 million to $2.812 billion.

No comments

- n/a -

To calculate an expected value, these undiscounted expected annual losses would be multiplied by an annual probability of such a seismic event and failure occurring. According to Figure 5 in the executive summary[9] of the Delta Risk Management Strategy Phase 1 report, the annual probability of 10+ islands failing from earthquake is about 3%, and the annual probability of 30 or more islands failing is about 1%. Many engineers feel that these failure probabilities are far too high[10], but we utilize them below in the absence of more current published probabilities.

Table 1 Expected annual urban losses from a Delta earthquake

Annual Probability	6 mos outage ($970m)	12 mos outage ($2,812m)
.03	$29.1 m	$84.4 m
.02	$19.4 m	$56.3 m
.01	$9.7 m	$28.1 m

The median value in the table is about a $29 million expected annual urban losses that could be avoided if the Delta water supply tunnels were built. The Brattle presentation did not calculate agricultural losses, but assuming that the urban to agriculture ratio of earthquake protection benefits is similar to the water supply benefits, the expected annual benefits from earthquake protection are $48 million annually for urban and agriculture combined. If this annual benefit is extended over a 50 year period beginning in 2025, the present value of earthquake protection benefits are $866 million using a 3% discount rate and $376 million using a 6% discount rate. Although we use these values in the benefit-cost analysis, they are likely to be far too high as the earthquake probabilities are lower, and, as explained below, there are less costly options that could lower the risk of seismic water export outages to near zero.

If a massive earthquake were to cause ten or more Delta islands to simultaneously flood, the human and economic losses that would result are much larger than the impact on water supplies. According to the Delta Risk Management Strategy (DRMS) reports, hundreds of people in the Delta would drown in such a catastrophic flood, possibly more. In addition, the DRMS reports found that interruptions of export water supply would be only 20% of the economic loss of such a catastrophe. Much larger economic losses would come from disruptions to natural gas systems, electricity transmission and generation, state highways, ports, railroads, and significant losses of in-Delta businesses, homes, and farmland. Given the scale of these potential losses to multiple types of economic infrastructure, it makes sense to consider seismic upgrades to the Delta levee system that protect all economic values in the Delta, including water exports. Unlike a tunnel, seismic levee upgrades could also save hundreds of lives and prevent environmental destruction of such a catastrophic flood.

Two reports by state agencies have identified seismic levee upgrades as a viable earthquake risk reduction strategy in the Delta.[11] The Delta Protection Commission Economic Sustainability

[9] http://www.water.ca.gov/floodmgmt/dsmo/sab/drmsp/docs/drms_execsum_ph1_final_low.pdf

[10] For example, Dr. Robert Pyke, a well-known geotechnical engineer states that the probability of an earthquake flooding ten or more islands is much lower than 1%.

[11] "Economic Sustainability Plan for the Sacramento-San Joaquin River Delta." Delta Protection Commission. January 2012. http://www.forecast.pacific.edu/desp.html. "Risks and Options to Reduce Risks to Fishery and Water Supply Uses of the Sacramento/San Joaquin Delta." Department of Water Resources and Department of

No comments

- n/a -

Plan estimated the cost of 300 to 600 miles of seismic levee upgrades at between $2 billion and $4 billion, including riparian habitat enhancements on the enlarged levees. The Department of Water Resources' January 2008 AB 1200 found an "Improved Levees" scenario with 100 miles of seismic upgrades to eight islands in the south Delta was the lowest cost of three promising risk reduction strategies, including a peripheral canal.[12] In addition, a 2007 PPIC report estimated the cost of a similar Dutch style, "Fortress Delta" strategy at $4 billion.[13] Seismic levee upgrades are 1/6 to 1/3 the cost of the proposed water conveyance tunnel, and provide a much larger and broader range of risk reduction benefits to the economy.

Understanding the larger picture of earthquake risk is essential because benefit-cost analysis is based on "with and without" comparisons to the next best alternative. It is hard to envision that the state and federal governments would allow the seismic risk to human life and other economic assets in the Delta to remain unaddressed even if water exporters moved ahead with a Delta tunnel. Since necessary seismic upgrades to Delta levees could be completed by the time a Delta tunnel conveyance was constructed, a water supply tunnel would create no additional seismic protection for water exports. In this scenario, the earthquake risk reduction benefits of the water supply tunnel are zero.[14] Although we believe zero is a more appropriate value for benefit-cost analysis, we utilize the higher estimates that assume that alternative strategies to reduce seismic risk are not implemented, and thus the risks to the broader economy and public safety are ignored.

Environmental Benefits:

At equal levels of water exports, a water supply tunnel could have environmental benefits for endangered fish over the current diversion location in the south Delta that causes reverse flows in some Delta rivers and entrainment of endangered fish in the pumps. However, as water exports are increased beyond the no-tunnel estimate of 4.7 maf of average exports, the marginal environmental benefits of a tunnel diminish. The BDCP's most recent "effects analysis" found that an operating plan that includes 5.9 maf of average exports would harm many of the endangered species the BDCP intends to help. This benefit-cost analysis assumes an increase in water exports to a slightly lower level of 5.3 maf, near the top of the 4.3maf to 5.5maf range that is reported to be under current consideration. At higher levels of water exports, most if not all environmental benefits that could directly result from a tunnel are consumed or monetized in the form of higher water exports, and the environmental benefits of

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Fish and Game. January 2008.
http://www.water.ca.gov/floodmgmt/dsmo/sab/drmsp/docs/AB1200_Report_to_Legislature.pdf.

[12] The seismic upgrade of only 8 islands was found to reduce the cost of water export interruptions from the largest Delta earthquake by 2/3, and the strategy had the largest overall economic risk reduction because it also protected other economic assets from flood in the case of an earthquake.

[13] The PPIC ruled out a "fortress Delta" solution in 2007, because its $4 billion cost was seen as too high, and they assumed a peripheral canal cost only $3 billion. The PPIC also ignored or downplayed public safety and the risk to non-water supply infrastructure. See "Envisioning Futures for the Sacramento-San Joaquin Delta" Public Policy Institute of California, February 2007. http://www.ppic.org/main/publication.asp?i=671

[14] If the tunnel conveyance were implemented as part of a Delta policy package that prevented or delayed seismic levee upgrades in the Delta, it could be argued that that the net earthquake risk reduction benefits of a tunnel are negative compared to the next best alternative.

No comments

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the BDCP would come from an extensive program of habitat restoration separately funded by state and federal taxpayers. If the tunnel did not result in increased water exports, there could be an increase in environmental benefits, but the water supply benefits would drop to zero. This trade-off between export water supplies and environmental benefits has been at the center of much of Delta discussions. Because increased water exports are essential to financing the tunnel by water contractors, we believe that a more environmentally beneficial scenario of tunnel conveyance that does not result in increases export water supplies is financially infeasible and irrelevant. Thus, we focus on the most realistic case of high water exports.

Costs of a Delta Water Supply Tunnel

Capital Costs:

We use the $12.7 billion construction cost estimate from Chapter 8 of the February 29, 2012 Draft Bay Delta Conservation Plan (BDCP).[15] There are news reports that tunnel cost estimates have risen to $14 billion[16] and possibly more. However, the proposed design change to a 9,000 cfs system with three intakes and large gravity fed tunnels may reduce construction costs. The elimination of two intakes and an intermediate pumping plant from the original 15,000 cfs design could reduce the cost estimate by about $2 billion. However, the gravity flow tunnels may have to be larger than originally estimated[17] which would increase costs. Since there are conflicting reports that costs have increased or decreased by roughly $2 billion, we stay with the original cost estimate. These figures are easy to revise once updated cost estimates are available. In addition, this construction cost estimate does not include costs for "avoidance and minimization" measures associated with construction of the tunnel conveyance, since no cost estimate for this component was included in the most recent draft of BDCP.

Chapter 8 of the BDCP describes a financing strategy for construction that would involve issuing a series of 4 revenue bonds with 40 year repayment terms. Debt servicing costs are estimated at $1.1 billion annually from 2021 through 2056, and the last of the bonds would be retired in 2061. Table 8-61 of BDCP Chapter 8 details the distribution of the $12.7 billion in construction costs over time. The present value of these construction costs are $10.777 billion using a 3% discount rate and $9.205 billion using a 6% discount rate.

Operating and Maintenance Costs:

The February 29, 2012 draft BDCP estimates operation and maintenance costs for the Delta tunnel at $85 million annually, including $17.8 million in electricity costs.[18] For the 50 year

[15] http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/BDCP_Chapter_8_-_Implementation_Costs_and_Funding_Sources_2-29-12.sflb.ashx

[16] Weiser, M. *Sacramento Bee*, February 20, 2012. "Water Tunnels Would Be Huge Project—If They Clear Huge Obstacles."

[17] Chapter 8 of the BDCP states that the tunnels would accommodate 7,000 cfs gravity feed, and DWR representatives at the June 20 meeting says that sizing had not been finalized but acknowledged that 9,000 cfs gravity feed tunnels may have to be larger than 15,000 cfs tunnels with an intermediate pumping plant.

[18] The electricity share of operating costs could decrease if tunnels are sized for gravity flows. Since electricity is a relatively small share of operating costs, we have not made an adjustment without further details of the impact.

No comments

- n/a -

period beginning in 2025, the present value of operating and maintenance costs are $1.533 billion using a 3% discount rate and $665 million using a 6% discount rate.

In-Delta and Upstream Costs:

The water supply tunnel will generate a variety of costs on in-Delta and upstream uses. As discussed before, the large new diversion on the Sacramento River will degrade water quality for those who divert Sacramento River downstream from the proposed intakes. These users include Delta farmers, the Contra Costa Water District, the Cities of Antioch and Stockton, industrial user such as power plants in eastern Contra Costa County, and the North Bay Aquaduct that serves Napa and Solano. In addition, the footprint of the tunnel facility will eliminate Delta farmland and property (although less than a surface canal), and three massive new water intakes will create substantial visual and noise pollution along a scenic, rural stretch of the Sacramento River, harming Delta residents and detracting from recreation and tourism in the area. Upstream users, such as the North State Water Alliance, are concerned that the tunnel operation could reduce upstream water supplies, and result in lower reservoir levels which could affect hydroelectric power generation and recreational use of reservoirs.

Economic values have not been estimated for most of these impacts. The Delta Protection Commission Economic Sustainability Plan estimated a water conveyance tunnel would result in an average of $65 million in annual losses for Delta agriculture; including about $50 million in losses from reduced water quality, and an additional $15 million in annual crop losses from roughly 8,000 acres of farmland lost to construction impacts and the physical footprint of the facilities.[19] It is possible that a tunnel with fewer intakes and operated for environmental benefits would be more protective of in-Delta water quality and result in lower impacts on Delta agriculture. Even if Delta agriculture impacts were lower than $65 million, the other impacts to in-Delta urban water intakes, Delta communities, and upstream water users would surely push the overall cost of in-Delta and upstream impacts higher. We use $65 million as a very conservative, preliminary estimate of the annual costs to in-Delta and upstream interests, and have not made any estimate of in-Delta costs associated with the construction activity itself. For the 50 year period beginning in 2025, the present value of estimated in-Delta and upstream costs are $1.173 billion using a 3% discount rate and $509 million using a 6% discount rate.

Benefit-Cost Ratio

Table 2 summarizes the benefits and costs detailed in the previous section. Using both a 3% and 6% discount rate, the economic benefits of the tunnels are about $7 billion less than the costs. Even without discounting, meaning that the time value or opportunity cost of money is ignored, the benefits are still $500 million lower than the cost through 2074. The benefit-cost ratio ranges from 0.3 to 0.5 depending on the discount rate used. Alternatively, costs are two to three times higher than the benefits.

[19] http://www.forecast.pacific.edu/desp.html

No comments

- n/a -

Table 2 Benefits and Costs of Delta Tunnels through 2074
Results are expressed as present discounted values calculated with 3% and 6% discount rates. Ending year of 2074 is fifty years after estimated completion of tunnels in 2025. (millions of current dollars)

Benefits ($ millions)	**3% Discount Rate**	**6% Discount Rate**
Export Water Supply at 5.3 maf of exports	3,916	1,670
Export Water Quality	2,328	1,010
Earthquake Risk Reduction	866	376
Environmental Benefits at 5.3maf of exports	0	0
Total Benefits ($ millions)	**7,110**	**3,056**
Costs ($ millions)		
Debt Service Capital Cost	10,777	9,205
Operation and Maintenance	1,533	666
In-Delta and Upstream Impacts	1,173	509
Total Costs ($ millions)	**13,484**	**10,380**
Net Benefits ($ millions)	**-6,374**	**-7,324**
Benefit-Cost Ratio	**0.527**	**0.297**
Cost-Benefit Ratio	**1.90**	**3.36**

Table 3 Estimated Annual Benefits and Costs in 2030

Benefits ($ millions)	**2030 Benefits/Costs**
Export Water Supply at 5.3 maf of exports	217
Export Water Quality	129
Earthquake Risk Reduction	47
Environmental Benefits at 5.3maf of exports	0
Total Annual Benefits ($ millions)	393
Costs ($ millions)	
Debt Service Capital Cost	1,100
Operation and Maintenance	85
In-Delta and Upstream Impacts	65
Total Annual Costs ($ millions)	**1,250**

Although we have been careful to use the most recent reliable values from the BDCP and reports of other state agencies, there is uncertainty surrounding any assessment of this kind. The uncertainties and any omitted values are balanced between items that help and harm the economic case for the tunnels. For example, the in-delta and upstream costs are almost certainly underestimated, and include no in-Delta impacts from the construction process, in-Delta municipal water supply and quality impacts, and a host of potential upstream impacts on water supplies from the Sacramento Valley to the east side of the San Joaquin Valley. As discussed in a previous section, the earthquake risk reduction benefit is likely overstated since it ignores the alternative of seismic upgrades to the Delta levee system. The water supply benefits and capital costs may also prove to be too optimistic, further weakening the case for the tunnels. On the other hand, the tunnels would facilitate water transfers from areas north of the Delta, benefits that have not been valued in this analysis. In addition, the initial Brattle

No comments

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results did not include urban benefits to Santa Clara which receives some of their water supplies from the Delta. The cost of the tunnels may also be reduced if an alternative with fewer intakes is selected. Overall the uncertainties and omissions are balanced and it seems very unlikely that any of them could be large enough to change the conclusion given the size of the gap between costs and benefits.

Some socio-economic considerations are also not included in the analysis. Most notably, the values of agricultural water do not include multiplier effects to capture the broader regional economic benefits created by water supplies. There are legitimate reasons why these indirect impacts are generally excluded from benefit-cost analysis, but the special role of agriculture in supporting the economic base of the Central Valley should be acknowledged. If these socio-economic values of agricultural production were included, the benefits would increase by about $100 million per year, a roughly 25% increase in total benefits. However, it is important to note that these socio-economic impacts are present for both areas that benefit from water exports from the tunnels, and for the in-Delta and upstream areas that are potentially harmed. Incorporating socio-economic impacts would increase both the benefits and the costs of the tunnels.

Financial Feasibility and Ratepayer Impacts

Benefit-cost analysis is sometimes confused with financial analysis and ratepayer impacts. Benefit-cost analysis does not estimate rate increases as these depend upon a number of financing assumptions, the amount of public investment, cost recovery principles, and business considerations of individual utilities. Benefit-cost analysis is a tool for policy analysis and decision making that informs whether a project is economically justified and should be built.

In contrast, financial feasibility analysis simply investigates whether a project can be financed and paid for, whether or not it is economically desirable or the most cost-effective way to meet a given objective. Financial feasibility must be demonstrated for certain regulatory requirements, and also must be proven to investors who are needed to buy bonds to finance construction. Financial feasibility is clearly linked to estimating ratepayer impacts since increased water rate revenue will be required to finance the bonds.

Despite the differences, the benefit-cost calculations raise serious questions about financial feasibility. If only the benefits and costs to water exporters in Table 2 are considered, the total benefits of the tunnels are still about $6 billion shy of the total costs that would be paid by the water agencies. However, there could be additional benefits to water agencies that are not accounted for in Table 2, such as the value of regulatory assurances that would be part of the BDCP. Financial feasibility also raises concerns about how the costs would be distributed across the state and federal water projects and urban and agricultural agencies.

Regulatory Assurance under the Endangered Species Act:

The tunnels are proposed as part of the BDCP, a habitat conservation plan (HCP) that may reduce regulatory risk to the exporting water agencies from further cuts in Delta water exports due to Endangered Species Act protections for endangered fish. This regulatory assurance would have tremendous value to the water agencies.

No comments

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Despite its value to water agencies, we did not include regulatory assurance in the comprehensive benefit-cost analysis because the assurance does not create any value from a comprehensive, statewide perspective. Regulatory assurance transfers the risk of a negative environmental outcome from the export water agencies to the environment, taxpayers, and in-Delta and upstream resource users who might have to pay in place of water agencies if the tunnels turn out to be negative for endangered fish. If the value of the fisheries and the Delta environment are as high as the Brattle Group and BDCP estimate, then shifting this risk away from water exporters could actually be a net negative from a statewide perspective.

Despite the lack of statewide value, there is no denying that regulatory assurance is valuable to water exporters and contributes to their financial feasibility. But what is it worth? Preliminary modeling from the Brattle Group presented at the June 20, 2012 BDCP meeting suggests the value of regulatory assurance could be as high as $11 billion. That would exceed the $6-7 billion shortfall suggested by the benefit-cost analysis. However, this issue begs another important question.

Does regulatory assurance and a valid HCP granting incidental take permits for the water agencies require the peripheral tunnels? According to this analysis, the water agencies could pay up to $6 billion in habitat improvements for an HCP on the current through Delta conveyance system, and still come out economically ahead of paying for the $13 billion tunnels. It seems logical that the necessary investments for an HCP and regulatory assurance on a no-tunnel alternative would be no more expensive than the $4 billion expense of habitat creation in the current BDCP proposal. Taxpayers would benefit greatly from this approach since a water bond that further burdens the state's beleaguered general fund would be unnecessary to finance Delta habitat upgrades.

Will Costs Be Allocated Proportional to Water Supply, Economic Benefits, or Population?

Although the BDCP has yet to release a detailed financial plan with cost allocations between Delta export water agencies, the agencies have said that the cost of the tunnel would be paid in proportion to the water received through the tunnel. For example, Metropolitan Water District, has said it expects its ratepayers to pay for 28% of the cost of the tunnel, equivalent to their share of Delta water exports. However, the high cost of the Delta project raises serious affordability questions for the agricultural users who receive the majority of water exported from the Delta. The cost of irrigating with water exported through the tunnels would exceed the profits of many crops grown in the Central Valley.

A proportional financing plan is simple to implement, prevents cross-subsidies between urban and agricultural users and is consistent with California Proposition 218. However, financial feasibility for a proportional financing plan requires the benefits to exceed the cost for every water agency, a much tougher standard than assessing whether the collective benefits to the agencies exceed the collective costs to the agencies. As discussed above, a proportional cost allocation means the tunnels are clearly financially infeasible for agricultural water agencies who receive the majority of water exported from the Delta under proportional cost allocation.

The most recent draft of the BDCP suggests a non-proportional financing approach, and compares the cost of the tunnel to urban rather than agricultural water supply projects. In fact,

No comments

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the draft BDCP financial analysis states the project is feasible because its per capita cost is smaller than some urban water projects financed by local urban water agencies. But the per capita financial feasibility analysis in the draft BDCP is inconsistent with the statements water contractors have made about proportional financing for the past five years. At the June 26, 2012 board meeting of the Metropolitan Water District (MWD), directors clearly expressed disapproval of the per capita financing suggested in the latest draft BDCP and MWD staff concurred.

Despite the fact that proportional cost allocation will clearly not work for financing the tunnels, water agencies have not put forward any other approach with their boards or ratepayers. The facts are that the tunnels are financially marginal for water agencies collectively, and that urban water use produces 2/3 of the benefit with 1/3 the water, and agricultural water use is 1/3 the benefit with 2/3 of the water. Financing the tunnels will either require a subsidy for agricultural users from urban ratepayers or taxpayers, or significant sales of water from agricultural to urban water agencies that will lead to fallowed fields in the Central Valley but more funds for bond repayment. But urban agencies and the government are adamant that there will be no ratepayer or taxpayer subsidies for farmers. And farmers insist that they have no intention of selling their water supplies to urban areas.

The result is that mere days from the Governor's expected announcement that the state is building the tunnels, water agencies still can't provide details on how much it will really cost their ratepayers or explain how they would generate the nearly $1.2 billion per year necessary for debt service and operating costs. There has been some informal discussion about pricing strategies that would yield more revenue for debt service such as differential pricing by reliability or allocating costs proportional to economic benefits instead of water quantity. However, it is unclear if such new pricing schemes are practical, supported by ratepayers or consistent with Proposition 218.

Of course, the main reason that financing the tunnels is so challenging is that the project does not provide economic benefits that exceed its cost. The recent recession is a powerful reminder that no amount of financial engineering can change the fundamental economics of an investment from bad to good.

Conclusion

This report updates an initial benefit-cost analysis of the water conveyance tunnels at the center of the Bay Delta Conservation Plan (BDCP). Primarily using the results of the BDCP's own economic benefit and cost studies, we find a benefit-cost ratios ranging from 0.3 to 0.5, meaning that there are between $1.90 and $3.36 of costs for every $1 in economic benefits. To put this in perspective, this benefit-cost ratio is 80% lower than those estimated for the State's high-speed rail project.

When these very low benefit-cost ratios are considered alongside the inconsistent and incomplete financial plans, it is clear that the Delta water conveyance tunnels proposed in the draft BDCP are not justified on an economic or financial basis.

No comments

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No comments

- n/a -

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Governor Brown and Obama Administration Outline Path Forward for Bay Delta Conservation Plan

California, Interior, NOAA Reaffirm commitment to comprehensive solution to California's water supplies and a healthy ecosystem

SACRAMENTO, CA – California Governor Edmund G. Brown Jr., Secretary of the Interior Ken Salazar, and National Oceanic and Atmospheric Administration (NOAA) Assistant Administrator for Fisheries Eric Schwaab today outlined revisions to the proposed Bay Delta Conservation Plan (BDCP) that, along with a full range of alternative proposals, will undergo a rigorous public environmental review in the coming months. In announcing the path forward for an enhanced BDCP process, the officials emphasized that California's water system is unsustainable from an environmental and economic perspective, and that the BDCP is a key part of a comprehensive solution to achieve the dual goals of a reliable water supply for California and a healthy California Bay Delta ecosystem that supports the State's economy.

Population growth, habitat loss and ongoing threats to levee stability and water supply have crippled the California Bay Delta, threatening the health and economies of California communities. The revised approach, which is grounded in science, is designed to help restore fish populations, protect water quality, and improve the reliability of water supplies for all water users who receive deliveries from state and federal projects. It improves on key aspects of previous proposals and offers a strong governance model, financing options, a scientific review process and a steadfast conservation foundation for a new water conveyance facility to move water and help restore the health of the ecosystem.

"A healthy Delta ecosystem and a reliable water supply are profoundly important to California's future," said Governor Brown. "This proposal balances the concerns of those who live and work

in the Delta, those who rely on it for water and those who appreciate its beauty, fish, waterfowl and wildlife."

"As broken and outdated as California's water system is, we are also closer than ever to forging a lasting and sustainable solution that strengthens California's water security and restores the health of the Delta," said Secretary Salazar. "Through our joint federal-state partnership, and with science as our guide, we are a taking a comprehensive approach to tackling California's water problems when it comes to increasing efficiency and improving conservation. Today marks an important step forward in transforming a shared vision into a practical, effective solution. With California's water system at constant risk of failure, nobody can afford the dangers or costs of inaction."

"The status quo isn't working for fish, communities around or dependent upon the Bay Delta, economic development, or water resources management," said Dr. Jane Lubchenco, Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator. "Our proposed changes to the BDCP reflect important improvements in shaping a comprehensive strategy to fix a broken system. Because this is a complicated issue and we do not have all the answers today, we will continue to evaluate and refine the proposal. We call upon the many participants throughout California to join us in staying focused on science-based solutions."

The elements of a preferred proposal include the construction of water intake facilities with a total capacity of 9,000 cubic feet per second -- down from an earlier proposal of 15,000 cfs – operations of which would be phased in over several years and a conveyance designed to use gravity flow to maximize energy efficiency and to minimize environmental impact. Many other alternatives, including no conveyance facility, and facilities with capacities ranging from 3,000 to 15,000 cfs, will also be fully considered as part of the upcoming environmental review process.

Governor Brown and Secretary Salazar affirmed their commitment to continue working with water users, non-governmental organizations and local governments to achieve the co-equal goals in a manner that incentivizes reduced, efficient water use throughout California and that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta.

Having identified the key elements of a proposal, the parties expect to issue a draft Bay Delta Conservation Plan and corresponding Environmental Impact Report/Environmental Impact Statement for public review this fall. In recognition that water supply reliability and affordability elements are vitally important to the public water agencies who are expected to pay for any proposed facilities, the state and federal agencies will work intensively with the public water agencies and other interested parties over the next 90 days to address these important questions. State and federal agencies will continue to refine the proposals announced today and will issue a major progress report after the completion of this initial work.

The proposal outlined today is based on shared objectives, including:

- ***Science:*** In order to determine the benefits of additional habitat and Delta outflow to fish, the State and U.S. governments are developing a process, including independent scientific review, to

No comments

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ensure that science is playing a neutral and informative role in determining a way forward for the BDCP. All parties, including water users, conservation groups and public agencies will be invited to fully participate in the process. Science will guide how to best restore the ecosystem and how much water can be exported.

- ***Conservation:*** The BDCP will contain biological goals and objectives to improve the status of a wide variety of listed species and species of concern under the Endangered Species Act, and will quickly implement new habitat projects in the Suisun Marsh and the Delta upon completion of appropriate environmental reviews.

- ***Cooperation and Governance:*** State and U.S. governments will work cooperatively with local water agencies, environmental organizations, and Delta governments and districts under a proposed governance structure to achieve an open, transparent, and inclusive process, allowing affected parties to play an appropriate role in the governance and implementation of the BDCP.

- ***Finance:*** State and U.S. governments are committed to the "user pay" principle, and the state and federal water contractors agree that the costs of the new water conveyance facility and associated mitigation of that facility will be paid through charges to the water users who would benefit from its development and operation. Habitat and other conservation measures in the BDCP would be financed in part by the contractors, but would mostly be paid by the state over a period of 40 years, with likely additional investment by the federal government through existing programs.

- ***Adaptive Management:*** The proposal reflects the shared commitment by state and U.S. governments to incorporate adaptive management to ensure flexibility as factors such as climate change, new invasive species, and unexpected prolonged drought continue to affect the biology and water supplies of the Delta.

- ***Sustaining Delta Communities:*** The State and U.S. governments recognize the need to preserve the unique communities and agricultural productivity of the Delta. State and federal agencies will continue investment in the Delta for flood protection, community development, and biological restoration.

- ***Protecting Upstream Water Users:*** State and U.S. governments will make sure implementation of BDCP will not result in adverse effects on the water rights of those in the watershed of the Delta, nor will it impose any obligations on water users upstream of the Delta to supplement flows in and through the Delta.

- ***Improved Water Management State-wide:*** State and U.S. governments will continue to explore new ways to satisfy competing water demands, including commitments to an Integrated Water Management approach, reducing water demand, increasing water supply, and improving efficiency of operations. The Metropolitan Water District of Southern California and the Santa Clara Valley Water District - the two largest urban regional water agencies-- have committed to exceed the urban water savings target established in the 2009 Delta Reform Act by saving 700,000 acre-feet a year based on predicted future demands. This includes a commitment by Southern California to annually save more water through conservation and recycling than it

No comments

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receives, on average, from Northern California, as well as a commitment from the Santa Clara County Water District to meet Silicon Valley's future increases in demand through conservation and recycling. With respect to agricultural water use, the Bureau of Reclamation has worked with local water agencies to invest close to $50 million over the last eight years in efficiency improvements in California. Reclamation is now partnering with the Natural Resources Conservation Service to provide funding for projects that improve water management and create new supplies for agricultural irrigation. In the last two years, approximately $15 million in federal funding has been invested in this effort. The State of California has invested more than $47 million in similar programs since 2001.

For more information on today's announcement, including a q&a document and information on how the proposal is expected to improve fish species, please visit:
http://baydeltaconservationplan.com

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No comments

- n/a -

To protect and restore California Rivers by influencing public policy and inspiring citizen action.

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January 11, 2013

Cindy Messer
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Re: Comments on Final Draft Delta Plan (DP), Recirculated Draft Programmatic Environmental Impact Report (RDPEIR) and Proposed Delta Plan Rulemaking Package (Regulations) **including Presentation of New Alternatives 2A and 2B**

Dear Ms. Messer and Council Members:

This organization, Friends of the River, objects to approval of the Delta Plan (DP), RDPEIR, and Regulations. This organization is included as a commenter in the detailed comments submitted by the Environmental Water Caucus (EWC). These brief additional comments are submitted solely on behalf of this organization. A fundamental threshold CEQA violation carried out by the Delta Plan, RDPEIR and Regulations is that they call for carrying out the "alternative" of developing new conveyance facilities to divert huge quantities of freshwater from the Sacramento River upstream from the Delta for the benefit of exporters south of the Delta. These documents call for that even though no true alternative to developing new conveyance has ever been considered by either the Council or by the exporters creating the BDCP project. This failure to consider an alternative that would avoid or substantially lessen the massive environmental impacts that would occur with construction and operation of new water delivery conveyance must be remedied by full consideration of a reasonable range of alternatives in a recirculated Draft EIR.

No comments

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The Council Process Violates CEQA by Failing to Develop and Consider a Range of Reasonable Alternatives to Developing New Conveyance

Close to two years ago, the National Academy of Sciences declared in reviewing the draft BDCP that: "[c]hoosing the alternative project before evaluating alternative ways to reach a preferred outcome would be post hoc rationalization— in other words, putting the cart before the horse. Scientific reasons for not considering alternative actions are not presented in the plan." (National Academy of Sciences, Report in Brief at p. 2, May 5, 2011).

In all that time, nothing has changed in this regard. The Council is still succumbing to the will of exporters who still want a conveyance that will take 15,000 cfs of freshwater out of the Sacramento River upstream from the Delta. The Delta would be left to face ever worsening salinity intrusion from the Bay due to a projected rise in the sea level by as much as 55" by 2100 (DP 80, 91) while the Revised Project further worsens salinity intrusion by taking out massive quantities of freshwater before it even reaches the Delta.

Conclusions in an EIR must be supported by substantial evidence. CEQA Guidelines section 15384 defines substantial evidence as "enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion, even though other conclusions might also be reached." "Substantial evidence shall include facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts." "Argument, speculation, unsubstantiated opinion or narrative, evidence which is clearly erroneous or inaccurate, or evidence of social or economic impacts which do not contribute to or are not caused by physical impacts on the environment does not constitute substantial evidence."

All that the subject documents contain to support the Revised Project alternative and the call for improved, meaning new conveyance, is argument, speculation, and unsubstantiated opinion and narrative. A new Draft EIR must be prepared and recirculated because "the draft EIR [and RPDEIR] was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded." (CEQA Guidelines, § 15088.5 (a)(4).) This entire process has been permeated from the outset with pre-decisional bias to develop the massive new conveyance capacity. As set forth in detail in the EWC comments there has been incomplete compliance with CEQA and there has been no public trust doctrine analysis performed.

We strongly support the EWC alternative which has been labeled Alternative 2. However, we present two additional alternatives in an attempt to help the Council and its EIR preparers to start down the road finally, of complying with CEQA and satisfying the obligations created by the public trust doctrine. These two alternatives are set forth below. Because the Council has been presented with three alternatives that substantially lessen significant and unavoidable impacts identified in the Draft Plan, recirculation of a new Draft EIR is now

No comments

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required. CEQA Guidelines section 15088.5(a)(3) requires recirculation when a feasible project alternative considerably different from others previously analyzed would clearly lessen significant environmental impacts of the project, but the project's proponents decline to adopt it. Alternative 2, 2A, and 2B are feasible alternatives that must be analyzed in a recirculated Draft EIR.

New Alternatives 2A and 2B Would Avoid the Adverse Impacts of the Revised Project

Alternative 2A: This alternative can be thought of as "think before you act." Under Alternative 2A, the Delta Plan and the Regulations would not encourage or recommend new or improved conveyance, water intakes, conveyance facilities, exporting more water in the wet years, optimizing diversions in wet years, and the like at this time. The decision whether to call for new conveyance would await the determination of such fundamental issues as water supply availability and the environmental impacts of supplying the water under CEQA including a helpful guide as to what is necessary, set forth in the California Supreme Court's decision in *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412. The decision whether to call for new conveyance would also await your determination that would take into consideration a cost-benefit analysis and public trust doctrine analysis. The decision would also await the Council's preparation and circulation of a new Draft EIR so that the decision-making public agencies, and the public itself, would have the benefit of full environmental disclosure, consideration of the true project and its environmental impacts, and thus the ability to make an informed choice among reasonable alternatives.

The RDPEIR demonstrates the lengths the EIR preparers are willing to go to in order to reach the desired pre-decisional conclusion that the Revised Project is environmentally superior. They may assert that the detailed CEQA analysis, water availability determinations, and public trust doctrine analysis will and/or should be made by other agencies such as the BDCP lead and responsible agencies and/or the State Water Resources Control Board (SWRCB). On the contrary, in order to proceed in a manner required by law ***some*** public agency must make these critical determinations ***before*** the threshold choice of alternatives is made to call for new conveyance. If the Council is unable or unwilling to do this work, a policy or recommendation calling for new conveyance cannot lawfully be adopted unless and until the CEQA and public trust doctrine analysis has been done in the BDCP process and/or the SWRCB process.

We maintain that Alternative 2 is the environmentally superior alternative that should be adopted at this time. If, however, the Council does not do that, Alternative 2A must be adopted if any alternative is adopted because there has not been sufficient CEQA analysis and compliance or any cost-benefit and public trust doctrine analysis to support calling for, encouraging, or recommending new conveyance at this time. Alternative 2A would lessen the significant environmental impacts of the project by not calling for new conveyance and diversion of significant quantities of freshwater upstream from the Delta.

No comments

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Alternative 2B ("Phased Reduced Exports Alternative"): Alternative 2B is also similar to Alternative 2 in that no new conveyance would be recommended prior to a robust CEQA, water supply and public trust doctrine analysis. This Alternative, however, lowers reduction in exports compared with Alternative 2, and/or, phases in reductions in exports over time by phasing out exports to impaired agricultural lands that will or should eventually cease production. This Alternative eases the practical constraints involved in reducing exports within a reasonable amount of time, given that any new conveyance would not be projected to be in operation before about 2026.

Analysis of these additional Alternatives would help the Council achieve its legal obligation to consider a reasonable range of alternatives. Thus far, the Council has failed to develop any reasonable alternatives to have more conveyance to export more water. Alternative 2 was presented to the Council by the EWC. As a public agency responsible for complying with CEQA, it is the Council that has the responsibility to ***develop a reasonable range of alternatives***. The Council should not simply reject Alternative 2 by characterizing the export reductions as being too severe. Rather, the Council should undertake to develop an alternative that on the one hand, like Alternative 2 does not call for new conveyance, but on the other hand, does not reduce exports to as great a degree as is done by Alternative 2. For example, Alternative 2B could include assessing limitations of exports to a maximum of 3,500,000 acre-feet/year which is more than the exports under Alternative 2.

An EIR must "describe ***a range*** of reasonable alternatives to the project, . . which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." CEQA Guidelines, § 15126.6(a) (emphasis added). "Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Public Resources Code Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly." CEQA Guidelines, § 15126.6, subd. (b). The Council has not described ***a range*** of reasonable alternatives to the project which would avoid the adverse impacts of adding large new diversions of freshwater upstream from the Delta even though these alternatives would not reduce exports as much as would be accomplished by Alternative 2. This deficiency in the CEQA process is so profound that a new Draft EIR describing and considering new alternatives 2A and 2B must be prepared and circulated. Adopting the Delta Plan, Regulations, and certifying a Final EIR without doing so would be failure to proceed in a manner required by CEQA. These are not violations that can be cured simply by responding to comments in a Final EIR.

No comments

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Finally, the Council may continue to make the lulling statements already made in the subject CEQA documents claiming, so to speak, that the Council is not really doing anything now in terms of developing new conveyance and that environmental impact analysis will take place in the future. It appears that the Council is trying to mislead the public into believing that the Delta Plan is not a real threat to the Delta, but that later on, the BDCP preparers will jump up and say that the Delta Tunnels are consistent with the Delta Plan call for new conveyance and that the threshold decision to develop new conveyance was made in the Delta Plan. Unless the Council eliminates the call for improved, new, conveyance and the like from the Delta Plan and Regulations, it will be necessary to challenge the Delta Plan, RDPEIR, and Regulations if approved and adopted, in court to prevent that "not now, not ever" unlawful end run on CEQA from being successful. Approval of any calls for new conveyance, optimizing diversions in the wet years and the like must be deferred until CEQA has been complied with and the public trust doctrine analysis has been performed.

Failure to Effectively Require Mitigation or Describe a Truly Environmentally Superior Alternative under CEQA and the Endangered Species Act

As pointed out in detail in the EWC comments, the RPDEIR concedes that the Revised Project would have significant and unavoidable environmental impacts including violation of water quality standards and adverse effects on special status species. (RPDEIR 24-10). Alternative 2 (and 2A and 2B), however, would result in far fewer significant and unavoidable environmental impacts than any of the other alternatives analyzed in the PDEIR or RPEIR. The RPDEIR concedes that "Alternative 2 contributes more to improving conditions for biological resources and arresting ecosystem decline than the Revised Project." (RPDEIR 25-7). Alternative 2 clearly meets the project objectives reducing reliance on the Delta in meeting the state's future water needs through regional self-reliance, is consistent with the Delta Reform Act, is implementable in a comprehensive, concurrent, and interrelated fashion, and can be accomplished as rapidly as realistically possible without jeopardizing ultimate success. Under CEQA, if an alternative is presented that meets project objectives and can reduce significant impacts to a less than significant level, the lead agency must adopt this alternative if feasible. *Mountain Lion Foundation v. Fish & Game Com.* (1997) 16 Cal.4th 105, 134. "CEQA compels government first to identify the [significant] environmental effects of projects, and then to mitigate those adverse effects through the imposition of feasible mitigation measures or through the selection of feasible alternatives." *Sierra Club v. State Board of Forestry* (1994) 7 Cal.4th 1215, 1233, Pub. Resources Code, § 21002. To simply accept such significant impacts while ignoring viable alternatives violates CEQA.

The proposed mitigation measures offered by the Plan also fail to meet CEQA's standards. Proposed mitigation is not sufficient unless such mitigation is implemented as a condition of future development. In its current state, there are no repercussions if subsequent

No comments

- n/a -

project proponents choose to adopt some mitigation measures but not others or no mitigation measures at all. Proposed mitigation cannot be mere suggestions, and instead must be fully enforceable. *Federation of Hillside & Canyon Assn. v. City of Los Angeles* (2d Dist. 2000) 83 Cal.App.4th 1252, 1259.

The failure to require mitigation for endangered species impacts also violates the Federal Endangered Species Act. There is no discretion under the Endangered Species Act to authorize a project that would jeopardize survival of listed fish or adversely modify critical habitat. *Center for Biological Diversity v. United States Bureau of Land Management(Ruby Pipeline Case),* 698 F.3d 1101 (9th Cir. 2012). In the *Ruby Pipeline* case, the Fish and Wildlife Service's Biological Opinion analyzing the impacts of a natural gas pipeline incorporated voluntary conservation actions as mitigation measures which factored into its determination that the project would not jeopardize the continued existence of several endangered species and would not adversely affect critical habitat. The Ninth Circuit found the Service's determination to be arbitrary and capricious because the conservation measures were mislabeled and unenforceable. The *Ruby Pipeline* case confirms the standard that valid mitigation measures must be enforceable under the Endangered Species Act and may not be simply voluntary suggestions.

If the Fish and Wildlife Service concludes that jeopardy or adverse modification is likely, then any take resulting from the proposed action is subject to Section 9 liability. *See Sierra Club v. Babbitt,* 65 F.3d 1502, 1505 (9th Cir. 1995). In its discussion of section 7 of the ESA in *TVA v. Hill,* the Supreme Court made clear that "Congress considered and rejected language that would have permitted an agency to weigh the preservation of species against the agency's primary mission." *Ctr. for Biological Diversity, supra*, pp.1115-16, citing *Sierra Club v. Marsh* (1987) 816 F.2d 1376. Thus, the Council may not summarily reject alternatives and mitigation measures that would avoid impacts to endangered species simply because the Council would rather increase export conveyance capacity.

In addition, mitigation measures here are dependent on actions that may never come to pass. Bond measures that have already been pulled from the ballot twice and that may never pass are not the effective mitigation required under the Endangered Species Act. Mitigation measures must be an integrated part of the project, so that if a measure is not implemented, re-initiation of consultation under the Endangered Species Act is automatically triggered. *Sierra Club v. Marsh* (1987) 816 F.2d 1376. The Delta Plan allows exporters to avoid all costs of the worsening salinity intrusion in the Delta that will result from the BDCP and shifts those costs on to the taxpayers. The problem for the Council in that regard is that mitigation must be real and assured. In the words of the Ninth Circuit, "any risk to listed species thereby created [by the project] 'must be borne by the project, not by the endangered species.'" *Center for Biological Diversity,* 698 F.3d 1101, 1115.

No comments

- n/a -

The EIR Fails to Adequately Analyze the Impacts to Upstream Areas that Will Result from the Delta Plan Policies.

The EIR does not include an analysis of how the proposed BDCP conveyance will affect upstream reservoir operations, and how regulatory restrictions on these reservoirs will affect proposed project operations. Such an omission frustrates the public participation goals of CEQA. The decision in *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, held an EIR insufficient to comply with CEQA in analyzing cumulative impacts with respect to a proposed increase in an agency's withdrawal of water from the Russian River. By failing to consider possible curtailment of water from the Eel River, the EIR failed to alert decision-makers and the public "to the possibility that the Agency will not be able to supply water to its customers in an environmentally sound way." 108 Cal.App.4th at 871. The failure to discuss the nature of altered reservoir operations and the related environmental impacts has frustrated the ability of public to understand the true nature of the Delta Plan, and has resulted in a failure to develop accurate mitigation measures and a reasonable range of alternatives.

Please call if you have any questions on our comments.

Sincerely,

E. Robert Wright
Senior Counsel

Kathryn Cotter
Legal Counsel

No comments

- n/a -

Section 5
Revisions to the Draft PEIR and Recirculated Draft PEIR

This section of the Final PEIR contains revisions to the Draft PEIR and Recirculated Draft PEIR that were identified through review and response to comments. These revisions identify certain modifications and corrections to the Draft and Recirculated Draft PEIR, and provide additional clarification, additional information, and/or correct errors. The changes to not alter the conclusions related to environmental impacts that were presented in the Draft PEIR and Recirculated Draft PEIR.

The following revisions are organized by document section for Delta Plan PEIR Volumes 1 and 2 (Draft PEIR and appendixes) and Volume 3 (Recirculated Draft PEIR). Additions to the Draft PEIR and Recirculated Draft PEIR are indicated with underlined text and deletions are indicated in strikethrough. Each change described below lists the page and line where the change begins.

After Volumes 1 through 3 of this PEIR were published, the California Department of Fish and Game (DFG) changed its name to the California Department of Fish and Wildlife (CDFW), effective Jan. 1, 2013. All references to California Department of Fish and Game (CDFG or DFG) are hereby revised to California Department of Fish and Wildlife (CDFW).

Please note that, generally speaking, the Recirculated Draft PEIR (Volume 3) did not change (or even repeat) the Draft PEIR (Volumes 1 and 2) discussion of the study area, significance thresholds, regulatory framework, or environmental setting for each resource topic. As each resource section explains (for example, see Recirculated Draft PEIR pages 3-1 and 3-2 for Water Resources), the study area, regulatory framework, environmental setting, and thresholds of significance are unchanged from the Draft PEIR Volumes 1 and 2 unless specifically noted. However, the impact and mitigation discussions in Volume 3 for each resource topic supersede the corresponding impact and mitigation discussions in Draft PEIR Volume 1 in most cases, unless otherwise noted (by, for example, cross-reference in Volume 3 to the impact discussion in Volume 1). Accordingly, where a text change is made below in this Section 5 of the Final PEIR to an impact or mitigation discussion, it is made only to Volume 3, except in cases where the Volume 3 impact discussion simply cross-referenced to the Volume 1 impact discussion.

5.1 Revisions to Executive Summary

Page ES-4, first full paragraph, second sentence (Volume 1)

In compliance with CEQA Guidelines section 15126.6(3)(A), the No Project Alternative assumes that existing relevant plans and policies would continue~~, which includes reasonably foreseeable modified or new plans or policies that are currently being analyzed for adoption or are required to be adopted.~~

Page ES-5, Line 32 (Volume 3)

In compliance with CEQA Guidelines section 15126.6(e)(3)(A), the No Project Alternative assumes that existing relevant plans and policies would continue~~, which includes reasonably foreseeable modified or new plans or policies that are currently being analyzed for adoption or are required to be adopted~~.

Page ES-12, Table ES-1 (Volume 3)

Table ES-1
Summary of Impacts and Mitigation Measures for Revised Project

Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
Abbreviations:	S+ = Majority of projects will have significant impacts; a few projects will have less-than-significant impacts. S = Many projects will have significant impacts; some projects will have less-than-significant impacts. S – = Majority of projects will have less-than-significant impacts; a few projects will have significant impacts. LTS= Less than significant. NI = No impact. S^ = Majority of projects will have significant and unavoidable impacts after mitigation. S = Majority of projects will have less-than-significant impacts if mitigation implemented; some projects will have significant and unavoidable impacts. Sv/LTS=Less than significant for covered actions. Less than significant for non-covered actions if implementing agencies implement the mitigation; however, significant and unavoidable for non-covered actions because the Delta Stewardship Council cannot mandate implementation.						
3-3. Substantially Change Water Supply Availability to Water Users that Use Delta Water[3]	LTS	LTS	NI	LTS	NI		~~Sv/~~LTS

[3] This change to the text of Table ES-1 reflects the discussion of Impact 3-3 found on pages 3-5, 3-9, 3-11, 3-14, and 3-16 of the Recirculated Draft PEIR (Vol. 3). It conforms the summary table to the analysis of Impact 3-3, which clearly identifies Impact 3-3 as less than significant. Accordingly, this text change corrects a typographic error in Table ES-1 but does not provide new or changed information relative to the Recirculated Draft PEIR.

Table ES-1
Summary of Impacts and Mitigation Measures for Revised Project

Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
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10-2. Discovery of Unrecorded Human Remains[4]	S	S	S	S	S	Measure 10-2: ▪ If human remains are encountered during ground-disturbing construction activities, stop work that would potentially affect the find and contact the county coroner, professional archaeologist, and representatives of California Indian tribes in accordance with the California Native American Graves Protection and Repatriation Act (CNAGPRA). ▪ If the discovery of human remains occurs on lands owned and administered by a federal agency, the provisions of the CNAGPRA and the federal Native American Graves Protection and Repatriation Act (NAGPRA) will apply.	~~Sv/LTS~~S
11-1. Exposure of People or Structures to Potential Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving	S-	S-	S-	S-	S-	Measure 11-1: ▪ For construction that occurs in an Alquist-Priolo Special Studies Zone, a determination must be made by a licensed practitioner that no fault traces are present within the building footprint of any structure intended for human occupancy.	~~Sv/LTS~~S

[4] This change to the text of Table ES-1 reflects the discussion of Impact 10-2 found on pages 10-4, 10-9, 10-13, 10-16 to 10-17, 10-20, and 10-24 to 10-25 of the Recirculated Draft PEIR (Vol. 3). It conforms the summary table to the analysis of Impact 10-2, which clearly identifies Impact 10-2 as significant and unavoidable in least some instances. Accordingly, this text change corrects a typographic error in Table ES-1 but does not provide new or changed information relative to the Recirculated Draft PEIR.

Table ES-1
Summary of Impacts and Mitigation Measures for Revised Project

Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
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Rupture of a Known Earthquake Fault[5]						▪ Lead agencies shall ensure that geotechnical design recommendations are included in the design of facilities and construction specifications to minimize the potential impacts from seismic events and the presence of adverse soil conditions.	
11-2. Exposure of People or Structures to Potential Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death due to Strong Ground Motion Associated with Seismic Shaking[5]	S+	S+	S+	S+	S+	Measure 11-2: ▪ Require adherence, at minimum, to the precepts of the current approved version of the International Building Code (IBC).	~~Sv/LTS~~S
11-3. Construction and Operations of Projects Could Be Located on a Geologic Unit or Soil That Is Unstable, or That Would Become Unstable as a	S-	S-	S-	S-	S-	Measure 11-3: ▪ For projects that would result in significant or potentially significant grading operations, a geotechnical investigation shall be performed and a geotechnical report prepared. The geotechnical report shall include a quantitative analysis to	~~Sv/LTS~~S

[5] Change to the text of Table ES-1 affecting Impacts 11-1 through 11-9 reflect the discussion of each of these impacts found on pages 11-3 to 11-42 of the Recirculated Draft PEIR (Vol. 3). These text changes conform the summary table to the analyses of Impacts 11-1 to 11-9, which clearly identify each impact as significant and unavoidable in least some instances. Accordingly, these text changes correct typographic errors in Table ES-1 but do not provide new or changed information relative to the Recirculated Draft PEIR.

Table ES-1
Summary of Impacts and Mitigation Measures for Revised Project

Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
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Result of the Project, and Potentially Result in Loss of Bearing Value, Lateral Spreading, Subsidence, Liquefaction or Collapse5						determine whether excavation or fill placement would result in a potential for damage due to soil subsidence during and/or after construction. Project designs shall incorporate measures to reduce the potential damage to an insignificant level. ▪ A geotechnical investigation shall be performed to determine the presence and thickness of potentially liquefiable sands that could result in loss of bearing value during seismic shaking events. Project designs shall incorporate measures to mitigate the potential damage to an insignificant level. ▪ For projects that would result in construction of wells intended for groundwater extraction, a hydrogeological/geotechnical investigation shall be performed to identify and quantify the potential for groundwater extraction-induced subsidence. ▪ For projects that would result in construction of surface reservoirs and canals a hydrogeological/geotechnical investigation shall be performed to identify and quantify the potential for seeps and springs to develop in areas adjacent to the proposed improvements and to propose mitigation measures.	
11-4. Construction of Projects Could Result in Substantial Soil	S-	S-	S-	S-	S-	Measure 11-4: ▪ Any covered action that would have significant soil erosion and	~~Sv/LTS~~S

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Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
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Erosion or the Loss of Topsoil[5]						topsoil loss impacts shall incorporate specific measures for future projects that would expand the use of BMPs or optional erosion control measures listed in the SWPPPs. The SWPPP shall identify an effective combination of BMPs to reduce erosion during construction and to prevent erosion during operation.	
11-5. Construction of Projects Could Lead to Impacts Associated with the Presence of Expansive Soils[5]	S-	S-	S-	S-	S-	Measure 11-5: ▪ In areas where expansive clays exist, a hydrogeological/geotechnical investigation shall be performed to identify and quantify the potential for expansion, particularly differential expansion of clayey soils due to leakage and saturation beneath new improvements. Measures could include, but are not limited to removal and recompaction of problematic expansive soils, soil stabilization, and/or reinforcement of constructed improvements to resist deformation due to expansion of subsurface soils.	~~Sv/LTS~~S
11-6. Operation of Projects Could Result in Impacts Associated with the Occurrence of Nuisance Water in Adjacent Areas Due to Leakage[5]	S-	S-	S-	S-	S-	Measure 11-6: ▪ For projects that would result in construction of canals, storage reservoirs and other surface impoundments, project design shall provide for protection from leakage to the subsurface. ▪ For ecosystem restoration projects that might cause subsurface	~~Sv/LTS~~S

Table ES-1
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Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
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						seepage of nuisance water onto adjacent lands: o Perform seepage monitoring studies by measuring the level of shallow groundwater in the adjacent soils, to evaluate the baseline conditions. Continue monitoring for seepage during and after the project implementation. o Develop a seepage monitoring plan if subsurface seepage constitutes nuisance water to the adjacent land. o Implement seepage control measures if adjacent land is not useable, such as installing subsurface agricultural drainage systems to avoid raising water levels into crop root zones. Cutoff walls and pumping wells can also be used to mitigate for the occurrence of subsurface nuisance water.	

Table ES-1
Summary of Impacts and Mitigation Measures for Revised Project

Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
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11-7. Exposure of People or Structures to Potential Substantial Adverse Effects, Including the Risk of Loss, Injury, or Death Involving Landslides[5]	S-	S-	S-	S-	S-	Measure 11-7: ▪ For projects that would result in construction of levees, surface impoundments and other fill embankments project design shall incorporate fill placement in accordance with local and State regulations and in accordance with the prevailing standards of care for such work. Measures could include, but are not limited to blending of soils most susceptible to landsliding with soils having higher cohesion characteristics, installation of slope stabilization measures, designing top-of-slope berms or v-ditches, terrace drains and other surface runoff control measures, and designing slopes at lower inclinations.	~~Sv/LTS~~S
11-8. Have Soils Incapable of Adequately Supporting the Use of Septic Tanks or Alternative Waste Water Disposal Systems Where Sewers are Not Available for the Disposal of Waste Water[5]	S-	S-	S-	S-	NI	Measure 11-8: ▪ A geotechnical investigation shall be performed and a geotechnical report prepared. The geotechnical report shall include a quantitative analysis to determine whether on-site soils would be suitable for an on-site wastewater treatment system. If it is determined that the soil could not support a conventional on-site treatment system, non-conventional systems shall be analyzed.	~~Sv/LTS~~S
11-9. Substantial Risks to Life or Property Due to Construction	S-	S-	S-	S-	S-	Measure 11-9: ▪ For projects that would result in significant or potentially	~~Sv/LTS~~S

Table ES-1
Summary of Impacts and Mitigation Measures for Revised Project

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of Project Facilities on High Organic Matter Soils[5]						significant risk to structures due to the presence of highly organic soils, lead agencies shall require geotechnical evaluation prior to construction to identify measures to mitigate organic soils.	

Table ES-1
Summary of Impacts and Mitigation Measures for Revised Project

Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
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14-3. Create Vector Habitat that would Pose a Significant Public Health Hazard[6]	S	S	LTS	LTS	S	Measure 14-3: ▪ Freshwater habitat management to include water-control-structure management, vegetation management, mosquito predator management, drainage improvements, and other best management practices, and coordination with the DFG and local mosquito and vector control agencies regarding these strategies and specific techniques to help minimize mosquito production. ▪ Maintenance of permanent ponds that increase the diversity of waterfowl yet decrease the introduction of vectors through constant circulation of water, vegetation control, and periodic draining of ponds. ▪ Tidal management focused on mosquito problems arising from the residual tidal and floodwaters remaining in depressions and cracked ground. ▪ Avoidance of ponding in tidal marsh habitat or in areas within the waterside of setback levees. Design of ecosystem	Sv/LTS

[6] This change to the text of Table ES-1 reflects the discussion of Impact 14-3 found on pages 14-5 to 14-6, 14-13 to 14-14, 14-20 to 14-21, 14-27 to 14-28, 14-34 to 14-35, and 14-40 of the Recirculated Draft PEIR (Vol. 3). It conforms the summary table to the analysis of Impact 14-3, which clearly identifies Impact 14-3 as less than significant after mitigation for covered actions, and significant and unavoidable for non-covered actions for which the Delta Stewardship Council cannot mandate mitigation. Accordingly, this text change corrects a typographic error in Table ES-1 but does not provide new or changed information relative to the Recirculated Draft PEIR.

Table ES-1
Summary of Impacts and Mitigation Measures for Revised Project

Impact and EIR Section	Revised Project Before Mitigation[a]: Reliable Water Supply	Delta Ecosystem Restoration	Protection and Enhancement of Delta as an Evolving Place	Water Quality Improvement	Flood Risk Reduction	Abbreviated Mitigation Measures (see resource sections for full text)	Significance after Mitigation[b]
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						restoration areas, waterfowl hunting areas, setback levees, parks, canals, and surface water storage facilities to minimize standing water, or use of other methods such as mosquito fish to reduce mosquito breeding.	

5.2 Revisions to Section 2A Proposed Project and Alternatives

Page 2A-5, Line 16 (Volume 1)

Four possible projects, however, are known to some degree and are named in the Proposed Project: North of Delta Offstream Storage Investigation, Los Vaqueros Reservoir Project - Phase 2, the Upper San Joaquin River Basin Storage Investigation Plan, and the next update of the Department of Water Resources (DWR) Bulletin 118 *California's Groundwater* (DWR 2003). Shasta Lake Water Resources Investigation is not included in the Proposed Project because the State cannot participate in this project, as described in subsection 2.2.1.2.4.

Page 2A-11, Line 37 (Volume 1)

Federal funding was provided in 20062~~2004~~ (Public Law 108-361) to complete studies for four of the storage projects identified in the CALFED ROD: Shasta Lake Water Resources Investigation, North-of-the-Delta Offstream Storage Investigation (Sites Reservoir), Los Vaqueros Expansion Investigation, and the Upper San Joaquin River Basin Storage Investigation (Temperance Flats Reservoir).

Page 2A-12, Line 4 (Volume 1)

DWR also suspended work on the Delta Wetlands Project because additional studies were required and, in 2006, no potential participants indicated a willingness to pursue the project and share in the cost of subsequent investigations (DWR 2010a~~and Reclamation 2002~~).

Page 2A-14, Line 40 (Volume 1)

Water is diverted into the reservoir from the Delta at existing ~~Rock Slough,~~Old River~~,~~ and Middle River~~Victoria Canal (also known at the Alternative Intake Project)~~ intakes.

Page 2A-34, Line 2 (Volume 1)

The DFG *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011) recommended ecosystem restoration in Cache Slough to primarily include riparian, ~~and~~ tidal marsh, deep open water, shallow subtidal marsh, perennial grassland, and vernal pool habitat restoration.

Page 2A-34, Line 19 (Volume 1)

The DFG *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011) recommended ecosystem restoration in the Cosumnes River-Mokelumne River confluence to include floodplain, riparian habitat, shallow subtidal marsh, and tidal marsh habitat restoration.

Page 2A-34, Line 42 (Volume 1)

The DFG *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011) recommended ecosystem restoration in the Lower San Joaquin River area to primarily include riparian, ~~and~~ tidal marsh, seasonal floodplain, and shallow subtidal marsh habitat restoration.

Page 2A-35, Line 13 (Volume 1)

The DFG *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011) described~~recommended~~ ecosystem conditions~~restoration~~ in Suisun Marsh, and indicated that elevations in Suisun Marsh would be consistent with uplands, intertidal, and transitional habitats ~~to primarily include riparian and tidal marsh habitat restoration~~.

Page 2A-35, Line 36 (Volume 1)

The DFG *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011) recommended ecosystem restoration in Yolo Bypass to primarily include seasonal floodplain, riparian, perennial grassland, vernal pool, and tidal marsh habitat restoration.

Page 2A-36, Line 8 (Volume 1)

The *Interim Strategic Plan* identifies several near-term strategies to accomplish the coequal responsibilities, including ~~development of a climate change and sea level rise policy,~~ development of criteria for willing seller provisions for land protections, ~~participation in regional water resources planning efforts for flood management and water supplies,~~ development of partnerships to accomplish the goals, and establishment of funding mechanisms.

Page 2A-36, Line 14 (Volume 1)

The Delta Conservancy Strategic Plan will address the Delta Conservancy's role and proposed actions regarding land use, recreation, ~~water and flood management,~~ and habitat conservation and protection within the Delta and Suisun Marsh, including criteria and priorities for projects and programs identified in~~to accomplish~~ the Delta Conservancy Strategic Plan.

Page 2A-40, Line 24 (Volume 1)

The Proposed Project will encourage increased emphasis on improved water quality for drinking water and environmental beneficial uses through several of its ~~policies and~~ recommendations, including WQ R1, WQ R2, WQ R3, WQ R4, WQ R5, WQ R6, WQ R7, WQ R8, WQ R9, and WQ R10.

Page 2A-41, Line 24 (Volume 1)

Current policies and plans lack water quality objectives for some drinking water constituents of concern, including some disinfection byproduct precursors and pathogens~~, and do not include strategies to effectively protect drinking water~~.

Page 2A-41, Line 36 (Volume 1)

In 2002~~2008~~, the Central Valley RWQCB initiated a process to amend the Basin Plan to increase protection of drinking water quality through additional monitoring by dischargers for drinking water constituents of concern, establishment of new narrative or numeric water quality objectives for dischargers to maintain current drinking water quality conditions, and establishment of new narrative or numeric water quality objectives for dischargers to improve drinking water quality conditions.

Page 2A-70, Table 2-4 (Volume 1)

Table 2-4
Summary of Delta Plan Environmental Impact Report Proposed Project and Alternatives

Policy Elements	Proposed Project (Fifth Staff Draft Delta Plan)	No Project Alternative	Alternative 1A Export More Water Out of the Delta; Decreased Emphasis on Local and Regional Water Self-Reliance; Focus Levee Improvements on Protecting Water Supply Corridors	Alternative 1B Export More Water Out of the Delta; Reduced Conservation and Water Efficiency Measures; Only Voluntary Actions by State and Local Agencies only; Coordination, not Regulation; Large Number of Additional-Studies Before Action	Alternative 2 Decreased Export of Water from the Delta; Increased Emphasis on Ecosystem Restoration throughout California	Alternative 3 Increased Emphasis on Protection and Enhancement of Delta Communities and Culture; Protection of Delta Agricultural Land and Less Ecosystem Restoration; Fewer Regulations for Delta Counties
Reliable Water Supply (continued)	***Conveyance*** Recommendation to DWR to complete Bay-Delta Conservation Plan (BDCP) with a full evaluation of a robust set of alternatives by December 31, 2014. No Recommendations or Policies are identified regarding selection or implementation of *Specific* conveyance options. [b]	***Conveyance*** Continuation of BDCP process.	***Conveyance*** Recommendation to DWR to complete BDCP. No Recommendations or Policies are identified regarding selection or implementation of *Specific* conveyance options. [b]	***Conveyance*** Recommendation to DWR to complete BDCP by January 1, 2014. No Recommendations or Policies are identified regarding selection or implementation of *Specific* conveyance options. [b]	***Conveyance*** Recommendation to DWR to complete BDCP to decrease physical vulnerability and increase predictability of Delta water supplies, achieve maximum ecosystem protection, and not increase Delta diversions. Limits on water transfers and reduced exports of Delta water. Recommendation to analyze public trust flow criteria, other water supply investments, and full range of conveyance capacities and operational criteria, including reduction in use~~abandonment~~ of the south Delta intakes. No Recommendations or Policies are identified regarding selection or implementation of *Specific* conveyance options. [b]	***Conveyance*** Recommendation to DWR to complete BDCP with a full evaluation of a robust set of alternatives, including an improved through Delta conveyance, by December 31, 2014. No Recommendations or Policies are identified regarding selection or implementation of *Specific* conveyance options. [b]

NOTE:
a. Water supplies for water users located outside the Delta.

b. As explained in more detail in Appendix A to the Fifth Staff Draft Delta Plan, the BDCP is a process currently under way, and generally independent from this current Delta Plan development process. The BDCP will have its own Environmental Impact Report/Environmental Impact Statement (EIR/EIS), expected in 2012. Accordingly, the Delta Plan EIR discusses in Section 23, Bay Delta Conservation Plan, at a general level, the reasonably foreseeable scope of the BDCP and related EIR/EIS.

Page 2A-92, Line 14 (Volume 1)

Water is diverted into the reservoir from the Delta at existing ~~Rock Slough,~~ Old River~~,~~ and Middle River~~Victoria Canal (also known at the Alternative Intake Project)~~ intakes.

5.3 Revisions to Section 3 Water Resources

For this section, all reference citations for Reclamation 1999 in this chapter have been changed to Reclamation 1999a.

Page 3-7, Line 41 (Volume 3)

Overall, these water quality changes would benefit some native species that evolved with the natural flow regime that the objectives would seek to emulate.

Page 3-10, Line 2 (Volume 1)

Approximately 50,000 acres of the Delta is covered by surface water~~, and approximately 520,000 acres of Delta land is used for agriculture~~ (Reclamation 1997, p. II-55).

Page 3-10, Line 38 (Volume 1)

Middle River, Old River, and the Stockton Deep Water Ship Channel are listed as impaired due to DO depletion, with DO concentrations criteria set at 6 milligrams per liter (mg/L) minimum for the San Joaquin River between Turner Cut and Stockton between September 1 and November 30, and 5 mg/L between December 1 and August 31 (SWRCB 2006).

Page 3-13, Line 27 (Volume 1)

Delta water is used by two-thirds of California's population (DWR 2009a). The Delta also supplies water to more than 3~~700~~ million acres of irrigated land in various regions of California: San Francisco Bay, Central Coast, San Joaquin Watershed, Tulare Lake, and Southern California.

Page 3-14, Line 7 (Volume 1)

The Barker Slough Pumping Plant pumps water from Barker Slough into the North Bay Aqueduct for export to the northern areas of the San Francisco Bay Area ~~and Suisun Marsh~~. The Barker Slough Pumping Plant has a maximum pumping capacity of 175 cfs~~, and the average annual pumping rate is approximately 35 cfs~~ (CALFED 2000, p. 5.1-5). The North Bay Aqueduct supplies water to Solano County Water Agency and Napa County Flood Control and Water Conservation District. Solano County Water Agency provides water to the cities of Benicia, Vallejo, Vacaville, Fairfield, and Travis Air Force Base. Napa County Flood Control and Water Conservation District~~Agency~~ provides water from the North Bay Aqueduct to the cities of Napa, American Canyon, Saint Helena, Calistoga, and the town of Yountville.

Page 3-16, Line 43 or Page 3-17, Line 1 (Volume 3)

- Soil stabilization, sediment control, wind erosion control, tracking control, non-storm water management, and waste management/materials pollution control

Page 3-17, Line 9 (Volume 1)

Since 1964, a portion of the flow from the Trinity River Basin has been exported to the Sacramento River Basin through CVP facilities. Based on the Trinity River Main-stem Fishery Restoration ROD, dated December 19, 2000, from 368,600 to 815,000 acre-feet are allocated annually for Trinity River flows. This amount is scheduled in coordination with the U.S. Fish and Wildlife Service (FWS) to best meet habitat, temperature, and sediment transport objectives in the Trinity Basin. The seasonal timing of Trinity exports is a result of determining how to make best use of a limited volume of Trinity export (in concert with releases from Shasta Lake) to help conserve cold water pools and meet temperature objectives on the upper Sacramento and Trinity rivers. Reclamation maintains at least 600,000 acre-feet in Trinity Lake except in drier years when storage in Shasta Lake is low. ~~An average of about 732,400 acre-feet of water is diverted from Whiskeytown Lake to Keswick Reservoir annually (USFWS 2004, p. 3-14).~~

Page 3-17, Line 9 (Volume 3)

- Mitigate sediment contaminant bioavailability impacts through (a) the exclusion of bird use or nesting areas from areas that may have excessive selenium or mercury; (b) minimization of methylmercury production; and/or (c) maximization of contaminant degradation before discharge of water, as appropriate.

Page 3-17, Line 30 (Volume 3)

Dredging would be particularly prone to the production of re-suspended sediment and contaminants, but potential impacts could be reduced~~, but not necessarily fully mitigated,~~ through the use of submerged dredge cutter heads, silt curtains, and cofferdams, depending upon the site-specific soil conditions within the channel.

Page 3-22, Line 10 (Volume 1)

The EDID has dual plumbing for recycled water in highway medians, golf courses, landscaping, and at ~~1,600~~3,630 homes in its service area in 2010. The EDID produced~~s~~ over ~~1 billion~~ 672 million gallons ~~per year~~ of recycled water in 2010 (EDID 2010).

Page 3-24, Line 14 (Volume 1)

Flows in the lower portion of the Tuolumne River are controlled primarily by the operation of New Don Pedro Dam, which was jointly constructed in 1971 by Turlock Irrigation District and ~~Madera~~ Modesto Irrigation District with participation by the City and County of San Francisco.

Page 3-40, Line 31 (Volume 1)

The retained preferred alternative was the "In-Valley/Drainage-Impaired Area Land Retirement Alternative" (Reclamation 2006a, p. ES-9), whereby a minimum of 44,106 acres of land is retired. The Record of Decision selected a different alternative (In-Valley/Water Needs Land Retirement) that included drainage reduction measures, water reuse and treatment, and evaporation ponds. Other options were being investigated, such as treating the drainage water and releasing it in Delta areas or conveying it to the ocean.

Page 3-47, Line 341 (Volume 1)

High TDS and hardness can create ~~are a problem caused by~~ pipe scaling and ~~appliance~~ corrosion.

Page 3-48, Line 10 (Volume 1)

Agricultural use covers 943,000 acres of irrigated farmland (BAWAC 2006a).

Page 3-50, Table 3-9 (Volume 1)

Table 3-9
Imported Water from the Delta Watershed in the San Francisco Bay Area

Water Conveyance Facility Name	Water Source	Operator	Counties Served	Water Supplied in 2005 (Thousand Acre-Feet)
Putah South Canal (Solano Project)	Lake Berryessa	Reclamation	Solano County	~~44.1~~200
Contra Costa Canal	Western Delta Water	CCWD (CVP)	Contra Costa County	~~59~~100

Source: DWR 2009a, p. SF-11.

Page 3-51, Line 44 (Volume 1)

The Bay Area Integrated Regional Water Management Plan~~Recycling Program~~ was developed as part of this effort.

Page 3-53, Table 3-10 (Volume 1)

Table 3-10
San Francisco Bay Area Water Supply Transfers and Exchange Agreements and System Interties

CCWD and CCWD's Wholesale Customer Interties	Emergency ~~interties including one raw water intertie with EBMUD and~~ treated water interties between and among CCWD and its retailers include Diablo Water District-Antioch; Diablo Water District -Brentwood; Pittsburg–Southern California Water Company (Bay Point); Pittsburg-Antioch; CCWD-Antioch (via multipurpose pipeline); CCWD–Southern California Water Company; and CCWD-Martinez.~~; CCWD-EBMUD~~
EBMUD-CCWD Interties	~~One inactive one-way raw water intertie, one small treated water intertie, one raw water intertie between Los Vaqueros Pipeline and the Mokelumne Aqueduct, and two small interties with city of Hayward. The Los Vaqueros/Mokelumne intertie agreement permits conveyance of up to 10 mgd of water from EBMUD to CCWD and about 8 mgd of water from CCWD to EBMUD.~~ CCWD and EBMUD have three interties. The CCWD/EBMUD Interconnection Facility is a raw water intertie connection between the Los Vaqueros Pipeline and Mokelumne Aqueduct that can convey up to 100 mgd. Two other small treated water interties connecting the CCWD and EBMUD distribution systems can deliver up to 10 mgd of treated water.
~~Mojave Exchange Agreement~~	~~Solano County Water Agency has an agreement with Mojave Water Agency (MWA) for storage of wet weather flows in exchange for dry weather flows. Up to 10,000 acre-feet can be stored in any one year as part of this program. The City of Benicia is the only local agency that has participated in this program. It has a total of 5,500 acre-feet banked with MWA.~~

Source: BAWAC 2006a

Page 3-69, Line 44 (Volume 1)

Colorado River water is provided to Imperial Irrigation District, Coachella Valley Water District, Metropolitan, San Diego County Water Authority, and Palo Verde Irrigation District. A portion of the

Colorado River water supply is provided to Coachella Valley Water District through an exchange with Metropolitan for the SWP contract held by Coachella Valley Water District. Currently, water cannot be conveyed through existing facilities from the SWP aqueducts to Coachella Valley Water District. Therefore, a portion of the Colorado River water allocated to Metropolitan is provided to Coachella Valley Water District, and Metropolitan receives a similar amount of water from the SWP facilities.

Page 3-72, Line 35 (Volume 1)

Water conservation is an integral part of water management for the region. For example, the City of Los Angeles has implemented public outreach and school education programs, seasonal water rates that increase the price of water by 20 percent more in the summer than in the winter to reduce irrigation demands, and programs to provide free water conservation kits. These efforts have allowed the city to provide the same amount of water in the mid-2000s as they provided in the mid-1970s even though the population increased by more than one million people (DWR 2009a).

Page 3-77, Line 11 (Volume 1)

- Substantially change water supply availability to ~~water users located outside of the Delta that use~~ users of Delta water.

Page 3-83, Line 39 (Volume 1)

The magnitude of the salinity effects would depend on the location and size of the new tidal wetlands (Reclamation et al. 2010). Construction and operation of Delta ecosystem restoration projects may create long-term changes in the balance of sedimentation and scour within channels or newly created restoration areas that may affect the bioavailability of certain pollutants (e.g., mercury, selenium). Impacts could result from siltation and the re-suspension of sediment-associated pollutants or from the enhancement of bioavailability of mercury or selenium in new, highly organic, marsh areas. As an example, the North Delta Flood Control and Ecosystem Restoration Project Final EIR (DWR 2010c), which evaluated water quality impacts associated with levee modification, found that the release of pollutants and organic carbon would be less than significant, whereas the release of methylmercury required the use of mitigation to reduce the impact to a less-than-significant level.

Page 3-84, Line 4 (Volume 1)

Overall, these water quality changes would benefit some native species that evolved with the natural flow regime that the objectives would seek to emulate.

Page 3-84, Line 9 (Volume 1)

Increased salinity in the western Delta in the summer months, however, could cause adverse impacts to water users of Delta water, ~~especially~~ including municipal and agricultural users ~~that rely upon irrigation primarily during the summer months~~.

Page 3-96, Line 11 (Volume 1)

There would be ~~no~~ fewer ocean desalination projects because Alternative 1B would not encourage local and regional water supplies to the same extent as compared to the Proposed Project.

Page 3-109, Line 4 (Volume 1)

Reclamation (U.S. Bureau of Reclamation). 1999a. *Vernalis Adaptive Management Program Final EIS/EIR*. January.

Reclamation (U.S. Bureau of Reclamation). 1999b. *Trinity River Mainstem Fishery Restoration. Environmental Impact Statement/Report*. October.

Reclamation (U.S. Bureau of Reclamation). 1999c. *Central Valley Project Improvement Act. Final Environmental Impact Statement*. October.

Page 3-109, Line 10 (Volume 1)

Reclamation (U.S. Bureau of Reclamation). 2008. *Biological ~~Opinion~~ Assessment on the Continued Long-Term Operations of the Central Valley Project and State Water Project*. August.

Page 3-111, Line 26 (Volume 1)

SWRCB (State Water Resources Control Board). 2010c. Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem. Final report. Sacramento, CA. August 3.

SWRCB (State Water Resources Control Board). 2010d. 2010 Integrated Report, Clean Water Act Section 303(d) List/305(b) Report.

Tulare Basin Wildlife Partners. 2010. A Conservation Vision for the Tulare Basin.

Page 3-111, Line 41 (Volume 1)

USEPA (U.S. Environmental Protection Agency). 2010. Region 9: Water Division. Transmittal of Final List of Water Bodies Added by EPA to California's 2009-10 List of Water Quality Limited Segments Pursuant to Clean Water Act 303(d).

5.4 Revisions to Section 4 Biological Resources

Page 4-10, Line 33 (Volume 1)

In addition, modeling scenarios predict an increase in California's air temperature.

Page 4-17, Line 3 (Volume 3)

Ecosystems restoration actions guided by this conservation strategy also would occur within areas addressed by the Suisun Marsh Habitat Management, Preservation and Restoration Plan (SMHMPRP). Implementation of ecosystem restoration actions under the Proposed Project could be in conflict with habitat management plans of the SMHMPRP if the ecosystem restoration actions did not support the seasonal managed wetland habitats designated under the SMHMPRP. Changes to the ecosystem could result in loss of existing freshwater waterfowl habitat, including associated wetland plant and wildlife communities. These impacts could be significant.

Page 4-21, Line 30 (Volume 1)

California clapper rail is listed as endangered under the federal ESA and CESA, and it is a California fully protected species. Critical habitat has not been designated for this species. It inhabits tidal and brackish marshes mostly west of Suisun Bay.

Page 4-34, Line 31 (Volume 3)

- Implement advanced mitigation planning for ecosystem restoration prior to construction.

Page 4-35, Line 12 (Volume 3)

- An invasive species management plan shall be developed and implemented for any project whose construction or operation could lead to introduction or facilitation of invasive species establishment. The plan shall~~to~~ ensure that invasive plant species and populations are kept below preconstruction abundance and distribution levels.

Page 4-36, Line 33 (Volume 3)

- Protect, restore and enhance connectivity of habitats, including but not limited to wetland and riparian habitats that function as migration corridors for wildlife species (similar to how has been implemented through programs such as the California Essential Habitat Connectivity Project).

Page 4-37, Line 1 (Volume 3)

- Protect migratory pathways for migratory aquatic species such as salmon, steelhead, and sturgeon including those that use Delta tributaries and floodplain habitats by screening new diversions, and screening existing diversions and removing existing migration barriers if the specific proposed project/activity (*e.g.*, increased intake volume through an existing unscreened diversion, new diversion, new barrier, new barrier near an existing unscreened diversion, etc.) exacerbates the negative effect on migratory aquatic species caused by the existing barrier or unscreened diversion.

Page 4-39, Line 41 (Volume 1)

Trinity River

The Trinity River, which is tributary to the Klamath River, is not physically located within the Delta watershed; however, water from the Trinity River is transferred from the Klamath Basin to the Sacramento River Basin through series of facilities (tunnels and reservoirs) constructed as part of the CVP. Completion of the Trinity and Lewiston Dams in 1964 blocked migratory fish access to habitat upstream of Lewiston Dam, eliminated downstream sediment transport, and restricted anadromous fish populations to the remaining habitat below Lewiston Dam. Hydrology in the lower reach of the Trinity River is controlled primarily by reservoir releases based on flow requirements. The mainstem Trinity River downstream of Lewiston Dam supports several native anadromous fish species, including Chinook salmon, coho salmon, steelhead, green sturgeon, white sturgeon, and Pacific lamprey.

Page 4-46, Line 2 (Volume 1)

The Cosumnes River is tributary to the Mokelumne River, joining from the north near the town of Thornton. ~~There are no~~ The only major water storage reservoir~~s~~ on this system is Sly Park Reservoir.~~, and, because of the low elevation of its headwaters, t~~The river receives most of its water from rainfall (USFWS 1995, p. 2-V-14).

Page 4-65, Line 1 (Volume 1)

However, these transfers could adversely affect special-status species if they resulted in increased entrainment at South Delta intakes. In addition, temporary or permanent fallowing of agricultural land to facilitate the transfers might lead to a reduction in habitat for special-status species that use agricultural lands, such as giant garter snake.

Page 4-65, Line 15 (Volume 1)

The impacts on special status species would result primarily from construction activities. ~~Once constructed, the impacts of operation would be minimal.~~ However, certain activities, such as water transfers that result in fallowing of agricultural land, could continue to produce impacts on special-status species that use agricultural land as habitat over the long term.

Page 4-88, Line 21 (Volume 1)

Given the reduced number and magnitude of actions under the Alternative 1A (e.g., large-scale ecosystem restoration and an improved flow regime) to improve the current conditions or arrest further decline, on balance the adverse impacts on ~~sensitive natural communities~~ special-status species resulting from Alternative 1A would be **greater than** those of the Proposed Project, even though temporary impacts from construction might be fewer and the potential for temporary reductions in fallowing caused by water transfers might be reduced.

Page 4-88, Line 31 (Volume 1)

Overall, significant impacts on fish and wildlife habitat under Alternative 1A would be ~~**less**~~ **greater than** under the Proposed Project.

Page 4-91, Line 14 (Volume 1)

Impacts on fish and wildlife habitat would be the same as those described for sensitive natural communities in Section 4.4.6.1.1, above. However, because Alternative 1B would not require conformance with the ERP habitat types and elevation map, there might be more flexibility to restore or enhance other fish and wildlife habitats, such waterfowl habitat. Alternative 1B would contribute less to improving current conditions or arresting further ecosystem decline because it would not accelerate the development and implementation of flow objectives for the Delta or restore habitat to the same levels as the Proposed Project. ~~However, o~~On balance, significant impacts on fish and wildlife habitat under Alternative 1B ~~would~~ could be **greater than** under the Proposed Project.

Page 4-132, Table 4-2 (Volume 1)

Table 4-2

Special-status Fish and Wildlife Species Known to Occur or with Potential to Occur in the Delta and Suisun Marsh

Common Name	Scientific Name	Legal Status		Other Status[c]	Habitat	Range and Potential to Occur
		Federal[a]	State[b]			
Bryant's Savannah Sparrow	*Passerculus sandwichensis alandinns*	–	SSC	–	Nests along the tidal marsh/upland ecotone	The current known range includes Solano County

Sources: CNDDB 2011; DFG 2009; USFWS 2008e, 2008d

[a] U.S. Fish and Wildlife Service—Federal Listing Categories:

E: Listed as endangered under the federal Endangered Species Act (ESA).

T: Listed as threatened under the federal ESA.

BCC: U.S. Fish and Wildlife Service bird of conservation concern.

C: Candidate for listing.

–: No status.

[b] California Department of Fish and Game—State Listing Categories:

E: Listed as endangered under California Endangered Species Act (CESA).

T: Listed as threatened under CESA.

FP: Fully protected under the California Fish and Game Code.

SSC: California species of special concern.

WL: California Department of Fish and Game watch list.

CFGC: Rookeries protected under the California Fish and Game Code.

–: No status.

[c] Other Status (CNDDB Conservation Status Ranks) (shown only for species without legal status)

Global Rank:

GH: Possibly Extinct (species)—Missing; known from only historical occurrences but still some hope of rediscovery.

G1: Critically Imperiled—At very high risk of extinction because of extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2: Imperiled—At high risk of extinction because of very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3: Vulnerable—At moderate risk of extinction because of a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G5: Secure—Common; widespread and abundant.

G#G#: Range Rank—A numeric range rank (e.g., G2G3) is used to indicate the range of uncertainty in the status of a species or community.

T: Infraspecific Taxon (trinomial)—The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

State Rank:

SH: Possibly Extirpated (Historical)—Species or community occurred historically in the state, and there is some possibility that it may be rediscovered.

S1: Critically Imperiled—Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

S2: Imperiled—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

Table 4-2
Special-status Fish and Wildlife Species Known to Occur or with Potential to Occur in the Delta and Suisun Marsh

Common Name	Scientific Name	Legal Status		Other Status[c]	Habitat	Range and Potential to Occur
		Federal[a]	State[b]			

S3: Vulnerable—Vulnerable in the state because of a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S#S#: Range Rank—A numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty in the status of a species or community.

CNDDB: California Natural Diversity Database

Delta: Sacramento–San Joaquin Delta

5.5 Revisions to Section 5 Delta Flood Risk

Page 5-10, Line 7 (Volume 1)

Most of the levees in the Delta are non-project levees, comprising 730 miles out of 1,115 miles (see Figure 5-1). In Suisun Marsh, all of the approximately 230 miles of the levees are non-project levees. These levees are not part of the federally authorized project facilities contained in the ~~flood control program~~State Plan of Flood Control and are maintained by local agencies, reclamation districts ~~(regulated by CVFPB and not affiliated with Reclamation)~~, levee maintenance districts, and landowners. The Central Valley Flood Protection Board (CVFPB) requires permit applications to be filed for all proposed encroachments withi the floodways under its jurisdiction or on levees adjacent thereto. Most of the levees in the Delta area not adjacent to these regulated streams, however.

Some of the local maintenance activities are partially reimbursed by DWR under the Delta Levee Subventions Program established in 1973 to primarily benefit non-project levees. The Delta Flood Protection Act of 1988 significantly increased reimbursement opportunities and added mitigation requirements to ensure no net long-term loss of habitat. The Delta Levee Special Flood Control Projects Program (Special Projects) was initiated in 1988 to address flood problems on islands of special State interest. Improvement and maintenance of ~~these~~ levees are challenging because many require frequent maintenance by local agencies and groups that have limited funds to both maintain the levees and protect levee wildlife habitat (DWR 1995). In 1996, Assembly Bill 360 expanded the Delta Levees Program to include the entire Delta and small portions of Suisun Marsh. Funding for the Delta Levees Program was established at $6 million per year for Subventions (primarily Delta levee maintenance) and $6 million per year for the Special Flood Control Projects. Actual funding was typically less. In November 2006, the voter-approved Propositions 84 and 1E substantially incrased funding for Delta levees. Although this funding may be spent on both project and non-project levees, the emphasis has been to fund non-project levees in accordance with the funding guidelines published by DWR.

Page 5-10, Line 30 (Volume 1)

Many ~~L~~levees along the San Joaquin River and Stockton Channel are non-project levees.

Page 5-15, Line 19 (Volume 1)

DWR also incorporates a flood mapping program, which includes Best Available Maps, and Levee Flood Protection~~ed~~ Zones. These programs are described below.

Page 5-15, Line 31 (Volume 1)

Levee Flood Protection~~ed~~ Zones

A second DWR product is a set of maps of Levee Flood Protection~~ed~~ Zones. These maps "estimate the maximum area that may be inundated if a project levee fails when the water surface elevation is at the top of a project levee." Figure 5-6 shows the Delta portion of the Sacramento River Basin map that presents Levee Flood Protection~~ed~~ Zones (DWR 2010c).

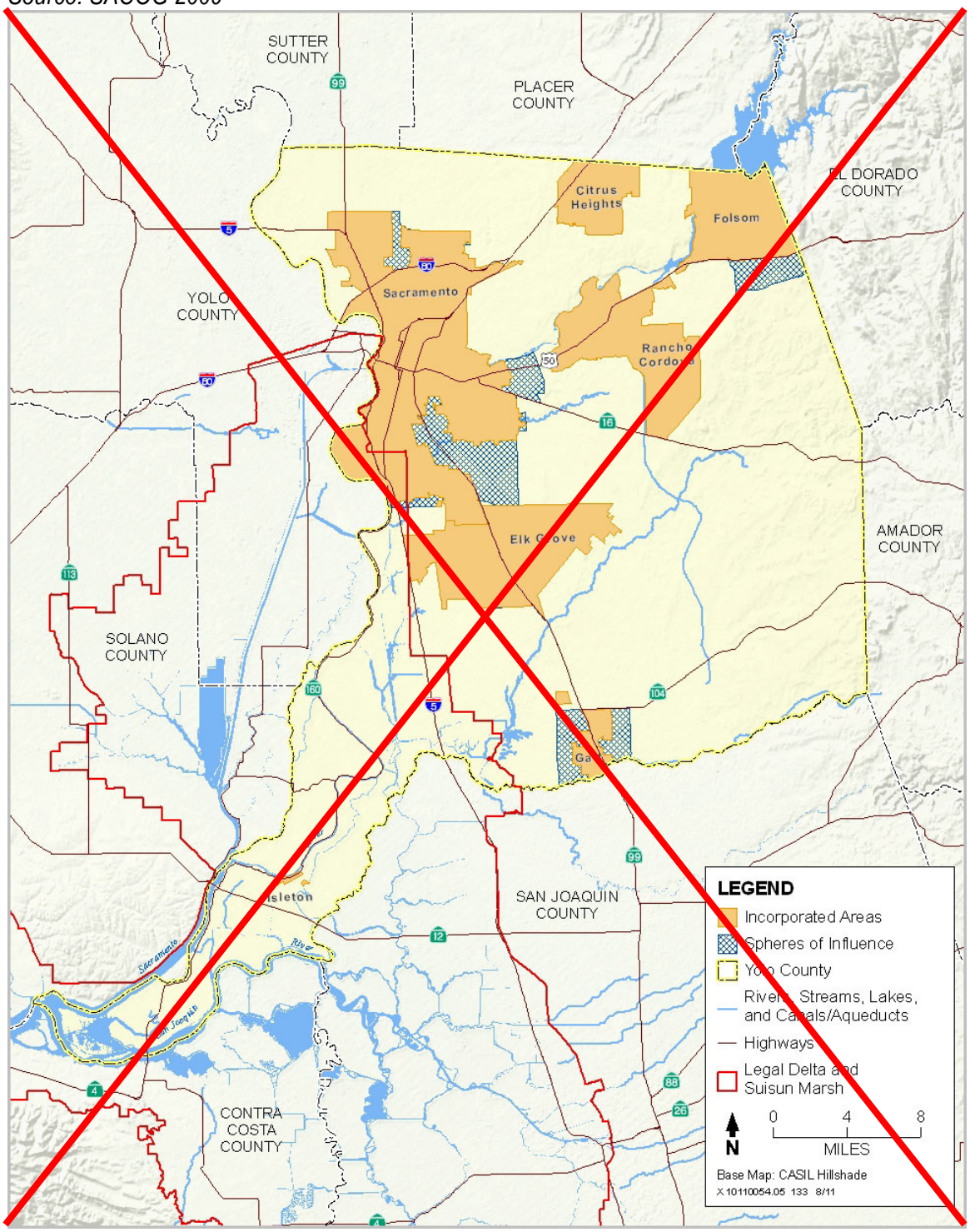
Page 5-33, Line 27 (Volume 3)

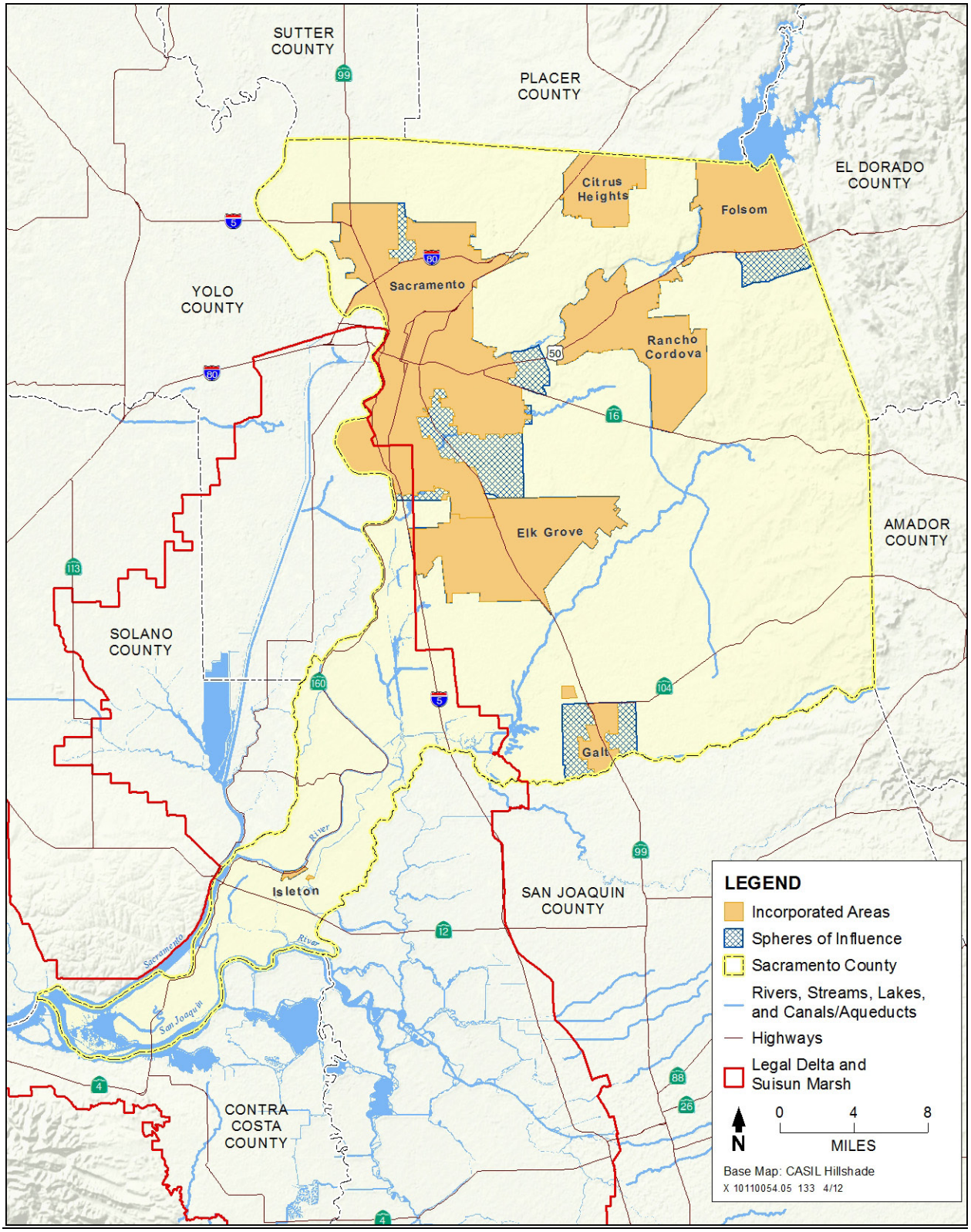
~~In some cases it will not be feasible to fully implement the mitigation measures in a manner that completely elimintaes flood management related impacts due to local hydrology and topography.~~

5.6 Revisions to Section 6 Land Use and Planning

Page 6-6, Line 1 or Figure 6-2 (Volume 1)

Figure 6-2
City Spheres of Influence in Sacramento County
Source: SACOG 2009




SUTTER COUNTY
PLACER COUNTY
EL DORADO COUNTY
YOLO COUNTY
SOLANO COUNTY
AMADOR COUNTY
SAN JOAQUIN COUNTY
CONTRA COSTA COUNTY
Citrus Heights
Folsom
Sacramento
Rancho Cordova
Elk Grove
Galt
Isleton
Sacramento River
San Joaquin River
LEGEND
Incorporated Areas
Spheres of Influence
Sacramento County
Rivers, Streams, Lakes, and Canals/Aqueducts
Highways
Legal Delta and Suisun Marsh
N
0 4 8
MILES
Base Map: CASIL Hillshade
X 10110054.05 133 4/12

Page 6-11, Line 21 (Volume 1)

The *Solano County General Plan* was adopted on August 5, 2008. The Resources chapter identifies numerous policies that apply specifically to the Delta and to the Suisun Marsh. The "Marsh" designation has been applied to portions of the Suisun Marsh in the Primary Zone on the Land Use Diagram. This designation is intendeddesigned to preserve and enhance the quality and diversity of marsh habitats. Uses in Marsh-designated areas wouldshould be restricted to aquatic and wildlife habitat; marsh-oriented recreational uses; agricultural activities that are compatible with the marsh environment and that protect the habitat value of marsh areas; and educational and scientific research opportunities and resources.

The majority of the Suisun Marsh within the Secondary Zone is designated "Agriculture," and a small portion of the marsh adjacent to the Sacramento River is designated "Water Dependent Industrial." The Agriculture designation identifies areas intended for agricultural uses that contribute substantially to the local agricultural economy, including crop production, processing facilities, single-family dwelling units, secondary dwelling units, and accessory buildings. The Water Dependent Industrial land use designation is specifically designed to accommodate water-dependent industrial development along the Sacramento River. Permitted uses within this designation include waterfront storage facilities, waterfront manufacturing or processing facilities that require frontage on navigable waters to receive raw materials and/or to distribute processed materials by ship, power plants and desalinization plants, and support facilities that are required to support the operation of a permitted waterfront use.

Page 6-21, Line 24 (Volume 1)

In November 2006, voters approved Measure L, which requires voter approval for any proposal to extend the ULL by more than 30 acres. Provisions of the ULL are in effect through 2026. Except for Bethel Island, Knightsen, Discovery Bay, and Byron and an area around Discovery Bay, most of the eastern portion of the unincorporated county is outside the ULL (Contra Costa County 2005, p. 3-10, Figure 3-1).

Page 6-24, Table 6-2 (Volume 1)

Table 6-2
Airport Land Use Compatibility Plans In or Near the Delta and Suisun Marsh

County	From Nearest City/Town	Facility Name	Land Use Authority	Ownership	Use	Airport Land Use Plan
Solano	3 miles northwest of Rio Vista	Rio Vista Municipal Airport	City of Rio VistaSolano County Airport Land Use Commission	Public	Public	Solano County Airport Land Use Commission provides a finding of consistencyreview procedures

Source: Compiled by AECOM in 2010
SACOG: Sacramento Area Council of Governments

Page 6-30, Line 34 (Volume 1)

The Potrero Hills Landfill is owned by Republic Services and is located south of SR12 near Suisun City in the Suisun Marsh.There are no lands in the Suisun Marsh with industrial uses; however, The cities of Fairfield and Benicia have industrial uses designated on lands adjacent to the Suisun Marsh boundary.

Page 6-39, Line 2 (Volume 1)

The island also supports a variety of cabins, recreational vehicle facilities, overnight boat berthing, camping sites, and a golf course. The Delta Coves project began in May 2006 and involved breaching an existing levee to connect a proposed residential subdivision's waterways to Dutch Slough and constructing a sheet-pile levee to protect the proposed residential subdivision. At present, no new homes have been constructed as part of the Delta Coves project on Bethel Island, and there are no known plans to begin construction of the residential subdivision.~~A new residential subdivision is under construction on the island. This project, known as Delta Coves, would breach an existing levee to connect the subdivision's waterways to Dutch Slough, but it would provide sheet-pile levee protection for the new homes.~~

Page 6-45, Line 14 (Volume 1)

The ability of these measures to reduce land use~~noise~~ impacts to less-than-significant levels depends on project-specific environmental studies; enforceability of these measures depends on whether or not the project being proposed is a covered action.

Page 6-48, Line 22 (Volume 1)

The subsequent introduction of new land uses, activities, or structures is not addressed as a construction activity; rather, it is discussed as an effect of project operations.

Page 6-49, Line 5 (Volume 1)

For example, new water supply facilities could be constructed on lands designated as "Agriculture" in Yolo County or "General Agriculture" in San Joaquin County. Permitted land uses include activities and structures that generally support agricultural production or other appurtenant uses, such as packing houses, fertilizer storage, or equipment repair. The siting of water supply facilities not intended to support local agriculture production that would be located in areas designated for agricultural uses could conflict with general plan land use designations and general plan policies related to agricultural land uses~~for exclusive agricultural use in Yolo or San Joaquin counties, conflicting with these local land use controls and resulting in a loss of agricultural land~~.

Page 6-51, Line 37 (Volume 1)

The subsequent introduction of new land uses, activities, or structures is not addressed as a construction activity; rather, it is discussed as an effect of project operations.

Page 6-51, Line 42 (Volume 1)

For example, Yolo, Solano, and San Joaquin counties have areas designated for agricultural uses~~exclusive agricultural designations~~ in which ecosystem restoration is not a permitted use, and so ecosystem restoration projects could conflict with general plan~~local~~ land use ~~plans in these~~ designations, and general plan policies related to agricultural land uses.

Page 6-57, Line 22 (Volume 1)

However, projects implementing the Delta Plan could conflict with land use plans. For example, construction of new water treatment facilities in areas~~could be constructed on lands~~ designated for ~~exclusive~~ agricultural use in Yolo or San Joaquin counties could conflict with general plan land use designations and general plan policies related to agricultural land uses~~, conflicting with these local land~~

~~use controls and resulting in a loss of agricultural land~~. Overall, this potential impact would be **significant**.

5.7 Revisions to Section 7 Agriculture and Forestry Resources

Page 7-4, Table 7-1 (Volume 1)

Table 7-1
Farmland in the Delta and Suisun Marsh

	Delta									
	Primary Zone		Secondary Zone		Total		Suisun Marsh		Delta and Suisun Marsh Total	
Category	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent

Source: DOC 2009

*Totals may vary from total area in Primary Zone, Secondary Zone, and Suisun Marsh because of rounding and mapping discrepancies. All acreage values are for year 2008.

Page 7-5, Line 3 (Volume 1)

In particular, Delta peat soils make the region one of the most fertile agricultural areas in California. In 2008, a~~A~~pproximately ~~47~~48 percent of the Delta and Suisun Marsh is Prime Farmland.

Page 7-10, Line 28 (Volume 1)

In 2011, the Board of Equalization reported that no timber sales occurred in the five counties partially within the Delta. However, the Board of Equalization reported a small amount of privately owned timber lands in Sacramento, Solano, and San Joaquin counties which were eligible for Timber Tax as TPZs with total land value of $34,632; $15,192; and $135, respectively (BOE 2012). The general plans of these counties do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no forestlands within the Delta (CDF 2010). Therefore, there would be no conflict with forest or timber zoning.

Page 7-14, Line 25 (Volume 1)

In the Delta watershed, the~~California has 5.4 million acres of land in TPZs. With the exception of about 146,000 acres in Del Norte County, all of this~~ TPZ land is~~ found in counties~~ located in the foothills and mountain areas~~either in the Delta watershed or in areas that use Delta water~~.

Page 7-16, Line 11 (Volume 1)

Agriculture in areas outside of the Central Valley accounts for approximately one-third of California's crop output. These areas include the Napa, Salinas, Santa Maria, Coachella, Imperial, and Palo Verde valleys; the Oxnard Plain; and areas in Lake, San Benito, Sonoma, and San Diego counties.~~Outside of the Central Valley, land is mostly urban, built up, or not suitable for farming~~.

Page 7-16, Table 7-6 (Volume 1)

Table 7-6
Farmland in Areas Outside the Delta That Use Delta Water

Category	Acres	Percent

Source: DOC 2009

*All acreage values are for year 2008 and include total values for counties where Delta water is used. These values include lands that do not use Delta water~~Totals may vary from total area of Delta watershed because of rounding and mapping discrepancies~~.

Page 7-14, Line 20 (Volume 1)

Areas outside the Delta that use Delta water do not use Delta water to irrigate TPZ lands. TPZ lands also are not located near areas that use Delta water.

~~7.3.3.2.1 Forestland and Timber Resources~~

~~Forest vegetation types, including mixed conifer forest, montane hardwood, and oak woodland, cover about 2.6 million acres of in areas outside the Delta that use Delta water, about 11 percent of the total land cover in these areas (CAL FIRE 2006).~~

~~7.3.3.2.2 Timber Production Zones~~

~~California has 5.4 million acres of land in TPZs. With the exception of about 146,000 acres in Del Norte County, all of this TPZ land is found in counties that are located either in the Delta watershed or in areas that use Delta water.~~

Page 7-20, Line 35 (Volume 1)

Small storage reservoirs and flood control facilities, modification of existing reservoirs, regulating reservoirs, and groundwater percolation basins that might be constructed to improve water supply reliability throughout the study area would convert less agricultural land than larger facilities but could still adversely impact agricultural land locally, particularly if local these lands have specific soil conditions (such as peat soils in the Delta) ~~that support high-value crops that cannot be readily grown elsewhere in the Delta watershed~~. Recent information reports that agriculture of high-value, specialty crops in the Delta has declined and that other areas also produce crops now typically found in the Delta (PPIC 2012). However, asparagus and dichondra seed are two specialty crops grown only in the Delta and cannot be readily grown elsewhere in the Delta watershed (PPIC 2012).

Page 7-23, Line 26 (Volume 3)

- For projects that will result in permanent conversion of Farmland, ~~P~~preserve~~, to the greatest extent feasible,~~ in perpetuity other Farmland through acquisition of an agricultural conservation easement, or contributing funds to a land trust or other entity qualified to preserve Farmland in perpetuity (at a target ratio of 1:1 ~~or more~~, depending on the nature of the conversion and the characteristics of the Farmland to be converted, to compensate for permanent loss).

- Redesign project features~~, to the greatest extent feasible,~~ to minimize fragmenting or isolating Farmland. Where a project involves acquiring land or easements, ensure that the remaining nonproject area is of a size sufficient to allow ~~economically~~ viable farming operations. The project proponents shall be responsible for acquiring easements, making lot line adjustments, and merging affected land parcels into units suitable for continued commercial agricultural management.

- Reconnect utilities or infrastructure that serve agricultural uses if these are disturbed by project construction. If a project temporarily or permanently cuts off roadway access or removes utility lines, irrigation features, or other infrastructure, the project proponents shall be responsible for restoring access as necessary to ensure that economically viable farming operations are not interrupted.

- Manage project operations~~, to the greatest extent feasible,~~ to minimize the introduction of invasive species or weeds that may affect agricultural production on adjacent agricultural land. ~~Where a project has the potential to introduce sensitive species or habitats or have other spill-over effects on nearby agricultural lands, the project proponents shall be responsible for acquiring easements on nearby agricultural land and/or financially compensating for indirect effects on nearby agricultural land. Easements (e.g., flowage easements) shall be required for temporary or intermittent interruption in farming activities (e.g., because of seasonal flooding or groundwater seepage). Acquisition or compensation would be required for permanent or significant loss of economically viable operations.~~

- Establish buffer areas~~, to the greatest extent feasible,~~ between projects and adjacent agricultural land that are sufficient to protect and maintain land capability and agricultural operation flexibility. Design buffers to protect the feasibility of ongoing agricultural operations and reduce the effects of construction- or operation-related activities (including the potential to introduce special-status species in the agricultural areas) on adjacent or nearby properties. The buffer shall also serve to protect ecological restoration areas from noise, dust, and the application of agricultural chemicals. The width of the buffer shall be determined on a project-by-project basis to account for variations in prevailing winds, crop types, agricultural practices, ecological restoration, or infrastructure. Buffers can function as drainage swales, trails, roads, linear parkways, or other uses compatible with ongoing agricultural operations.

Page 7-24, Line 12 (Volume 1)

~~In the Delta, potential conflicts with forestland zoning and TPZ could occur near the cities of Sacramento, Elk Grove, Isleton, West Sacramento, Rio Vista, Fairfield, Benicia, Suisun City, Stockton, Lathrop, Manteca, Tracy, Pittsburg, Antioch, Brentwood, and Oakley and in Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties. Applicable forestland and timberland zoning in the Delta would include those adopted and enforced by these cities and counties. In the Delta watershed and areas outside the Delta that use Delta water, other local forest or TPZ zoning could also apply.~~

Page 7-24, Line 24 (Volume 3)

- Design proposed projects to minimize, to the greatest extent feasible, conflicts and inconsistencies with~~the loss of~~ land protected by agricultural zoning or a Williamson Act contract and the terms of the applicable zoning/contract.

Page 7-24, Line 37 (Volume 3)

- Avoid land protected as forestland and timberland through site selection and/or project design~~, to the greatest extent feasible~~. Where feasible, project proponents should take into account the value of the forest, not only in terms of direct products such as wood but also as part of the watershed ecosystem, when selecting a project site. Wherever possible, nonprotected sites should be preferred and selected instead of protected sites.

Page 7-24, Line 40 (Volume 1)

~~The USFS estimates indicate that approximately 44,530 acres of private timberland, half of which is composed of western oaks, are located in the five Delta counties. Timberland represents about one-quarter of forestland in the five Delta counties. Western oaks make up approximately 75 percent of nontimberland forest resources, making them the most abundant forest type in the five Delta counties.~~

~~It is unclear how much, if any, of this forestland is located in the Delta, although the Fire and Resource Assessment Program estimates that 3,288 acres of hardwood habitats are located in the Delta. As described in greater detail in Section 4, Biological Resources, 8,980 acres of riparian forest habitat are in the Delta. These areas typically are found as long, linear patches separating other terrestrial biological communities from agricultural or urban land or as low-lying, flood-prone patches near river bends, canals, or breached levees. They can be located along major waterways, drainage channels, pond margins, and oxbows and in abandoned, low-lying fields.~~

Page 7-25, Line 9 (Volume 3)

- For projects that will result in permanent conversion of Forestland, ~~P~~preserve~~, to the greatest extent feasible,~~ in perpetuity other forestland through a conservation easement or by acquiring

lands or contributing funds to a land trust or other agency (at a ~~minimum~~ target ratio of 1:1, depending on the nature of the conversion and the characteristics of the Forestland to be converted, to compensate for permanent loss).

- Avoid land protected as forestland and timberland~~, to the greatest extent feasible,~~ through site selection and/or project design. Where feasible, project proponents should take into account the value of the forest, not only in terms of direct products such as wood, but also as part of the watershed ecosystem, when selecting a project site. When possible, unprotected sites should be preferred and selected instead of protected sites.

Page 7-31, Line 18 (Volume 1)

The restoration areas could be located in the Delta, or in the Delta watershed. Each of these activities could conflict with agricultural zoning or Williamson Act contracts if restoration projects are not permitted uses under such contracts or in agricultural zones, and these conflicts could lead to cancellation of Williamson Act contracts~~the conversion of lands from agricultural use indirectly causing physical impacts similar to those described in Section 7.4.3.2.1 (Impact 7-1b)~~.

Restoration could indirectly result in the cancellation of Williamson Act contracts. Where construction-related activities and restoration do not require acquisition of an entire property, the remainder of the property unaffected by these facilities could remain under contract. However, agricultural parcels could become fragmented, be reduced in size, or become irregularly shaped, making the continued agricultural use of the land infeasible, which may indirectly result in the cancellation of Williamson Act contracts where agricultural lands are converted to nonagricultural uses.

Page 7-31, Line 30 (Volume 1)

Ongoing operation of restoration projects could conflict with agricultural zoning or Williamson Act contracts if restoration projects are not permitted uses under such contracts or in agricultural zones, and these conflicts could lead to cancellation of Williamson Act contracts~~the conversion of lands from agricultural use~~. The extent of impact would be influenced by the size of the footprint for individual projects.

Page 7-32, Line 10 (Volume 1)

The acres of Williamson Act contract lands that could be cancelled would vary depending on the amount of active agricultural land needed for operations and maintenance activities, the extent to which adjacent agricultural fields are affected, and the nature of agricultural operations on adjacent agricultural land. Therefore, the potential impacts of projects encouraged by the Delta Plan are considered significant.~~However, because temporary construction-related impacts could occur, and because substantial changes to the landscapes could conflict with agricultural zoning or Williamson Act contracts,~~ T~~t~~he potential impacts of projects encouraged by the Delta Plan are considered **significant**.

Page 7-32, Line 15 (Volume 1)

Delta ecosystem restoration projects would take place entirely within the Delta. In 2011, the Board of Equalization reported that no timber sales occurred in the five counties partially within the Delta. However, the Board of Equalization reported a small amount of privately owned timber lands in Sacramento, Solano, and San Joaquin counties which were eligible for Timber Tax as TPZs with total land value of $34,632; $15,192; and $135, respectively (BOE 2012). The general plans of these counties do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no

forestlands within the Delta (CDF 2010). Therefore, there would be no conflict with forest or timber zoning.

Conclusion

Delta ecosystem restoration projects encouraged the Proposed Project would not conflict with forestland, timberland, or TPZ lands, so there would be **no impact**.

~~*Effects of Project Construction*~~

~~Forestland, timberland or timberland zoned for timberland production are protected by State and federal laws which may be compatible with ecological restoration objectives.~~

~~The Delta Plan encourages projects, including the projects identified in Section 7.4.3.2, that would include the construction and operation of ecological restoration areas. Temporary effects from construction would include removal of vegetation and disturbance of soil in restoration area footprints and borrow/spoils sites. These temporary effects could become permanent where areas are cleared for replanting or restoration of nonagricultural habitats, such as tidal marsh, riparian corridors, and grassland. Construction of projects encouraged by the Delta Plan could require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, and backhoes. Haul trucks would be used to move borrow and/or spoils and other materials. Restoration projects could be located in the Delta or in the Delta watershed. If these activities occurred on lands zoned for forest or timberland use, they could conflict with zoning requirements and potentially lead to conversion of land to nonforest use, causing physical impacts similar to those described in Section 7.4.3.2.4 (Impact 7-4b).~~

~~In the Delta, potential conflicts with forest or timber zoning could occur near the cities of Sacramento, Elk Grove, Isleton, West Sacramento, Rio Vista, Fairfield, Benicia, Suisun City, Stockton, Lathrop, Manteca, Tracy, Pittsburg, Antioch, Brentwood, and Oakley and in Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties. Applicable forest and timberland zoning in the Delta would include those adopted and enforced by these cities and counties. In the Delta watershed, other local forest zoning or TPZ regulations could also apply.~~

~~*Effects of Project Operations*~~

~~Ongoing operation of restoration projects could conflict with forest or timberland zoning if restoration projects create nonforest habitats or other uses that are not permitted in these zones. The physical effect of this conflict would be the conversion of forestlands. The extent of impact would be influenced by the size of the restoration area footprint.~~

~~The Delta Plan encourages implementation of several ecosystem restoration projects, including the Cosumnes River-Mokelumne River Confluence: North Delta Flood Control and Ecosystem Restoration Project; Suisun Marsh Habitat Management, Preservation, and Restoration Plan; Cache Slough Complex Project; Yolo Bypass Project; and the Lower San Joaquin River Bypass Proposal. It is not known at this time what specific activities would occur that could affect agricultural and forestry resources.~~

~~Review of these past projects provides analogous information to understand how Delta Plan–encouraged projects, for which there are no project-specific details or associated reviews, might affect timberland resources or TPZ. The EIRs and EISs for these projects did not specifically find conflict with zoning for forestland, timberland, or TPZ to be an issue of concern.~~

~~*Conclusion*~~

~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies. However, because temporary construction-related impacts could occur, and because substantial changes to the landscapes could conflict with forest zoning or TPZ, the potential impacts of projects encouraged by the Delta Plan are considered **significant**.~~

Page 7-33, Line 11 (Volume 1)

The general plans of counties with land in the Delta do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no forestlands within the Delta (CDF 2010). Therefore, there would be no loss or conversion of forestland.

Conclusion

Delta ecosystem restoration projects encouraged by the Proposed Project would not result in loss or conversion of forestlands, so there would be **no impact**.

~~*Effects of Project Construction*~~

~~The USFS estimates indicate that approximately 44,530 acres of private timberland, half of which is composed of western oaks, are located in the five Delta counties. Timberland represents about one-quarter of forestland in the five Delta counties. Western oaks make up approximately 75 percent of nontimberland forest resources, making them the most abundant forest type in the five Delta counties. It is unclear how much, if any, of this forestland is located in the Delta, although the Fire and Resource Assessment Program estimates that 3,288 acres of hardwood habitats are located in the Delta.~~
~~As described in greater detail in Section 4, Biological Resources, 8,980 acres of riparian forest habitat are in the Delta. These areas typically are found as long, linear patches separating other terrestrial biological communities from agricultural or urban land or as low-lying, flood-prone patches near river bends, canals, or breached levees. They can be located along major waterways, drainage channels, pond margins, and oxbows and in abandoned, low-lying fields.~~

~~The Delta Plan encourages projects, including the projects identified in Section 7.4.3.2, that would include the construction and operation of ecological restoration areas. Temporary effects from construction would include removal of vegetation and disturbance of soil in restoration area footprints and borrow/spoils sites. These temporary effects could become permanent where areas are cleared for replanting or restoration of nonagricultural habitats, such as tidal marsh, riparian corridors, and grassland. Construction of projects encouraged by the Delta Plan could require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, and backhoes. Haul trucks would be used to move borrow and/or spoils and other materials. Restoration projects could be located in the Delta, or in the Delta watershed. If these activities occurred on forest or timberland, they could convert these lands to nonforest use.~~

~~*Effects of Project Operation*~~

~~Ongoing operation of restoration projects in areas that are currently in forest or timber cover could cause conversion of forest or timberlands to other uses. The extent of impact would be influenced by the size of the footprint for individual restoration projects.~~

~~The Delta Plan encourages implementation of several ecosystem restoration projects, including the Cosumnes River-Mokelumne River Confluence: North Delta Flood Control and Ecosystem Restoration Project; Suisun Marsh Habitat Management, Preservation, and Restoration Plan; Cache Slough Complex Project; Yolo Bypass Project; and the Lower San Joaquin River Bypass Proposal. It is not known at this time what specific activities would occur that could affect agricultural and forestry resources.~~

~~Review of these past projects provides analogous information to understand how Delta Plan–encouraged projects, for which there are no project-specific details or associated reviews, might affect timberland resources or TPZ. The EIRs and EISs for these projects did not specifically find conversion of forestland, timberland, or TPZ to be an issue of concern, but construction and operations-related impacts on these resources associated with surface facilities would be similar to the impacts, mitigation measures, and findings as the more general farmland conversion impacts described in Section 7.4.3.2.1 because the impact mechanisms would be the same types of footprint impacts.~~

~~*Conclusion*~~

~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies. However, because substantial permanent changes to the landscapes could convert forestland to nonforest use, the potential impacts of projects encouraged by the Delta Plan are considered **significant**.~~

Page 7-34, Line 25 (Volume 1)

In addition to direct impacts described in Sections 7.4.3.2.1 (Impact 7-1b), 7.4.3.2.2 (Impact 7-2b), 7.4.3.2.3 (Impact 7-3b), and 7.4.3.2.4 (Impact 7-4b), construction activities related to Delta ecosystem restoration projects could affect nearby ~~forest or~~ agricultural lands because of noise, access constraints, dust, or other effects that would indirectly result in conversion of these lands to other uses.

Page 7-34, Line 34 (Volume 1)

In addition to direct impacts described in Sections 7.4.3.2.1 (Impact 7-1b), 7.4.3.2.2 (Impact 7-2b), 7.4.3.2.3 (Impact 7-3b), and 7.4.3.2.4 (Impact 7-4b), ongoing operational activities related to Delta ecosystem restoration projects could affect nearby ~~forest or~~ agricultural lands because of noise, access constraints, dust, or other effects that would indirectly result in conversion of these lands to other uses.

Page 7-35, Line 17 (Volume 1)

However, because temporary construction-related impacts could occur, and because substantial changes to the landscapes could indirectly result in conversion of agricultural land ~~or forestland~~, the potential impacts of projects encouraged by the Delta Plan are considered **significant**.

Page 7-38, Line 36 (Volume 1)

Water quality improvement projects would take place entirely within or adjacent to the Delta. In 2011, the Board of Equalization reported that no timber sales occurred in the five counties that are partially within the Delta. However, the Board of Equalization reported a small amount of privately owned timber lands in Sacramento, Solano, and San Joaquin counties which were eligible for Timber Tax as TPZs with total land value of $34,632; $15,192; and $135, respectively (BOE 2012). The general plans of these counties do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no forestlands within the Delta (CDF 2010). Therefore, there would be no conflict with forest or timber zoning.

Conclusion

Water quality improvement projects encouraged by the Proposed Project would not conflict with forestland, timberland, or TPZ lands, so there would be **no impact.**

~~*Effects of Project Construction*~~

~~It is unclear at this time how implementation of the Proposed Project would result in specific activities, including the location, number, methods, and duration of construction activities and the type of facilities that would be operated. The Delta Plan encourages implementation of the North Bay Aqueduct Alternative Intake Project. The new alternative intake structure would be located on the Sacramento River in a rural area of Sacramento or Yolo County and the new pipeline would extend from the new intake structure to the existing North Bay Regional Water Treatment Plant.~~

~~Construction-related activities at construction sites for water quality improvement projects, including projects identified in Section 7.4.3.3 and water treatment plants, pipelines, wastewater treatment plants, stormwater treatment facilities, and agricultural runoff treatment could require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, backhoes, and concrete mixing and pumping trucks. Temporary effects from construction would include removal of vegetation and disturbance of soil in facilities footprints and borrow/spoils. These temporary effects could become permanent where areas are cleared for buildings, facilities, paved roads and storage / staging, and other project features. The facilities could be located in the Delta, in the Delta watershed, or in areas outside the Delta that use Delta water, as described in Section 2A, Proposed Project and Alternatives.~~

~~In the Delta, potential conflicts with forestland zoning could occur near the cities of Sacramento, Elk Grove, Isleton, West Sacramento, Rio Vista, Fairfield, Benicia, Suisun City, Stockton, Lathrop, Manteca, Tracy, Pittsburg, Antioch, Brentwood, and Oakley and in Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties. Applicable forestland and timberland zoning in the Delta would include those adopted and enforced by these cities and counties. In the Delta watershed, and areas outside the Delta that use Delta water, other local forest zoning or TPZ requirements could also apply.~~

~~*Effects of Project Operations*~~

~~Projects encouraged by the Delta Plan could include water treatment plants, pipelines, wastewater treatment plants, stormwater treatment facilities, and agricultural runoff treatment. The facilities would be located in the Delta, the Delta watershed, and areas outside the Delta that use Delta water, as described in Section 2A, Proposed Project and Alternatives. Operation of each of these facility types could potentially conflict with existing zoning for forestland and timberland or TPZ if they occur in these zones, and lead to the conversion of these lands from forest use, causing physical impacts similar to those described in Section 7.4.3.3.4 (Impact 7-4c). The extent of impact would be influenced by the size of the footprint for individual projects and facilities.~~

~~*Conclusion*~~

~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies. However, because named projects and projects encouraged by the Delta Plan could result in conflict with existing timber or forest zoning or TPZ, this potential impact is considered **significant**.~~

Page 7-39, Line 31 (Volume 1)

The general plans of counties with land in the Delta do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no forestlands within the Delta (CDF 2010). Therefore, there would be no loss or conversion of forestland.

Conclusion

Water quality improvement projects encouraged by the Proposed Project would not result in loss or conversion of forestlands, so there would be **no impact**.

~~*Effects of Project Construction*~~

~~It is unclear at this time how implementation of the Proposed Project, including those projects identified in Section 7.4.3.3, would result in specific activities, including the location, number, methods, and duration of construction activities and the type of facilities that would be operated. The Delta Plan encourages implementation of the North Bay Aqueduct Alternative Intake Project. The new alternative intake structure would be located on the Sacramento River in a rural area of Sacramento or Yolo County and the new pipeline would extend from the new intake structure to the existing North Bay Regional Water Treatment Plant.~~

~~The USFS estimates indicate that approximately 44,530 acres of private timberland, half of which is composed of western oaks, are located in the five Delta counties. Timberland represents about one quarter of forestland in the five Delta counties. Western oaks make up approximately 75 percent of nontimberland forest resources, making them the most abundant forest type in the five Delta counties. It is unclear how much, if any, of this forestland is located in the Delta, although the Fire and Resource Assessment Program estimates that 3,288 acres of hardwood habitats are located in the Delta.~~

~~As described in greater detail in Section 4, Biological Resources, there are 8,980 acres of riparian forest habitat in the Delta. These areas typically are found as long, linear patches separating other terrestrial biological communities from agricultural or urban land or as low-lying, flood-prone patches near river bends, canals, or breached levees. They can be located along major waterways, drainage channels, pond margins, and oxbows and in abandoned, low-lying fields. Forestlands in the Delta watershed and areas outside the Delta that receive Delta water and that are most likely to be located near future construction sites would include woodlands in the foothills, and wooded riparian habitat along streams and major waterways, drainage channels, pond margins, and oxbows and in abandoned, low-lying fields.~~

~~Construction-related activities at construction sites for water quality improvement projects, including water treatment plants, desalination plants, pipelines, wastewater treatment plants, stormwater treatment facilities, and agricultural runoff treatment could require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, backhoes, and concrete mixing and pumping trucks. Temporary effects from construction would include removal of vegetation and disturbance of soil in facilities footprints and borrow/spoils. These temporary effects could become permanent where areas are cleared for buildings, facilities, paved roads and storage/staging, and other project features. The facilities could be located in the Delta, in the Delta watershed, or in areas outside the Delta that use Delta water, as described in Section 2A, Proposed Project and Alternatives.~~

~~*Effects of Project Operation*~~

~~Projects encouraged by the Delta Plan could include water treatment plants, pipelines, wastewater treatment plants, stormwater treatment facilities, and agricultural runoff treatment. The facilities would be located in the Delta, the Delta watershed, and areas outside the Delta that use Delta water, as described in Section 2A, Proposed Project and Alternatives. Operation of these facilities could permanently remove lands from forest or timberland use. The extent of impact would be influenced by the size of the footprint for individual projects and facilities.~~

~~*Conclusion*~~

~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies. However, because named projects and projects~~

~~encouraged by the Delta Plan could result in conversion of forestlands to nonforest use, this potential impact is considered **significant**.~~

Page 7-40, Line 43 (Volume 1)

In addition to direct impacts described in Sections 7.4.3.3.1 (Impact 7-1c), 7.4.3.3.2 (Impact 7-2c), 7.4.3.3.3 (Impact 7-3c), and 7.4.3.3.4 (Impact 7-4c), construction activities related to water quality projects could affect nearby ~~forest or~~ agricultural lands because of noise, access constraints, dust, or other effects that would indirectly result in conversion of these lands to other uses.

Page 7-41, Line 10 (Volume 1)

In addition to direct impacts described in Sections 7.4.3.3.1 (Impact 7-1c), 7.4.3.3.2 (Impact 7-2c), 7.4.3.3.3 (Impact 7-3c), and 7.4.3.3.4 (Impact 7-4c), operation of water quality project facilities could affect nearby ~~forest or~~ agricultural lands because of noise, access constraints, dust, or other effects that would indirectly result in conversion of these lands to other uses.

Page 7-41, Line 38 (Volume 1)

However, because named projects and projects encouraged by the Delta Plan could indirectly result in conversion of ~~forest or~~ agricultural lands, this potential impact is considered **significant**.

Page 7-44, Line 31 (Volume 1)

Flood risk reduction projects would take place entirely within the Delta. In 2011, the Board of Equalization reported that no timber sales occurred in the five counties that are partially within the Delta. However, the Board of Equalization reported a small amount of privately owned timber lands in Sacramento, Solano, and San Joaquin counties which were eligible for Timber Tax as TPZs with total land value of $34,632; $15,192; and $135, respectively (BOE 2012). The general plans of these counties do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no forestlands within the Delta (CDF 2010). Therefore, there would be no conflict with forest or timber zoning.

Conclusion

Flood risk reduction projects encouraged by the Proposed Project would not conflict with forestland, timberland, or TPZ lands, so there would be no impact.

~~*Effects of Project Construction*~~

~~Forestland, timberland or timberland zoned for timberland production are protected by State and federal laws. These laws generally are not compatible with the flood risk reduction activities and projects encouraged by the Delta Plan.~~

~~Construction-related activities at construction sites for flood risk reduction projects, including expansion and modification of levees, construction of setback levees, dredging (including land-based staging and placement of dredged material), and operable barriers along the levees, could require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, backhoes, and concrete mixing and pumping trucks. The facilities would be located in the Delta and the Delta watershed. Each of these activities could potentially conflict with zoning for forest or timberland or TPZ and result in the conversion of land from forest use, causing physical impacts similar to those described in Section 7.4.3.4.4 (Impact 7-4d).~~

~~In the Delta, potential conflicts with forestland zoning and TPZ could occur near the cities of Sacramento, Elk Grove, Isleton, West Sacramento, Rio Vista, Fairfield, Benicia, Suisun City, Stockton, Lathrop, Manteca, Tracy, Pittsburg, Antioch, Brentwood, and Oakley and in Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties. Applicable forestland and timberland zoning in the Delta would include those adopted and enforced by these cities and counties. In the Delta watershed, other local forest zoning or TPZ requirements could also apply.~~

~~*Effects of Project Operations*~~

~~Implementing the Proposed Project could increase investments in levee improvements in the Delta. The improvements could primarily be to existing levees and typically would not alter their basic shape and configuration, except for the use of setback levees. Setback levees could extend the levee footprint and width into the landside of an area and increase riparian habitat on the waterside of the levee. Operation of these facilities could potentially conflict with existing zoning for forestland and timberland or TPZ if they occur in these zones and lead to the conversion of land from forest use. The extent of impact would be influenced by the size of the facility footprint.~~

~~It is likely that some forestland and timberland resources or TPZ conversion impacts of named projects and projects encouraged by the Delta Plan could be mitigated to a less-than-significant level. This could be achieved by modifying a project to avoid land zoned for forestland or timberland production, For situations that are ecosystem restoration projects or have the opportunity to include ecosystem restoration as an element of a project (e.g. levee degradation for floodplain expansion), an ecological restoration plan could be prepared that is consistent with the existing forestland or timberlands zoning provisions. The details of many of the aspects of these projects, however, are not currently known, and it is possible that significant impacts on forestland and timberland resources or TPZ conversion might be encountered that cannot be mitigated.~~

~~It is not known at this time what specific flood risk reduction projects would occur. A variety of levee improvements, modification, and maintenance, including construction of setback levees, could be part of projects encouraged by the Delta Plan.~~

~~*Conclusion*~~

~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies. However, because named projects and projects encouraged by the Delta Plan could result in conflict with existing timber or forest zoning or TPZ, this potential impact is considered **significant**.~~

Page 7-45, Line 33 (Volume 1)

The general plans of counties with land in the Delta do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no forestlands within the Delta (CDF 2010). Therefore, there would be no loss or conversion of forestland.

Conclusion

Flood risk reduction projects encouraged by the Proposed Project would not result in loss or conversion of forestlands, so there would be **no impact**.

~~*Effects of Project Construction*~~

~~The USFS estimates indicate that approximately 44,530 acres of private timberland, half of which is composed of western oaks, are located in the five Delta counties. Timberland represents about one quarter of forestland in the five Delta counties. Western oaks make up approximately 75 percent of nontimberland forest resources, making them the most abundant forest type in the five Delta counties. It is~~

~~unclear how much, if any, of this forestland is located in the Delta, although the Fire and Resource Assessment Program estimates that 3,288 acres of hardwood habitats are located in the Delta.~~

~~As described in greater detail in Section 4, Biological Resources, 8,980 acres of riparian forest habitat are in the Delta. These areas typically are found as long, linear patches separating other terrestrial biological communities from agricultural or urban land or as low-lying, flood-prone patches near river bends, canals, or breached levees. They can be located along major waterways, drainage channels, pond margins, and oxbows and in abandoned, low-lying fields. Forestlands in the Delta watershed that are most likely to be located near future construction sites would include woodlands in the foothills, wooded riparian habitat, and along streams, and along major waterways, drainage channels, pond margins, and oxbows and in abandoned, low-lying fields.~~

~~Construction-related activities at construction sites for flood risk reduction projects, including expansion and modification of levees, construction of setback levees, dredging (including land-based staging and placement of dredged material), and operable barriers along the levees, could require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, backhoes, and concrete mixing and pumping trucks. The facilities would be located in the Delta and the Delta watershed. Each of these activities could potentially result in loss of forestland or convert forestland to nonforest use if it occurs on or near forestland, including oak woodland riparian forests.~~

~~*Effects of Project Operation*~~

~~Implementing the Proposed Project could increase investments in levee improvements in the Delta. The improvements could primarily be to existing levees and typically would not alter their basic shape and configuration, except for the use of setback levees. Setback levees could extend the levee footprint and width into the landside of an area and increase riparian habitat on the waterside of the levee. Operation of these facilities could convert forestland or timberland to nonforest use. The extent of impact would be influenced by the size of the facility footprint.~~

~~It is likely that some forestland or timberland resources impacts of named projects and projects encouraged by the Delta Plan could be mitigated to a less-than-significant level. As described above in Section 7.4.3.4.3, these mitigation measures could include avoidance through redesign or the inclusion of an ecological restoration plan that is consistent with the provisions of the existing forestland or timberland code. The details of many of the aspects of these projects, however, are not currently known, and it is possible that significant impacts on forestland or timberland resources might be encountered that cannot be mitigated.~~

~~It is not known at this time what specific flood risk reduction projects would occur. A variety of levee improvements, modification, and maintenance, including construction of setback levees, could be part of projects encouraged by the Delta Plan.~~

~~*Conclusion*~~

~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies. However, because named projects and projects encouraged by the Delta Plan could result in conversion of forestlands to nonforest use, this potential impact is considered **significant**.~~

Page 7-48, Line 17 (Volume 1)

The number and location of all potential projects that would be implemented is not currently known. However, four possible projects are known to some degree and are named in the Delta Plan: new State parks at Barker Slough, at Elkhorn Basin, and in the southern Delta and the Economic Sustainability~~Stability~~ Plan. The Economic Stability Plan is not an activity that would generate agriculture or forestry resources impacts; therefore, it is not discussed further in this section.

Page 7-50, Line 24 (Volume 1)

Delta enhancement projects would take place entirely within the Delta. In 2011, the Board of Equalization reported that no timber sales occurred in the five counties partially within the Delta. However, the Board of Equalization reported a small amount of privately owned timber lands in Sacramento, Solano, and San Joaquin counties which were eligible for Timber Tax as TPZs with total land value of $34,632; $15,192; and $135, respectively (BOE 2012). The general plans of these counties do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no forestlands within the Delta (CDF 2010). Therefore, there would be no conflict with forest or timber zoning.

Conclusion

Delta enhancement projects encouraged by the Proposed Project would not conflict with forestland, timberland, or TPZ lands, so there would be **no impact**.

~~Gateways, bike lanes, trails, parks, marinas, and other facilities could be established in the Delta to protect and enhance it as an evolving place. Operation of these facilities could potentially lead to the conversion of land to nonforest use. However, as of 2001, none of the five Delta counties had land zoned TPZ, so there would be no conflict with forest or timber zoning.~~

~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies. However, because there is no existing timber or forest zoning or TPZ in the Delta counties in which activities enhancing the Delta as an evolving place would occur, there would be **no impact** at the program level. Future project-specific analyses may develop adequate information to arrive at a different conclusion; however, for purposes of this program-level analysis, there is no available information to indicate that another finding is warranted or supported by substantial evidence.~~

Page 7-50, Line 36 (Volume 1)

The general plans of counties with land in the Delta do not include designation of timber lands within the Delta. The California Department of Forestry and Fire Protection's California's Forest and Rangeland 2010 Assessment described that there were no forestlands within the Delta (CDF 2010). Therefore, there would be no loss or conversion of forestland.

Conclusion

Delta enhancement projects encouraged by the Proposed Project would not result in loss or conversion of forestlands, so there would be no impact.

~~*Effects of Project Construction*~~

~~The USFS estimates indicate that approximately 44,530 acres of private timberland, half of which is composed of western oaks, are located in the five Delta counties. Timberland represents about one quarter of forestland in the five Delta counties. Western oaks make up approximately 75 percent of nontimberland forest resources, making them the most abundant forest type in the five Delta counties. It is unclear how much, if any, of this forestland is located in the Delta, although the Fire and Resource Assessment Program estimates that 3,288 acres of hardwood habitats are located in the Delta.~~

~~As described in greater detail in Section 4, Biological Resources, 8,980 acres of riparian forest habitat are in the Delta. These areas typically occur in long, linear patches separating other terrestrial biological communities from agricultural or urban land or as low-lying, flood-prone patches near river bends, canals, or breached levees. They can be located along major waterways, drainage channels, pond margins, and oxbows and in abandoned, low-lying fields. Forestlands in the Delta watershed that are most likely to be~~

~~located near future construction sites would include woodlands in the foothills, and wooded riparian habitat along streams, along major waterways, drainage channels, pond margins, and oxbows and in abandoned, low-lying fields.~~

~~Construction-related activities at construction sites for Delta enhancement projects, including those identified in Section 7.4.3.5, could require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, backhoes, and concrete mixing and pumping trucks. The facilities would be located in the Delta and the Delta watershed. Each of these activities could potentially result in loss of forestland or convert forestland to nonforest use if it occurs on or near forestland, including oak woodland riparian forests.~~

~~Effects of Project Operation~~

~~Gateways, bike lanes, trails, parks, marinas, and other facilities could be established in the Delta to protect and enhance it as an evolving place. Depending on their location, operation of these facilities could convert forestland to nonforest use. The extent of impact would be influenced by the size of the facility footprint.~~

~~It is not known at this time what types or where specific Delta as evolving place type projects that could convert forestland to nonforest use would occur. However, the Delta Plan encourages implementation of State parks at Barker Slough, at Elkhorn Basin, and in the southern Delta. Some wooded or riparian forest areas could be affected by these projects, depending on the location of new roads, buildings, and other developed recreational facilities associated with these parks.~~

~~Conclusion~~

~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time such projects are proposed by lead agencies. However, because named projects and projects encouraged by the Delta Plan could result in conversion of forestlands to nonforest use, this potential impact is considered **significant**.~~

Page 7-57, Line 36 (Volume 1)

Under this alternative, there would be fewer of the projects described in Sections 7.4.3.1 (Reliable Water Supply)~~, 7.4.3.2 (Delta Ecosystem Restoration), and 7.4.3.4 (Flood Risk Reduction)~~. Because fewer water supply~~, Delta ecosystem restoration, and flood risk reduction~~ projects would occur under this alternative compared to the Proposed Project, there would be a smaller area of potential physical effect and, therefore, a reduced likelihood of loss or conversion of forestland under Alternative 1A.

~~Alternative 1A would have the same number and type of projects described for the Proposed Project in Sections 7.4.3.3 (Water Quality Improvement) and 7.4.3.5 (Protection and Enhancement of Delta as an Evolving Place). Therefore there would be a similar area of potential physical effect and therefore a similar likelihood of loss or conversion of forestland under Alternative 1A for these types of projects.~~

Page 7-58, Line 13 (Volume 1)

Under this alternative, there would be fewer of the projects described in Sections 7.4.3.1 (Reliable Water Supply)~~, 7.4.3.2 (Delta Ecosystem Restoration), and 7.4.3.4 (Flood Risk Reduction)~~. Because fewer water supply~~, Delta ecosystem restoration, and flood risk reduction~~ projects would occur under this alternative compared to the Proposed Project, there would be a smaller area of potential physical effect and, therefore, a reduced likelihood of conflict with timber or forest zoning under Alternative 1A.

~~Alternative 1A would have the same number and type of projects described for the Proposed Project in Sections 7.4.3.3 (Water Quality Improvement) and 7.4.3.5 (Protection and Enhancement of Delta as an~~

~~Evolving Place). Therefore, would be a similar area of potential physical effect and therefore a similar likelihood of conflict with timber or forest zoning under Alternative 1A for these types of projects.~~

Page 7-60, Line 37 (Volume 1)

This alternative would have fewer reliable water supply projects (as described in Section 7.4.3.1)~~, ecosystem restoration projects (as described in Section 7.4.3.2), and Delta enhancement projects (as described in Section 7.4.3.5)~~. Because this alternative would have fewer of these types of projects compared to the Proposed Project, there would be a smaller geographic area affected by new facilities and uses and, therefore, a reduced likelihood of loss or conversion of forestland.

~~Although some types of water quality projects (as described in Section 7.4.3.3) would be more likely under this alternative, there would be less emphasis on water treatment plants and conveyance facilities. Hence, it is uncertain how these changes in emphasis would affect the overall footprint in comparison to the Proposed Project.~~

~~Similarly, although there would be more of some types of flood risk reduction projects (as described in Section 7.4.3.4), Alternative 1B would have fewer setback levees and floodplain expansion projects. Hence, it is uncertain how these changes in emphasis would affect the overall footprint in comparison to the Proposed Project.~~

Page 7-61, Line 17 (Volume 1)

This alternative would have fewer reliable water supply projects (as described in Section 7.4.3.1)~~, ecosystem restoration projects (as described in Section 7.4.3.2), and Delta enhancement projects (as described in Section 7.4.3.5)~~. Because this alternative would have fewer of these types of projects compared to the Proposed Project, there would be a smaller geographic area affected by new facilities and uses and, therefore, a reduced likelihood of conflict with timber or forest zoning.

~~Although some types of water quality projects (as described in Section 7.4.3.3) would be more likely under this alternative, there would be less emphasis on water treatment plants and conveyance facilities. Hence, it is uncertain how these changes in emphasis would affect the overall footprint in comparison to the Proposed Project.~~

~~Similarly, although there would be more of some types of flood risk reduction projects (as described in Section 7.4.3.4), Alternative 1B would have fewer setback levees and floodplain expansion projects. Hence, it is uncertain how these changes in emphasis would affect the overall footprint in comparison to the Proposed Project.~~

Page 7-63, Line 9 (Volume 1)

Although some types of flood risk reduction projects (described in Section 7.4.3.4), including floodplain expansion projects, would be more likely under Alternative 2, there would be fewer levee improvements compared to the Proposed Project, which would result in less farmland conversion for flood management facilities but greater flood risks for farmland~~and it is uncertain how these changes in emphasis would affect the overall footprint of improvements~~ in Alternative 2 in comparison to the Proposed Project.

Page 7-64, Line 5 (Volume 1)

Overall, significant impacts related to conflicts with existing agricultural zoning or Williamson Act contracts under Alternative 2 would be **greater**~~**less**~~ **than** under the Proposed Project.

Page 7-64, Line 12 (Volume 1)

~~Although some types of water supply projects described in Section 7.4.3.1 (including desalination projects, water transfers, and water efficiency and conservation projects) would be more likely under this alternative,~~ Alternative 2 would have no major water storage facilities, with the Tulare Basin emphasized instead of facilities associated with the Surface Water Storage Investigation. Because there would be fewer surface water projects, the overall footprint of possible disturbance areas would be smaller than for the Proposed Project, resulting in a lower likelihood of forestland conversion.

~~This alternative would have less extensive ecosystem restoration projects (described in Section 7.4.3.2), resulting in a smaller footprint and therefore a reduced likelihood of forestland conversion.~~

~~Alternative 2 would have more water quality projects (as described in Section 7.4.3.3), resulting in a larger area potentially affected by new facilities and therefore a greater likelihood of forestland conversion.~~

~~Although some types of flood risk reduction projects (described in Section 7.4.3.4), including floodplain expansion projects, would be more likely under Alternative 2, there would be fewer levee improvements compared to the Proposed Project, and it is uncertain how these changes in emphasis would affect the overall footprint of improvements in Alternative 2 in comparison to the Proposed Project.~~

~~This alternative would have the same number and type of Delta enhancement projects as described for the Proposed Project in Section 7.4.3.5 (Protection and Enhancement of Delta as an Evolving Place). There would be a similar area of potential physical effect and therefore a similar likelihood of forestland conversion for this topic area.~~

Page 7-64, Line 33 (Volume 1)

As compared to existing conditions, the impacts related to loss of forestland or conversion of forestland to nonforest uses under Alternative 2 would be **less than significant**.

Page 7-65, Line 1 (Volume 1)

~~Although some types of water supply projects described in Section 7.4.3.1 (including desalination projects, water transfers, and water efficiency and conservation projects) would be more likely under this alternative,~~ Alternative 2 would have no major water storage facilities, with the Tulare Basin emphasized instead of facilities associated with the Surface Water Storage Investigation. Because there would be fewer surface water projects, the overall footprint of possible disturbance areas would be smaller than for the Proposed Project, resulting in a lower likelihood of conflict with forest or timber zoning.

~~This alternative would have less extensive ecosystem restoration projects (described in Section 7.4.3.2), resulting in a smaller footprint and therefore a reduced likelihood of conflict with forest or timber zoning.~~

~~Alternative 2 would have more water quality projects (as described in Section 7.4.3.3), resulting in a larger area potentially affected by new facilities and therefore a greater likelihood of conflict with forest or timber zoning.~~

~~Although some types of flood risk reduction projects (described in Section 7.4.3.4), including floodplain expansion projects, would be more likely under Alternative 2, there would be fewer levee improvements compared to the Proposed Project, and it is uncertain how these changes in emphasis would affect the overall footprint of improvements in Alternative 2 in comparison to the Proposed Project.~~

~~This alternative would have the same number and type of Delta enhancement projects as described for the Proposed Project in Section 7.4.3.5 (Protection and Enhancement of Delta as an Evolving Place). There would be no impacts on TPZ because none occurs in the Delta.~~

Page 7-65, Line 21 (Volume 1)

As compared to existing conditions, the impacts related to conflicts with existing forestland and timberland zoning under Alternative 2 would be **less than significant**.

Page 7-65, Line 28 (Volume 1)

Although some types of water supply projects described in Section 7.4.3.1 (including desalination projects, water transfers, and water efficiency and conservation projects) would be more likely under this alternative, Alternative 2 would have no major water storage facilities, with the Tulare Basin emphasized instead of facilities associated with the Surface Water Storage Investigation. Although some types of water supply projects described in Section 7.4.3.1 of the Draft Program EIR (including desalination projects, water transfers, and water efficiency and conservation projects) would be more likely under this alternative, Alternative 2 would have major storage facilities in the Tulare Basin instead of facilities associated with the Surface Water Storage Investigation. The development of surface storage in the Tulare Lake Basin could result in the inundation of up to about 320,000 acres of agricultural land. In addition, implementing Alternative 2 would encourage the retirement or fallowing of about 380,000 acres of agricultural land within the San Luis Drainage Area and possible periodic fallowing of additional agricultural lands as a result of restrictions on the total amount of water to be exported from the Delta. If some of these lands are zoned for agricultural land uses, these effects could result in the conversion of these lands to nonagricultural land uses if continued agricultural use of the land is infeasible. However, the degree to which these changes would result in conflicts with agricultural zoning in comparison to the Proposed Project is uncertain because detailed descriptions of these projects are not available.~~Because there would be fewer surface water projects, the overall footprint of possible disturbance areas would be smaller than for the Proposed Project, resulting in a lower likelihood of indirect agricultural land or forestland conversion.~~

Page 7-66, Line 5 (Volume 1)

Overall, significant impacts related to indirect conversion of agricultural land and forestland under Alternative 2 would be **greater~~less~~ than** under the Proposed Project.

Page 7-66, Line 10 (Volume 1)

Mitigation measures for Alternative 2 would be the same as those described in Sections 7.4.3.6.1 (Mitigation Measure 7-1~~),~~) and 7.4.3.6.2 (Mitigation Measure 7-2)~~, 7.4.3.6.3 (Mitigation Measure 7-3), and 7.4.3.6.4 (Mitigation Measure 7-4)~~ for the Proposed Project. Because it is not known whether the mitigation measures listed above would reduce Impacts 7-1, 7-2~~, 7-3, 7-4~~, and 7-5 to a less-than-significant level for Alternative 2, these potential impacts are considered **significant and unavoidable**.

Page 7-67, Line 28 (Volume 1)

~~This alternative would have less extensive ecosystem restoration projects (described in Section 7.4.3.2), resulting in a smaller affected-area footprint and, therefore, a reduced likelihood of loss or conversion of forestland.~~

~~Although some types of flood risk reduction projects (described in Section 7.4.3.4), including modification of levees, would be more likely under Alternative 3, there would be no setback levees or subsidence reversal. Hence, it is uncertain how these changes in emphasis would affect the overall footprint (and thus impact) in comparison to the Proposed Project.~~

This alternative would have the same number and type of projects described for the Proposed Project in Sections 7.4.3.1 (Reliable Water Supply)~~, 7.4.3.3 (Water Quality Improvement), and 7.4.3.5 (Protection and Enhancement of Delta as an Evolving Place)~~. There would be a similar area of potential physical effect and, therefore, a similar likelihood of loss or conversion of forestland for these types of projects.

Overall, significant impacts related to loss of forestland or conversion of forestland to nonforest uses under Alternative 3 would be **the same as**~~**less than**~~ under the Proposed Project.

Page 7-68, Line 5 (Volume 1)

~~This alternative would have less extensive ecosystem restoration projects (described in Section 7.4.3.2), resulting in a smaller affected area footprint and, therefore, a reduced likelihood of conflict with forest or timber zoning.~~

~~Although some types of flood risk reduction projects (described in Section 7.4.3.4), including modification of levees, would be more likely under Alternative 3, there would be no setback levees or subsidence reversal. Hence, it is uncertain how these changes in emphasis would affect the overall footprint (and thus impact) in comparison to the Proposed Project.~~

This alternative would have the same number and type of projects described for the Proposed Project in Sections 7.4.3.1 (Reliable Water Supply)~~, 7.4.3.3 (Water Quality Improvement), and 7.4.3.5 (Protection and Enhancement of Delta as an Evolving Place)~~. There would be a similar area of potential physical effect and, therefore, a similar likelihood of conflict with forest or timber zoning for these types of project.

Overall, significant impacts related to conflicts with existing forestland and timberland zoning under Alternative 3 would be **the same as**~~**less than**~~ under the Proposed Project.

Page 7-70, Line 14 (Volume 1)

PPIC (Public Policy Institute of California). 2012. Transitions for the Delta Economy. San Francisco, CA.

5.8 Revisions to Section 8 Visual Resources

Page 8-20, Line 30 (Volume 3)

- Develop design form and materials with a goal to achieve aesthetic visual character instead of a strictly utilitarian objective. Use cast natural form elements or natural materials ~~(stone)~~ for facing to achieve texture and color compatible with the adjacent landscape; natural materials would be preferable for areas of high visibility and public use. Landscape areas adjacent to facilities. Use natural materials, such as wood and stone, for signage at proposed facilities.

Page 8-20, Line 38 (Volume 3)

- To the extent consistent with the safety and reliability of the electric grid, as well as site-specific considerations, ~~U~~use single-pole electrical transmission towers instead of lattice-form towers for proposed large electrical transmission lines, and put transmission lines underground along areas with high visibility and high public use.

Page 8-37, Line 25 (Volume 1)

Implementing the Proposed Project could increase investments in levee improvements in the Delta. The improvements could primarily be to existing levees and typically would not alter their basic shape and configuration, except for the use of setback levees. Following levee repair, reconstruction, or improvement activities, the visual character of the existing levee system would generally be consistent with current conditions. Larger footprint activities, such as construction of setback levees and wide seepage berms, would typically occur in rural areas where there are few sensitive viewers and where flood control structures are common visual features. Therefore, new setback levees or modification of existing levees would not result in a substantial alteration in the existing visual character of the sites. Setback levees could extend the levee footprint and width into the landside of an area and increase riparian habitat on the waterside of the levee. These improvements would not cause a significant permanent change in the landscape.

5.9 Revisions to Section 9 Air Quality

Page 9-24, Line 10 (Volume 3)

- To minimize track-out of dirt and mud from dirt and gravel roads, all trucks and equipment, including their tires, shall be washed prior to leaving the site. Only exteriors of trucks and equipment are to be washed (no engine degreasing), no detergents or chemicals shall be used in the wash water, and off-site runoff of rinse water shall be prevented.

Page 9-26, Line 13 (Volume 3)

- A protocol for monitoring, ~~and~~ recording, reporting and responding to odor events, including notification of the local and downwind jurisdictions of projects that may result in odor complaints, including contact numbers for responsible individuals during construction. If odor an event occurs, construction activity should be suspended until conditions change, removing the cause and resultant odors, or until alternate management practices are implemented that significantly reduce the odors.
- ~~A protocol for reporting and responding to odor events~~

5.10 Revisions to Section 10 Cultural Resources

Page 10-13, Line 6 (Volume 3)

Construction of ~~ecosystem restoration areas~~Delta enhancement projects could require the use of heavy equipment, such as excavators, graders, scrapers, bulldozers, and backhoes in the Delta, which could cause impacts related to the discovery of unrecorded human remains in the same manner described for the Proposed Project in Section 10.4.3.5, Protection and Enhancement of Delta as an Evolving Place, of the Draft PEIR.

Page 10-13, Line 35 (Volume 3)

Construction of ~~ecosystem restoration~~Delta enhancement projects encouraged by the Revised Project could require use of heavy equipment, such as excavators, graders, scrapers, bulldozers, and backhoes, which could disturb or destroy historic buildings, structures, and linear features in the same manner

described for the Proposed Project in Section 10.4.3.5, Protection and Enhancement of Delta as an Evolving Place, of the Draft PEIR.

Page 10-17, Line 9 (Volume 1)

These resources include Native American habitation and burial mound sites and 19th and early 20th to mid-20th century residences, ranches and farmsteads, railroads, shipwrecks, historical landings and other maritime-related cultural resources, water conveyance systems, levees, and bridges.

Page 10-22, Line 1 (Volume 1)

Implementation of these types of actions and construction and operation of these types of facilities could result in indirect impacts on cultural resources.

Page 10-23, Line 11 (Volume 1)

Review of existing information indicates that various resource types have been identified and documented in the Delta. These include early Native American habitation, burial, and activity sites; traditional cultural properties; late 19th century residences, ranches, and farmplexes (typically, a small complex with a residence and agricultural-related buildings); shipwrecks and other maritime-related cultural resources; early 20th to mid-20th century residential and farm buildings, levees, canals, and other water-related systems; railroad segments; commercial properties; and landscape features (e.g., trees, walls, and curbs).

Page 10-23, Line 12 (Volume 3)

- If potentially CRHR-eligible prehistoric or historic-era archeological resources are discovered during the survey phase, additional investigations may be necessary. These investigations could include, but not necessarily be limited to, measures providing resource avoidance, archival research, archaeological testing and CRHR eligibility evaluations, and contiguous excavation unit data recovery. In addition, upon discovery of potentially CRHR-eligible prehistoric resources, coordinate with the California Native American Heritage Commission (CNAHC), Native American Heritage Commission (NAHC), and the Native American community to provide for an opportunity for suitable individuals and tribal organizations, including federally recognized tribes, to comment on the proposed research.

Page 10-23, Line 28 (Volume 3)

- Granting of cultural easements to Native American tribes for the purpose of protecting cultural resource properties

Page 10-23, Line 28 (Volume 3)

- If federal agencies are participants in the activity and Section 106 of the National Historic Preservation Act applies, conduct formal consultation with the State Historic Preservation Officer, Tribal Historic Preservation Officer (THPO) or Tribal Administrator for tribes that do not have a THPO, and the Native American community. Potential adverse effects on cultural resources recommended as eligible for listing in the NRHP will be resolved through the development of a memorandum of agreement and/or a program-level agreement.

- As part of efforts to identify, evaluate, and consider cultural resources, including prehistoric sites, Native American human remains, and traditional cultural properties, Native Americans would be consulted. The California Native American Heritage Commission (CNAHC) would be asked to provide a list of Native Americans who should be contacted concerning an identified future project. The NAHC would also be asked to search its Sacred Lands Files. Native Americans

identified by the NAHC would be contacted by letter to request information on cultural resources of importance. They also would be asked to identify concerns they have about the project. THPOs and Tribal Administrators of federally recognized tribes would be contacted and asked to search their files and provide information necessary for the identification and consideration of cultural resources.

- Before any project-specific ground-disturbing activities begin, conduct investigations to identify submerged cultural resources. These investigations would include review of State Lands Commission (SLC) Shipwrecks Database and other SLC files, and remote sensing surveys conducted under the direction of a qualified maritime archaeologist. If avoidance of significant submerged cultural resources is not feasible, a permit from SLC may be necessary to conduct resource documentation and possible salvage of artifacts, ship components, and other data and objects.
- If CRHR-eligible archaeological resources, including submerged or buried shipwrecks or other maritime-related cultural resources, are discovered during construction activities, work would halt within 100 feet of the discovery until the find can be evaluated by a qualified archaeologist or maritime archaeologist as appropriate. In addition, SLC would be consulted.

Page 10-24, Line 9 (Volume 3)

The following mitigation measures would reduce the effects of Impact 10-2a through e, Discovery of Unrecorded Human Remains.~~:~~ The identification, evaluation, and determination of disposition of Native American human remains shall be conducted in accordance with Native American consultation procedures described below and in Mitigation Measure 10-1. The location, content, and character of Native American human remains are confidential and shall not be released to the public. Native American human remains and associated funerary objects shall be treated with the utmost respect and in accordance with the direction of the identified Most Likely Descendant.

Page 10-24, Line 14 (Volume 1)

The determination of significance of certain types of cultural resources, such as prehistoric Native American sites, burial sites, and traditional cultural properties, is made in consultation with Native American representatives. This consultation should be conducted throughout the planning, evaluation, and implementation phases of projects.

The fact that a resource is not listed in or determined to be eligible for listing in the CRHR, is not included in a local register of historical resources, or is not identified in a historical resources survey does not preclude a lead agency from determining that the resource may be a historical resource as defined in Public Resources Code 5020.1(j) or 5024.1 (CCR 15064.5[a][4]).

Page 10-26, Line 35 (Volume 1)

However, because named projects and projects encouraged by the Delta Plan could result in changes to significant prehistoric archaeological resources through the destruction or damage of the data potential retained by significant prehistoric archaeological resources (CRHR Criterion D—"has yielded, or may be likely to yield, information in prehistory or history"), this potential impact is considered **significant**.

Page 10-40, Line 41 (Volume 1)

Although the details of the flood risk projects named in the Delta Plan that could have cultural resources impacts, and the general types projects encouraged by the Delta Plan, are not known, based on these examples and the analysis above, it is likely that the potential impacts on undiscovered human remains archeological resources of projects encouraged by the Delta Plan would be significant, but may be

reduced to less than significant through implementation of mitigation measures described ~~and unavoidable for reasons noted~~ in Section 10.4.3.6.2~~4.1~~.

5.11 Revisions to Section 11 Geology and Soils

Page 11-41, Line 41 (Volume 3)

- Engineered-fill leach field

5.12 Revisions to Section 12 Paleontological Resources

Page 12-19, Line 27 (Volume 1)

C~~However, c~~onstruction of flood risk reduction projects would likely involve ground-disturbing activities such ~~at a similar depth and extent~~ as the water supply reliability actions described in Section 12.4.3.1, but at more shallow elevations, and therefore, effects on paleontological resources would be less likely ~~could cause similar significant effects~~. T~~Accordingly, t~~he potential impacts are considered **significant**. ~~Project-level impacts would be addressed in future site-specific environmental analysis conducted at the time specific flood risk reduction projects are proposed by lead agencies.~~

5.13 Revisions to Section 13 Mineral Resources

Page 13-9, Line 17 (Volume 1)

Documents reviewed for potential impacts included EIRs for the Los Vaqueros Reservoir Expansion Project (Reclamation and CCWD 2009), and Calaveras Dam Replacement Project (SFPUC 2011), which are illustrative of some of the types of impacts associated with surface water storage projects; the Davis-Woodland Water Supply Project (City of Davis 2007), which is illustrative of a potential water quality project; The Suisun Marsh Habitat Management, Preservation, and Restoration Plan (Reclamation et al. 2010), which is illustrative of a Delta ecosystem restoration project; the North Delta Flood Control and Ecosystem Restoration Project (DWR 2010), which is illustrative of a potential flood control Project; and the Bidwell-Sacramento River State Park Habitat Restoration and Outdoor Recreation Facilities Development Project (DPR 2008), which is illustrative of a Delta enhancement project.

Page 13-9, Line 17 (Volume 3)

- Implement recommendations identified in Division of Oil, Gas, and Geothermal Resources of the U.S. Geological Survey (DOGGR) construction site well review program (DOC 2007), such as:
  - For all future projects, identify all existing natural gas well sites and oil production facilities within or in close proximity to the project area.
  - Identify any oil and natural gas well within 100 feet of any navigable body of water or watercourse perennially covered by water or any officially recognized wildlife preserve as a "critical well" (California Code of Regulations, Title 14, Chapter 4, Article 2, Section 1720(a)(2)(B) and (C)). The DOC requires that a "critical well" include more stringent blowout prevention equipment than non-critical wells based on pressure testing and rating.
  - Identify safety measures to prevent unauthorized access to equipment.

- Include safety shut-down devices on oil and natural gas wells and other equipment, as appropriate.
- Notify DOC of new oil and natural gas wells or changes in oil and natural gas well operations or physical conditions, receive written approval from DOC of the changes, and receive written notification of DOC's inspection of new or changed equipment. The approvals will be primarily related to the ability to: (1) protect all subsurface hydrocarbons and fresh water, (2) protect the environment, (3) use adequate blowout prevention equipment, and (4) use approved drilling and cementing techniques.
- If any plugged/abandoned or unrecorded oil and natural gas wells are uncovered during construction, the DOC should be notified, the wells should undergo remedial well plugging actions, and no structures should be constructed over the abandoned oil and natural gas wells.
- If oil and natural gas wells are under the jurisdiction or a lease from the California State Lands Commission, project proponents should provide additional plans and environmental documentation as required prior to modification of the oil or natural gas wells.

Page 13-10, Line 42 (Volume 1)

Documents reviewed for potential impacts included EIRs for the Dutch Slough Tidal Marsh Restoration Project (DWR and California State Coastal Conservancy 2008); the Los Vaqueros Reservoir Expansion Project (Reclamation and CCWD 2009); the Calaveras Dam Replacement Project (SFPUC 2011); the Davis-Woodland Water Supply Project (City of Davis 2007); the Suisun Marsh Habitat Management, Preservation, and Restoration Plan (Reclamation et al. 2010); the North Delta Flood Control and Ecosystem Restoration Project (DWR 2010); and the Bidwell-Sacramento River State Park Habitat Restoration and Outdoor Recreation Facilities Development Project (DPR 2008).

Page 13-11, Line 6 (Volume 1)

Based on these examples, it is likely that impacts could be avoided in many cases by siting projects such that they do not significantly limit access to producing oil and gas wells or permitted mining operations,. Extraction sites in the Delta, Delta watershed, and areas outside the Delta that use Delta water would likely be avoided during project siting and design in these areas (Mitigation Measure 13-2 would so ensure). The details of many of the aspects of these projects, however, are not currently known, and it is possible that significant impacts on locally important mineral resource recovery sites might be encountered. For example, large-scale projects that are located in the Delta and Suisun Marsh may have significant adverse impacts because producing natural gas wells may be difficult to avoid in many areas, especially in the Rio Vista gas field, which contains a high density of wells. However, even if wells have to be abandoned, they could likely be relocated (and directional drilling could be used if necessary) so that the duration of production loss is minimized. For the purpose of this program-level assessment, impacts related to loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan from one or more of the projects and actions encouraged by the Delta Plan could be **significant** ~~prior to mitigation~~.

Page 13-19, Line 18 (Volume 1)

~~Contra Costa Water District. 2009. *Los Vaqueros Reservoir Expansion Project EIS/EIR*. February 2009.~~

Page 13-19, Line 36 (Volume 1)

DWR (California Department of Water Resources) and the California State Coastal Conservancy. 2008. *Draft Environmental Impact Report: Dutch Slough Tidal Marsh Restoration Project*. SCH# 2006042009 November.

Page 13-19, Line 37 (Volume 1)

Reclamation (U.S. Bureau of Reclamation) and Contra Costa Water District. 2009. *Los Vaqueros Reservoir Expansion Project Draft EIS/EIR*. February.

5.14 Revisions to Section 14 Hazards and Hazardous Materials

Page 14-3, Line 36 (Volume 1)

~~County vector control districts provide mosquito and other vector control.~~

Although the most prevalent diseases associated with mosquitoes are discussed above, this analysis does not rule out the possibility of new and emerging diseases or of vector control associated with the potential introduction of new or exotic mosquitoes and their related diseases.

County-wide vector control districts provide mosquito and other vector control. All mosquito districts within the State of California, including the District, are formed pursuant to the California Health and Safety Code Division 3, Chapters 1-2, Sections 2000 and are authorized to enforce Section 2060, which includes the abatement of public health nuisances.

Page 14-3, Line 41 (Volume 1)

Wildland fire protection is provided by the United States Department of Agriculture Forest Service, County Park Districts, County Fire Patrols, and the California Department of Forestry and Fire Protection (CAL FIRE). CAL FIRE manages the State Responsibility Areas (SRAs), and local fire districts manage Local Responsibility Areas (LRAs). First responders are typically the local fire districts. The Forest Service provides wild land fire protection both independently and cooperatively with the California Department of Forestry and Fire Protection. In addition, the United States Department of the Interior (National Park Service and Bureau of Land Management) similarly hold resource management and fire protection responsibilities of significance in the State.

Page 14-10, Line 9 (Volume 1)

The Solano County Environmental Health Division, which is a division of the Department of Resource Management, is the CUPA for all cities and unincorporated areas in Solano County and is responsible for a number of programs including regulation of UST sites. UST storage tanks store hazardous materials such as gasoline, diesel, and waste engine oil. These facilities are required to file an application, obtain a permit, and complete monitoring according to state law and regulations. The CUPA inspects these facilities. There are 190 underground storage facilities in Solano County.

Hazardous Waste Generators

Hazardous waste generator site facilities are required to file an application, obtain a permit, and complete monitoring according to state law and regulations. The CUPA inspects these facilities.

Aboveground Petroleum Storage

Aboveground storage facilities store at least 1,320 gallons of petroleum products in aboveground containers defined as 55-gallons or greater and must develop a Spill Prevention Control and Countermeasure Plan.

Tiered Treatment Facilities

Tiered treatment facilities that generate hazardous wastes and wish to treat this waste to either lessen its hazardous characteristics or change it to non-hazardous waste must obtain a permit from this activity from the CUPA.

California Accidental Release Prevention Programs

California Accidental Release Prevention Programs are classified as facilities that handle and use extremely hazardous substances such as ammonia or chlorine and are required to submit a Risk Management Plan to the CUPA.

~~The Solano County Department of Resource Management is the Certified Unified Program Agency for all cities and unincorporated areas in Solano County, and is responsible for a number of programs including regulation of UST sites. Approximately 227 UST sites are located within Solano County.~~

Brownfield Sites

Brownfield sites are properties that are contaminated, or thought to be contaminated, and are underused because of perceived remediation costs and liability concerns. The Solano County Department of Resource Management is not responsible for Brownfield sites. Solano County EMD has a contract with the State Water Resources Control Board to oversee the cleanup of former UST facilities and conducts regulatory oversight of other sites through voluntary agreements on cost recovery basis.~~the Certified Unified Program Agency for all cities and unincorporated areas in Solano County, and is responsible for a number of programs including regulation of brownfield sites. The county Department of Resource Management maintains a list of about 500 brownfield sites within the county and works with State and federal agencies to ensure cleanup of those sites.~~

Page 14-11, Line 10 (Volume 1)

The San Joaquin County EHD is the local CUPA responsible for the permitting, inspection, and enforcement of the six hazardous materials programs within the County as identified below~~:~~.

Hazardous Materials Management Plan or Business Plan Program

All hazardous materials that equal or exceed specified quantities must be reported to the local CUPA prior to storage of the hazardous materials onsite. Reporting quantities are 55 gallons or more of a hazardous liquid, 200 cubic feet of a hazardous gas, and 500 pounds of a hazardous solid. Facilities that store any of these amounts are require to file a Business Plan inventory and facility map that identifies specific hazardous material locations to prevent fire fighters, first responders, and other interested parties from possible exposure to chemical releases during an emergency event. There are over 2,900 regulated facilities within San Joaquin County (California Health and Safety Code, Chapter 6.95, Article 1, and California Code of Regulations, Title 19).

California Accidental Release Prevention Program (CalARP)

The goal of the CalARP Program is to reduce the likelihood and severity of possible exposures to extremely hazardous material releases. Examples of extremely hazardous materials (regulated substances) include toxic gases such as chlorine, ammonia, sulfur dioxide, and other toxic materials. The EHD CUPA coordinates with facilities that handle extremely hazardous materials to evaluate the risks of covered processes and require appropriate Risk Management Programs (RMP). There are 144 CalARP/RMP regulated in San Joaquin County (California Health and Safety Code, Chapter 6.95, Article 1 and California Code of Regulations, Title 19).

Hazardous Waste Storage Program

Under State law, every owner/operator who generates and stores hazardous waste on their property is considered a hazardous waste generator. There is no minimum generation or storage amount that triggers regulation under the program. The program goal is to ensure that hazardous waste is stored, treated, transported, and disposed of properly. There are over 1,700 regulated hazardous waste generator facilities in San Joaquin County (California Health and Safety Code, Chapter 6.5, and California Code of Regulations, Title 22).

Hazardous Waste Storage and Treatment (Tiered Permitting) Program

A CUPA permit is required for all hazardous waste generated and treated onsite. The program goal is to ensure all hazardous waste is treated in accordance with California Health and Safety Code, Chapter 6.5, and California Code of Regulations, Title 22, requirements. There are 15 treatment facilities regulated in San Joaquin County.

Aboveground Petroleum Storage Act (APSA)

All petroleum stored aboveground in containers 55 gallons or larger are regulated under this program~~,~~ if the total stored on site is at least 1,320 gallons. The facility owner is required to prepare a Spill Prevention Control and Countermeasure Plan (SPCC) to prevent any petroleum releases from reaching waters of the State. Aboveground tanks can be found at vehicle maintenance shops, trucking businesses, farms, school corporation yards, and bulk storage facilities for later delivery to service stations and other underground storage tank (UST) facilities. The CUPA conducts inspections at these facilities to assure compliance with the California Health and Safety Code, Chapter 6.67, and 40 Code of Federal Regulations, Part 112. There are over 700 APSA regulated facilities in San Joaquin County.

Underground Storage Tank Program

The goal of the UST Program is to protect public health, the environment, and groundwater from releases of hazardous materials, predominantly fuel, from USTs. To accomplish this goal, the EHD ensures that facilities with ongoing UST operations are properly permitted and meet the monitoring requirements applicable to their type of equipment. This is accomplished during plan check and inspection activities. As the CUPA, the EHD is responsible for permitting installations of new UST systems, UST repairs, and piping removals, including plan checks and inspections. Gasoline stations are typical locations to find USTs, but they can also be found at corporation yards, hospitals, communication facilities, vehicle maintenance shops, bus depots, farms, and even residential locations. Each UST site is inspected annually as mandated by State Law. There are over 250 regulated facilities with USTs (California Health and Safety Code, Chapter 6.7 and California Code of Regulations, Title 23).

Landfills

No hazardous waste landfills occur in San Joaquin County, although illegal or mistaken. The Forward, Inc. Landfill located at 9999 S. Austin Road, Manteca, is a Class II facility authorized to accept designated waste streams.

Designated waste is defined in California Water Code section 13173 as one of the following:

- Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to Section 25143 of the Health and Safety Code.
- Non-hazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.

~~*Hazardous Waste Generation*~~

~~The Department of Occupational Health and Safety (DOHS) estimates that about 33,270 tons of hazardous waste per year are generated in San Joaquin County. Of this, about 17,780 tons are managed onsite in treatment, storage, or disposal facilities. The remaining 15,490 tons are managed at hazardous waste facilities.~~

~~*Hazardous Waste Disposal*~~

~~Waste management involves some form of treatment to render waste nontoxic or less toxic, or to substantially reduce its volume. Onsite management usually involves discharge of diluted effluent to the sewer system, solar evaporation in surface impoundments, chemical treatment, recycling, incineration, and land disposal. Offsite management of hazardous wastes primarily consists of land disposal techniques. Seven Class I disposal landfills are located in California; those closest to San Joaquin County are located in Martinez and King City. Transportation of hazardous materials to these landfills occurs through San Joaquin County.~~

~~*Hazardous Waste Facilities*~~

~~Two hazardous waste facilities are permitted, and two permits are under consideration for two more facilities in San Joaquin County. McCormick and Baxter Creosoting Company operates a wood-preserving facility that produces primarily waste liquids and sludge waste onsite. The Tracy Defense Depot has been issued a storage container permit from DOHS. The site stores petroleum products, solvents, process chemicals, and other chemicals that have passed their shelf life. These wastes are resold, recycled, or transported to a Class I landfill for disposal. The Stockton Development Center and the Deuel Vocational Institution are under study to receive permits.~~

~~*Hazardous Waste Properties*~~

~~Properties permitted to dispose of hazardous waste to land through treatment or storage in surface ponds, waste piles, or land treatment are managed through DOHS. Five facilities are listed as potential hazardous waste properties within the county.~~

~~*Hazardous Waste Sites*~~

~~The Health & Safety Code was amended by Assembly Bill 129 in 1985. The law requires DOHS to develop a site-specific expenditure plan for appropriation from the Hazardous Substance Cleanup Bond Act funds. The amendment consists of a new listing of site categories. The following seven Category 1 sites in San Joaquin County are being remediated by the responsible parties pursuant to and in conformance with DOHS cleanup orders: Lika Corporation Field Avenue Annex; Lika Corporation Navy Drive Facility; McCormick and Baxter; Acme Galvanizing; Aready Oil/SP Pipeline; Kearney KPF; and Lustre-California. Lague Sales is the only site in the county listed as a Category 2 site. One site, the Marley Cooling Tower Company, listed separately on the National Priorities List, is located in San Joaquin County. National Priorities List sites are also RCRA enforcement and closure sites and the responsibility of USEPA. Federal facility cleanup sites in San Joaquin County are the Tracy Defense Depot, the Naval Communications Center, Rough & Ready, and the Sharpe Army Depot. Noncategorized sites include Brea Agricultural Services, Lodi Airport, Lodi Door and Metal Company, and Southern Pacific Transportation Company in French Camp. Potential hazardous sites listed by the DOHS are America Forest Products in Stockton, and Georgia Pacific in Tracy.~~

~~*Landfills*~~

~~No hazardous waste landfills occur in San Joaquin County, although illegal or mistaken hazardous waste dumping has occurred at the Corral Hollow Landfill.~~

Page 14-13, Line 25 (Volume 1)

The Burlington Northern-Santa Fe Railroad and Union Pacific Railroad both transport non-munitions hazardous materials to and from industrial sites in eastern and western Contra Costa County. These include hazardous materials used in the manufacturing of household chemical products and in petroleum refining. Both railroads also carry munitions for the U.S. Army's Military Traffic Management Command.

Page 14-28, Line 22 (Volume 1)

Another document reviewed for potential impacts is the Grassland Bypass Project EIS/EIR (Reclamation and San Luis & Delta-Mendota Water Authority 2008). This document found that there would be no impactys from hazardous materials based upon the treatment methods considered. However, if treatment processes were used to physically or chemically separate waste products from the water, the waste material could result in the need for disposal of hazardous materials at licensed facilities.

Page 14-39, Line 20 (Volume 3)

These types of mitigation measures, in addition to following federal, state and local requirements for hazardous materials, ~~are generally standard. In most cases, they~~would reduce significant impacts related to hazardous materials to less–than-significant levels.

Page 14-40, Line 23 (Volume 3)

- Freshwater habitat management to include water-control-structure management, vegetation management, mosquito predator management, drainage improvements, and other best management practices, and coordination with the DFG and local mosquito and vector control agencies regarding these strategies and specific techniques to help minimize mosquito production.

5.15 Revisions to Section 16 Population and Housing

Page 16-10, Table 16-6 (Volume 1)

Table 16-6
Housing Type Trends by County and Selected Communities, Delta and Suisun Marsh,1990–2010[a]

County and Community[b]	1990[c]			2000[c]			2010[d]		
	Family Housing Type		Vacancy Rate	Family Housing Type		Vacancy Rate	Family Housing Type		Vacancy Rate
	Single	Multiple		Single	Multiple		Single	Multiple	
Fairfield	18,760	7,283	3.54%	23,444	7,434	2.90%	28,832~~178, 172~~	8,725~~41,852~~	6.65~~3.94~~%
Benicia	7,102	2,143	3.95%	7,856	2,365	2.08%	8,511~~4,604~~	2,508~~106~~	2.08~~3.18~~%

[a] Estimates shown are for entire counties and communities and not just the portions within the Delta region.
[b] The portion of the Delta in Alameda County is not included because it has no residents.
[c] DOF 2011a
[d] DOF 2011b

Page 16-28, Line 33 (Volume 1)

Under the No Project Alternative, population and housing projections would be consistent with land use plans and DOF housing projections identified under the existing conditions. The No Project Alternative would not encourage projects such as those under the Proposed Project, and would have fewer impacts on population and housing than the Proposed Project. The impacts would be significant.~~With the No Project Alternative, the Delta Plan would not be in place to encourage various other projects to move forward. To the extent that the absence of the Delta Plan prevents those projects from moving forward, there could be **fewer** potential construction-related population and housing impacts in the near term and **fewer** construction- and operations-related population and housing impacts over the long-term. However, these occurrences may be **significant** depending on site-specific conditions.~~

5.16 Revisions to Section 18 Recreation

Page 18-4, Line 2 (Volume 3)

Less storage at any of the reservoirs could impact the recreational facilities and activities at reservoirs that store SWP or CVP water~~outside of the Delta~~[5] by either precluding or limiting lake access from existing facilities such as marinas, launch ramps, and beaches; creating less desirable day use and camping areas due to increased distances from the lowered water levels; and/or shortening the recreational season, due to earlier seasonal drawdowns and/or overall lower lake levels.

Page 18-15, Table 18-5 (Volume 1)

Table 18-5
Wildlife Areas in the Delta and Suisun Marsh

Name	Ownership	Acres[a]	Annual Visitation	Types of Recreation
Suisun Marsh	Multiple Owners	106,511	Over 50,000[j]	Hunting, fishing, wildlife viewing, education

[a] The Dangermond Group 2011
[b] Arrington 2011
[c] Solano Land Trust 2011
[d] VanKlompenburg 2011
[e] DFG 2011b
[f] The Nature Conservancy 2003
[g] USFWS and U.S. Census Bureau 2006
[h] Hopperstad 2011
[i] Burkholder 2011
[j] Reclamation 2010
N/A: not available

[5] Reservoirs located outside the Delta that store water from the Delta and could potentially be affected are: Bethany Reservoir, Lake Del Valle, San Luis Reservoir State Recreation Area, and Los Vaqueros Reservoir in the San Francisco Bay Area ~~, Lake Evans, and Lake Webb in Northern California~~ and the Central Valley; and Quail Lake, Pyramid Lake, Castaic Lake, Silverwood Lake, Lake Perris, Lake Piru, Diamond Valley Lake, Lake Skinner, and several smaller San Diego County reservoirs in Southern California.

Page 18-21, Line 10 (Volume 1)

~~Reservoirs of the SWP and CVP within the watershed zone that provide recreation include many areas from the Sacramento (including the Trinity) and San Joaquin river watersheds.~~ Recreation areas at reservoirs within the Sacramento and Trinity watersheds include those listed in Table 18-7.

Page 18-21, Table 18-7 (Volume 1)

Table 18-7
Reservoirs with Major Recreation Areas~~of the SWP and CVP~~ within the Sacramento and Trinity Watersheds

Name	Ownership/ Management	Surface Acres	Annual Visitation	Facilities
Antelope Lake[a,g]	USFS/ Northwest Park Management (special use permit)	930	17,200~~N/A~~	Three campgrounds with 194 campsites plus one group campground with four group campsites, one three-lane boat launch ramp, three day-use fishing access sites, a day-use picnic area, and a disabled fishing access area. RV camping available at all campsites
Lake Davis[b,g]	USFS/ Thousand Trails Management (special use permit)	4,000	20,800~~N/A~~	Three campgrounds with 180 campsites, RV/trailer campsites available, trailer dump station, one two-lane boat launching ramp, two paved launch ramps, one boat top launching facility with paved loading/unloading area
Frenchman Lake[c,g]	USFS/ Thousand Trails Management (special use permit)	1,580	65,600~~N/A~~	Five campgrounds with 199 campsites, including two group campsites, RV/trailer campsites available, two concrete boat ramp launches, and trailer dump station
Lake Oroville and Thermalito Diversion Pool, Forebay, and Afterbay[d,g]	DWR, State Parks	20,200	Average 1.38 ~~Close to 1~~ million visitors at the SRA~~,~~ and Wildlife Areas, and more than 76,600~~85,000~~ visitors to the Lake Oroville Visitors Center	More than 1,700 campsites, 2 marinas, three boat launches, more than 50 miles of trails, DWR visitor center
Trinity (Clair Engle) Lake[g]	USFWS	17,000	N/A	23 developed campgrounds with 542 total sites, four boat-in only campgrounds with 34 total sites, two group campgrounds with 70 total sites, and eight boat ramps
Lake Red Bluff[i]	USFWS	200 (seasonal)	N/A	One campground with 30 sites, one group campground with 100 max. capacity, one boat launch
Englebright Lake[j]	USACE	815	539,516 visits/year	Ten boat-in campground areas with 100 camp sites, two boat ramps, one marina with 92 slips

Table 18-7
Reservoirs with Major Recreation Areas~~of the SWP and CVP~~ within the Sacramento and Trinity Watersheds

Name	Ownership/ Management	Surface Acres	Annual Visitation	Facilities
New Bullards Bar[k]	USFWS	4,500	N/A	Four campgrounds with 98 campsites, one group campground with five campsites, one boat launch, one marina
Folsom Lake and Lake Natoma[o]	Reclamation, State Parks	11,500	Approximately 1 million	75 miles of shoreline, boat launch areas at four locations around the lake, 700-slip marina, two campgrounds, multiple picnic areas, and more than 78 miles of paved and unpaved trails
Sugar Pine Reservoir[p]	Foresthill Public Utility District~~Reclamation~~, USFWS	165	N/A	Two campgrounds, one boat launch
~~Sly Park Reservoir[qa]~~	~~El Dorado Irrigation District, Reclamation~~	~~650~~	~~N/A~~	~~159 campsites, five group use areas, two launch ramps~~

[a] DWR 2011a, 2011b; The Dangermond Group 2011; USFS 2011a
[b] DWR 2011c; USFS 2011b
[c] DWR 2011d; USFS 2011c
[d] DWR 2010a; State Parks 2011a ; 2010, pp. 26-27
[e] Stienstra 2008, pp. 71-74; USFS 2011d
[f] NPS 2011
[g] USFS 2011e
[h] BLM 2011
[i] NRRS 2011a; USFS 2011f
[j] USACE 2011a
[k] Emerald Cove Marina 2011; YCWA 2011
[l] Nevada County 2011
[m] NRRS 2011b
[n] Reclamation 2011a
[o] State Parks 1978, 2010, pp. 20-21, 2011b
[p] NRRS 2011c; Reclamation 2011b
[q] Samuels 2011~~EID 2011; NRRS 2011d~~

Page 18-23, Line 22 (Volume 3)

The following mitigation measures would reduce the effects of Impacts 18-1a through 18-1e, Impair, Degrade, or Eliminate Recreational Facilities and Activities:

- If the substantial impairment, degradation, or elimination of recreational facilities occurs, replacement facilities of equal capacity and quality with ongoing funding provided for maintenance of these facilities.

  ~~New water supply, ecosystem restoration, and water quality facilities shall be located away from existing recreational sites, including historical towns, areas with developed areas to access or view recreational opportunities, and areas with high levels of recreational use, including public and private facilities, State and local parks, State and federal wildlife areas, marinas, and hunting clubs. IIf significant impacts cannot be avoided, existing facilities shall be relocated within the local area and ongoing funding for maintenance of these facilities shall be provided.~~

- If degradation or impairment of recreational facilities, settings, and activities occur from implementation of water use efficient practices and water conservation measures at recreational areas, the park and recreation areas shall be redeveloped with drought-tolerant plant materials, water efficient irrigation systems, and synthetic turf substitutes where appropriate, in such a way as to retain recreational facilities and use areas.

- If the volume of water exported from the Delta declines over multiple years, the lead agencies that implement local water supplies ~~probably would not~~ may be unable to develop a long-term replacement water supply for the south-of-Delta surface water reservoirs with recreation uses. ~~However, if feasible, reservoir storage operations criteria must be modified to increase the minimum amount of emergency stand-by storage water that remains in the reservoir to also provide water-based recreation. Also, if feasible, water allocations to water users must be modified to provide more surface water in the reservoirs for recreation and provide other water supplies for non-recreation water users.~~ At these sites,~~Access~~ recreation facilities must be modified (including access facilities, as necessary) to accommodate lower water elevations or more frequent fluctuations in water elevations that could occur more frequently in the Proposed Project than under existing conditions.

  ~~Ecosystem restoration areas shall be located away from high-use recreational sites, if feasible. Design of the restoration areas shall consider methods to maintain access to adjacent areas or recreational areas that would be periodically inundated under restoration. Design of levee modifications to provide for inundation of restored areas also shall consider the possibility of using levee remnants to maintain meander channels that would facilitate recreational opportunities. If significant impacts to marinas, hunting clubs, and other recreational facilities cannot be avoided, the lead agency shall consider relocation of these facilities, if feasible.~~

Page 18-23, Table 18-8 (Volume 1)

Table 18-8
Reservoirs with Major Recreation Areas~~of the SWP and CVP~~ within the San Joaquin Watershed

Name	Ownership/ Management	Surface Acres	Annual Visitation	Facilities
Sly Park Reservoir[g,h]	El Dorado Irrigation District	650	N/A	159 campsites, five group use areas, two launch ramps

[a] Lake Camanche Recreation 2011
[b] USACE 2011b
[c] Don Pedro Recreation Agency 2011
[d] Lake McClure Houseboat Owners Association 2011
[e] State Parks 2010, p. 18-19, 2011c; Stienstra 2008, p. 317;
[f] State Parks 2010, p. 18-19, 2011d; Stienstra 2008, p. 368;
[g] NRRS 2011e
[h] EID 2011
N/A: not available

Page 18-24, Line 36 (Volume 3)

These mitigation measures are commonly employed on a variety of ~~construction~~ projects.

Page 18-25, Table 18-9 (Volume 1)

Table 18-9
Wildlife Areas and Refuges in the Sacramento Valley that Receive Water from the Central Valley Project~~Delta Watershed~~

Name	Ownership	Estimated Recreation Use Days	Types of Recreation

Source: Reclamation 2001a, b, c

Page 18-26, Line 17 (Volume 1)

There are five~~six~~ reservoirs and two additional small bodies of water in Northern California and the Central Valley that receive water exported from the Delta~~. Five of those are part of the SWP[6]~~:

Bethany Reservoir
Lake Del Valle
San Luis Reservoir
O'Neill Forebay
Los Vaqueros Reservoir~~Los Banos Reservoir~~

~~Additional facilities include Los Vaqueros Reservoir north of Livermore, and Lake Evans and Lake Webb, southwest of Bakersfield, along the California Aqueduct.~~ Details on these reservoirs are included in Table 18-10.

Page 18-26, Table 18-10 (Volume 1)

Table 18-10
Northern California and Central Valley Reservoirs that Receive Water Exported from the Delta by the SWP and/or CVP within the San Joaquin Watershed

Name	Ownership/ Management	Surface Acres	Annual Visitation	Facilities
Bethany Reservoir[a]	DWR/ State Parks	166	24,900~~More than 26,000~~	Eight picnic sites, 2 miles of trails, a connection to the California Aqueduct Bikeway, fishing access, and boat launch
Lake Del Valle[b]	DWR/ East Bay Regional Park District	750	Approximately 346,000[c]	Day use picnic areas, a swimming beach, boat launching, and group camping
San Luis Reservoir SRA (San Luis Reservoir, O'Neill Forebay~~, and Los Banos Reservoir~~)[d,f]	DWR/ State Parks	27,388	More than 471,600~~285,000~~ visitors at SRA; more than 107,200~~131,000~~ visitors at its Romero Overlook Visitors Center	Complex of three bodies of water, 193 campsites, 150 picnic areas, group camp sites, more than 13 miles of trails, fishing access, boat launch, and swimming beaches. The SRA also includes Los Banos Reservoir, which does not receive water from SWP or CVP.

~~6 San Luis Reservoir, O'Neill Forebay, and Los Banos Reservoir are also jointly part of the CVP.~~

Table 18-10
Northern California and Central Valley Reservoirs that Receive Water Exported from the Delta by the SWP and/or CVP within the San Joaquin Watershed

Name	Ownership/ Management	Surface Acres	Annual Visitation	Facilities
Los Vaqueros Reservoir [e]	Contra Costa Water District/ East Bay Regional Park District	1,260	Approximately 50,000	Day-use facilities, picnic areas, fishing access, and boat rentals; 20,000 acres of protected lands with more than 55 miles of trails
~~Lake Evans and Lake Webb~~[f]	~~DWR/ Kern County~~	~~959~~	~~148,297~~[g]	~~Boating, fishing, jet skiing, sailing, campgrounds, picnic area, bicycle trails, and concession facilities~~

[a] State Parks 2010, p. 18-19
[b] Stienstra 2008, p. 279
[c] Schultz 2011
[d] State Parks 2010, p. 18-19; DWR 2010a
[e] CCWD 2011; Pike 2011
[f] Samuels 2011~~Kern County 2011~~
[g] ~~Ero 2011~~

Page 18-29, Table 18-13 (Volume 1)

Table 18-13
Wildlife Areas and Refuges in the San Joaquin Valley Outside of the Delta and Suisun Marsh~~Outside the Delta Watershed~~ that Receive ~~CVP~~ Water from the Central Valley Project

Name	Ownership	Estimated Recreation Use Days	Types of Recreation

Source: Reclamation 2001a, b, c

Page 18-59, Line 27 (Volume 1)

Samuels, William I. 2011. Staff Environmental Scientist, Recreation Planning & Implementation Program, California Department of Water Resources. Visitation data received by Karin Winters, The Dangermond Group, April 18, 2011 via e-mail. Visitation data is from 2007.

5.17 Revisions to Section 19 Transportation, Traffic, and Circulation

Page 19-28, Line 11 (Volume 1)

The Delta Conservancy Strategic Plan, currently under development, will provide strategies for ecosystem restoration and economic development in the Delta, which may include strategies for increasing tourism and recreation in the region. Increases in tourism and recreation may affect transportation in the Delta.~~strategy for conserving the Delta and would not lead directly to a project that would affect transportation.~~

Page 19-30, Line 44 or Page 19-31, Line 1 (Volume 3)

- As part of the traffic control plan, identify specific project-vehicle access routes that would avoid additional traffic in residential areas or would adversely affect other sensitive land uses, where feasible.

- Install roadway status signs at strategic locations in the Delta to inform the public of roadway closures and limits to ingress to/egress from Delta Islands. The signs shall include maps showing the relative locations of road closures and access restrictions to other Delta features.

Page 19-31, Line 10 (Volume 3)

- During the planning and analysis of site-specific actions, coordinate with Caltrans and/or other local agencies with jurisdiction over transportation system features for the purpose of minimizing impacts on bridges, roadways, culverts, or other features that may be affected. Agencies responsible for constructing and maintaining levees on which a public roadway may be located shall also be consulted to ensure consistency with levee design criteria.

Page 19-63, Line 16 (Volume 1)

CALFED. 2000. Final Programmatic Environmental Impact Statement/Environmental Impact Report. July 1, 2000.

5.18 Revisions to Section 20 Utilities and Service Systems

Page 20-1, Line 23 (Volume 1)

It is not reasonably foreseeable that the proposed Delta Plan or the alternatives would require or result in the need for new water or wastewater treatment facilities or stormwater drainage facilities, or the expansion of existing facilities in addition to the facilities that would be encouraged by the proposed Delta Plan or the alternatives.~~It is unlikely that the actions the Proposed Project would encourage would materially require or result in the need for new water or wastewater treatment facilities or stormwater drainage facilities, or the expansion of existing facilities~~; therefore, potential impacts are **less than significant**. Regarding electricity demand, impacts would be **less than significant**. There would be **no impacts** to natural gas production. Disruption of existing utility lines would be **less than significant** with mitigation, as would impacts to potentially disrupt or conflict with existing utility lines during construction of Delta-Plan-encouraged projects.

Page 20-7, Line 1 (Volume 1)

- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities in addition to those facilities identified as projects encouraged in Section 2A by the Proposed Project or the alternative, the construction or operation of which could cause significant environmental effects.

- Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities in addition to those facilities identified as projects encouraged in Section 2A by the Proposed Project or the alternative, the construction or operation of which could cause significant environmental effects.

5.19 Revisions to Section 21 Climate Change and Greenhouse Gas Emissions

Page 21-2, Line 18 (Volume 1)

The State is encouraging local agencies to prepare Climate Action Plans to identify an inventory of current and projected sources of GHG emissions and to identify a plan to implement methods to efficiently reduce those emissions and comply with State and federal GHG emissions requirements. In the Delta and Suisun Marsh, Yolo, Solano, and Contra Costa counties and the cities of Sacramento, Benicia, Tracy, and Antioch have completed their Climate Acton Plans. Sacramento County has adopted Phase I and is completing Phase II of the Climate Action Plan; and San Joaquin County is preparing their plan. Most of the remaining cities are preparing Climate Action Plans.

Page 21-8, Line 37 (Volume 3)

Construction-related GHG emissions for ~~reliable water supply~~Delta ecosystem restoration projects associated with the implementation of the Revised Project would primarily result from fuel combustion in construction equipment, trucks, worker vehicles, and dredging equipment.

Page 21-9, Line 21 (Volume 1)

Water transfers and water use efficiency and conservation programs are also activities that could be encouraged by the Proposed Project, but GHG emissions generally would not be expected from these activities. In some cases, water transfers and water use efficiency could result in modified surface water projects, as described for surface water projects.

Page 21-10, Line 29 (Volume 1)

The Final EIR concluded that the project's GHG emissions would ~~not~~ contribute considerably to significant cumulative GHG emissions.

Page 21-12, Line 19 (Volume 1)

- An analysis of compliance with local climate action plans;

Page 21-12, Line 24 (Volume 3)

Construction-related GHG emissions for ~~water quality improvement~~Delta enhancement projects associated with the implementation of the Revised Project would primarily result from fuel combustion in construction equipment, trucks, worker vehicles, and equipment.

Page 21-23, Line 29 (Volume 3)

6. Use local building materials ~~of~~ for at least ten percent of total materials.

5.20 Revisions to Section 22 Cumulative Impact Assessment

Page 22-3, Line 6 (Volume 3)

- Many users in Southern California use both Delta water and Colorado River water. Within the study period (through Year 2030), Colorado River water supplies could become less available for use in California. If that occurs, it is anticipated that additional local and regional water supplies, including ocean desalination facilities, would be implemented. Therefore, the Revised Project would have a less than significant cumulative impact.

Page 22-23, Table 22-1 (Volume 1)

Table 22-1
Related Actions, Programs, and Projects Considered in the Cumulative Impact Assessment

Agency	Program	Basis	Brief Description
RELIABLE WATER SUPPLY			
Semitropic Water Storage District	Delta Wetlands	Program under development.	~~In 1987, Delta Wetlands, a California Corporation, proposed a project for water storage and wildlife habitat enhancement on four privately owned islands in the Sacramento-San Joaquin Delta. The four islands considered were Bacon Island and Bouldin Island in San Joaquin County and Holland Tract and Webb Tract in Contra Costa County, encompassing approximately 23,000 acres. The project would involve a diversion and storage of winter flows on Bacon Island and Webb Tract for beneficial uses in summer, and developing seasonal wetlands and riparian habitats on Bouldin Island and most of Holland Tract. The project would divert 312,000 acre-feet of water from Delta through large siphons during December 15 through May 1. The stored water would be discharged to Delta outflows from May through July. From August to December, the habitat islands would be vegetated with wetland plants to support wintering waterfowl. From October through December, the islands would be managed as waterfowl habitat, where private hunting would be permitted.~~ ~~In 2007, the Semitropic Water Storage District (Semitropic WSD) partnered with the Delta Wetlands Project in response to State Water Resources Control Board (SWRCB) requirements to identify buyers of water provided by the project. Under the current proposal, the project would: 1) provide water to Semitropic WSD to augment its water supply, 2) bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank, and 3) provide water to other places, including the service areas of the Golden State Water Company and Valley Mutual Water Company. The San Bernardino Valley Municipal Water District, Western Municipal Water District of Riverside County, and Metropolitan Water District of Southern California also are potential places of use. Semitropic WSD would operate the Delta Wetlands Project in conjunction with the Semitropic groundwater storage bank to maximize project flexibility and yield. Delta Wetlands Project water would be provided to Semitropic WSD landowners for irrigation purposes and to other places of use. Semitropic WSD issued a Draft EIR in 2010.~~

Table 22-1
Related Actions, Programs, and Projects Considered in the Cumulative Impact Assessment

Agency	Program	Basis	Brief Description
			~~This project also was evaluated by DWR and Reclamation as part of the In-Delta Storage Project under the Surface Water Storage Investigation. This project was not studied after a Draft Supplemental Report was completed in 2006.~~ In 1987, Delta Wetlands, a California Corporation, proposed a project for water storage and wildlife habitat enhancement on four privately owned islands in the Sacramento-San Joaquin Delta. The four islands were Bacon Island and Bouldin Island in San Joaquin County, and Holland Tract and Webb Tract in Contra Costa County, encompassing approximately 23,000 acres. The Delta Wetlands Project would store water on two Reservoir Islands (Bacon Island and Webb Tract) for subsequent release into the Delta, and habitat enhancement to compensate for wetland and wildlife effects of the water storage operations with a Habitat Management Plan (HMP) on two Habitat Islands (Bouldin Island and Holland Tract). In 2007, the Semitropic Water Storage District (Semitropic WSD) partnered with the Delta Wetlands Project to provide water to Semitropic WSD to augment its water supply, and bank water within the Semitropic Groundwater Storage Bank and Antelope Valley Water Bank. The designated places of use for Delta Wetlands Project water would include Semitropic Water Storage District~~;~~, Member Agencies of the Metropolitan Water District of Southern California, the Western Municipal Water District of Riverside County, and select service areas of the Golden State Water Company. The project would include improvements of 27 miles of levees and screened diversions to divert water during high-flow periods in the winter months of December through March into Webb Tract (100,000 acre-feet of storage) and Bacon Island (115,000 acre-feet of storage). The water cannot be diverted in a manner that would adversely affect senior legal water rights holders, including the SWP and CVP. Stored water would be discharged into False River (from Webb Tract) and Middle River (from Bacon Island) for export when excess SWP or CVP diversion capacity is available, in the summer and fall months of July through November. Any water that could not be exported from the Delta in a given year would be available to increase Delta outflow in the fall months of September through November. Semitropic WSD issued a Draft EIR in 2010 and a Final EIR in 2011.

5.21 Revisions to Section 23 Bay Delta Conservation Plan

Page 23-1, Line 7 (Volume 1)

The BDCP is a multiple-stakeholder Habitat Conservation Plan (HCP) and Natural Community Conservation Plan (NCCP)~~ to make significant contributions to the recovery of covered species and restore a more naturally functioning Delta ecosystem while securing a reliable freshwater source from the Delta for human use~~. The BDCP is currently being developed through a collaboration of the California Department of Water Resources (DWR), federal Bureau of Reclamation (Reclamation), Metropolitan

Water District of Southern California, the Kern County Water Agency, the Santa Clara Valley Water District, Zone 7 Water Agency, San Luis and Delta-Mendota Water Authority, Westlands Water District, and Mirant Delta LLC (owners of an electric power generating facilities located near Antioch and Pittsburg, California). The BDCP HCP and NCCP permits and the related Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) are scheduled to be completed by December 2012 (CNRA 2011a). If approved, the BDCP would provide federal and State incidental take permits for covered species related to the following general categories of actions:

- The operation of existing State Water Project (SWP) Delta facilities and construction and operation of facilities for the movement of water entering the Delta from the Sacramento Valley watershed to the existing SWP and federal Central Valley Project (CVP) pumping plants located in the southern Delta;
- The implementation of any conservation actions that have the potential to result in take of species that are or may become listed under the federal Endangered Species Act (ESA), pursuant to the ESA at Section 10(a)(1)(B) and its implementing regulations and policies; and
- The diversion and discharge of water by Mirant for power generation in the western Delta.

If completed and approved by the California Department of Fish and Game (DFG) as an NCCP, the BDCP must be considered by the Delta Stewardship Council (Council) and included in the Delta Plan, as required by provided it meets the requirements of the Delta Reform Act (Water Code section 85320 et seq.). DWR is the California Environmental Quality Act (CEQA) lead agency for the BDCP. The Council is a responsible agency (Water Code section 85320(c)). DFG, State Water Resources Control Board (SWRCB), California Air Resources Control Board, California Department of Boating and Waterways, California Department of Transportation, California State Lands Commission, and San Francisco Bay Conservation and Development Commission are responsible or trustee agencies.

Page 23-3, Line 1 (Volume 3)

However, if CDFW approves the BDCP as a NCCP pursuant to the Fish and Game Code and determines that the BDCP meets the requirements of Water Code section 85320, However, if the BDCP is approved by DFG in compliance with Water Code section 85320 and approved as a federal HCP, the Council is required to incorporate the BDCP into the Delta Plan (Water Code section 85320(e)).

Page 23-3, Line 23 (Volume 3)

BDCP could result in either more or less construction of construction of local and regional water supplies than under the Revised Project, depending upon the capacity of the Delta conveyance facility that is ultimately selected in the BDCP process. For example, if BDCP increases the long-term average amount of Delta exports as compared to projects encouraged by the Revised Project or alternatives, there could be less incentive for local or regional projects in areas outside of the Delta that use Delta water.

Page 23-3, Line 24 (Volume 1)

Conveyance options are currently being studied in detail by the agencies and interested parties preparing the BDCP and the related EIR/EIS. A public draft of the BDCP and the related EIR/EIS is planned for release by mid-20122013. Upon successful completion of the BDCP process (scheduled for December 20122013 or 2014), and if BDCP meets certain the requirements of the explained in Water Code section 85320(e), the BDCP becomes part of the Delta Plan.[7] Those requirements include:

[7] The DFG's decision that BDCP meets the requirements for incorporation into the Delta Plan may be appealed to the Council under Water Code section 85320(e).

Page 23-4, Line 13 (Volume 1)

- The potential effects of each Delta conveyance alternative on Delta water quality (Water Code section 85320(b)).

Subsequently, if another government agency, such as DWR, proposes to implement the BDCP preferred conveyance project and that project qualifies as a "covered action" (which is most likely), the BDCP preferred conveyance project would be consistent with the Delta Plan ~~regardless of whether the Delta Plan had previously endorsed a different conveyance option. Accordingly, the Council's regulatory authority over conveyance is contingent upon a different conveyance project being proposed and becoming a covered action prior to BDCP's incorporation into the Delta Plan~~.

Page 23-5, Line 6 (Volume 3)

Physical improvements associated with BDCP-related ecosystem restoration and enhancement and Delta conveyance, in addition to the Revised Project, are not likely to increase the exposure of people or structures to flood hazards compared to existing conditions as ~~expose people or structures to flood hazards as~~ a consequence of construction within or adjacent to existing levees; this is because the design of levee modifications for floodplain, riparian habitat (including channel margins), and tidal marsh restoration and enhancement, siphons, and intakes/diversions would be required by federal and State law to be completed in accordance with the requirements and or guidelines of the U.S. Army Corps of Engineers (USACE), Federal Emergency Management Agency, Central Valley Flood Protection Board, DWR, and local flood management agencies.

Page 23-5, Line 19 (Volume 1)

The BDCP is a voluntary undertaking initiated and funded by public water agencies with the active participation of the DFG, USFWS, NMFS, environmental organizations, and other federal, State and local organizations that are involved in development of a plan for the long-term sustainability of the Delta~~.~~ to:

- Provide for a more reliable water supply for California by modifying conveyance facilities to create a more natural flow pattern
- Provide a comprehensive restoration program for the Delta
- Provide the basis for permits under federal and state endangered species laws for activities covered by the plan based on the best available science.
- Identify sources of funding and new methods of decision-making for ecosystem improvements
- Provide for an adaptive management and monitoring program to enable the plan to adapt as conditions change and new information emerges
- Streamline permitting for projects covered by the plan (CNRA 2013)

~~The BDCP approach is being developed to make significant contributions to the recovery of covered species and to the restoration of a more naturally functioning ecosystem while securing a reliable freshwater source for human use (DWR 2009).~~

Page 23-5, Line 25 (Volume 1)

The BDCP also is intended as an NCCP to provide for the conservation and management of covered species.

Page 23-5, Line 31 (Volume 1)

The goal of the BDCP participants is to formulate a plan that could ultimately be approved by USFWS and NMFS as an HCP under the provisions of ESA section 10(a)(1)(B) and by DFG as an NCCP under Fish and Game Code sections 2800 et seq. ~~and/or the California Endangered Species Act (CESA) sections 2050 et seq.~~

DWR, and potentially SWP and CVP water contractors, intend to apply for incidental take permits under the federal ESA ~~and CESA incidental take permits~~[8] for Delta water operations and management activities. The ESA and CESA) incidental take permits may also address species that are not currently listed as threatened or endangered, but that may become listed because of changes and disturbances resulting from the covered activities. The BDCP is also intended to be used as the basis for ESA compliance by Reclamation, including compliance with Section 7 of the ESA in coordination with USFWS and NMFS.

Page 23-6, Line 5 (Volume 3)

These effects would be permanent. Other effects could be temporary (e.g., spoils storage, soil compaction from heavy equipment, pipeline construction), which would not be a significant impact, or permanent.

Page 23-6, Line 8 (Volume 3)

~~Physical improvements associated with BDCP-related construction of Delta conveyance, in addition to the Revised Project, could cause conversion of oak woodland forestlands but would not conflict with existing Timberland Production Zones.~~

Page 23-9, Line 13 (Volume 3)

Physical improvements associated with BDCP-related ecosystem restoration and enhancement, reduction of other stressors, and Delta conveyance, in addition to the Revised Project, could improve some recreational opportunities;~~, and~~ impair, degrade, or eliminate other recreational facilities and activities; and conflict with adopted recreation plans and policies in the following ways:

Page 23-16, Line 29 (Volume 1)

~~Changes in Delta inflow and outflow patterns and modification of the SWP and CVP intake/diversion facilities were identified in the BDCP process as a conservation measure to reduce stress on the Delta ecosystem. On December 14, 2010, the United States District Court for the Eastern District of California remanded the 2008 biological opinion for the Delta smelt to USFWS for further revisions. On September 20, 2011, the same Court remanded the 2009 biological opinion for several salmonid species to NMFS for further revisions.~~ Changes in Delta inflow and outflow patterns and modification of the SWP and CVP intake/diversion facilities were identified in the BDCP process as a conservation measure to reduce stress on the Delta ecosystem. In December 2008, USFWS issued a new biological opinion on the impacts of SWP and CVP operations on delta smelt and their critical habitat, including a Reasonable and Prudent Alternative (RPA) to avoid jeopardy to delta smelt, and Reclamation accepted and implemented the RPA. In June 2009, NMFS issued a new biological opinion on the impacts of SWP and CVP operations on Sacramento River winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Central Valley steelhead, Southern distinct population segment of North American green sturgeon, and Southern resident

[8] Actions that harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage threatened and endangered species in any such conduct as "take." "Incidental take" of threatened and endangered species occurs incidentally to implementation of an otherwise lawful activity, and not due to the primary purpose of the action.

killer whales and their critical habitat, including an RPA. Reclamation accepted and implemented the RPA.

Several lawsuits were filed challenging portions of the USFWS and NMFS biological opinions and Reclamation's acceptance of the associated RPAs. The U.S. District Court for the Eastern District of California invalidated and remanded certain portions of the biological opinions to USFWS and NMFS for further consideration, and ordered Reclamation to complete the review of the remanded biological opinions in accordance with the National Environmental Policy Act (NEPA) prior to implementation of operations in accordance with revised biological opinions. USFWS and NMFS have initiated review of the biological opinions, and Reclamation has initiated the NEPA process. The District Court's ruling is currently on appeal to the Ninth Circuit U.S. Court of Appeals. However, because the District Court did not vacate the 2008 USFWS and 2009 NMFS biological opinions, the CVP and SWP are currently being operated in accordance with those opinions pending resolution of the appeal and the USFWS and NMFS review of those opinions on remand.

Page 23-28, Line 35 (Volume 1)

However, if the BDCP is approved by DFG as an NCCP and by the FWS and NMFS as an HCP under the federal ESA, and the BDCP otherwise meets the requirements of~~in compliance with~~ Water Code section 85320 ~~and approved as a federal HCP~~, the Council is required to incorporate the BDCP into the Delta Plan (Water Code section 85320(e)).

Page 23-29, Line 13 (Volume 1)

BDCP could result in less construction of local and regional water supplies than under the No Project Alternative, and either more or less construction ~~of construction~~ of local and regional water supplies than under the Proposed Project and alternatives, depending upon the capacity of the Delta conveyance facility that is ultimately selected in the BDCP process. For example, if BDCP increases the long-term average amount of Delta exports as compared to projects encouraged by the Proposed Project or alternatives, there would be less encouragement for local or regional projects in areas outside of the Delta that use Delta water.

Page 23-30, Line 43 (Volume 1)

Physical improvements associated with BDCP-related ecosystem restoration and enhancement and Delta conveyance, in addition to the Delta Plan, are not likely to ~~expose~~ increase the exposure of people or structures to flood hazards ~~as~~ compared to existing conditions as a consequence of construction within or adjacent to existing levees; this is because the design of levee modifications for floodplain, riparian habitat (including channel margins), and tidal marsh restoration and enhancement, siphons, and intakes/diversions would be required by federal and State law to be completed in accordance with the requirements and or guidelines of the U.S. Army Corps of Engineers (USACE), Federal Emergency Management Agency, Central Valley Flood Protection Board, DWR, and local flood management agencies.

Page 23-31, Line 39 (Volume 1)

These effects would be permanent. Other effects could be temporary (e.g., spoils storage, soil compaction from heavy equipment, pipeline construction), which would not be a significant impact, or permanent.

~~Physical improvements associated with BDCP-related construction of Delta conveyance, in addition to the Delta Plan, could cause conversion of oak woodland forestlands but would not conflict with existing Timberland Production Zones.~~

Page 23-35, Line 7 (Volume 1)

Physical improvements associated with BDCP-related ecosystem restoration and enhancement, reduction of other stressors, and Delta conveyance, in addition to the Delta Plan, could improve some recreational opportunities;~~, and~~ impair, degrade, or eliminate other recreational facilities and activities; and conflict with adopted recreation plans and policies in the following ways:

Page 23-37, Line 18 (Volume 1)

CNRA (California Natural Resources Agency). 2013. Web site.

5.22 Revisions to Section Appendix D

Page D-2, Line 5 (Volume 2)

The SWRCB has delegated the specific responsibilities for the development and enforcement actions to the Central Valley Regional Water Quality Control Board (RWQCB) and San Francisco Bay RWQCB.

The Federal Clean Water Act (33 U.S.C. §§ 1251-1387) was enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." (33 U.S.C. § 1251(a).) Section 101 of the Clean Water Act (33 U.S.C. § 1251 (g)) requires federal agencies to "co-operate with the State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.

Section 401 of the Clean Water Act (33 U.S.C. §1341) requires every applicant for a federal license or permit which may result in a discharge into navigable waters to provide the licensing or permitting federal agency with certification that the project will be in compliance with specified provisions of the Clean Water Act, including water quality standards and implementation plans promulgated pursuant to section 303 of the Clean Water Act (33 U.S.C. § 1313). Clean Water Act section 401 directs the agency responsible for certification to prescribe effluent limitations and other limitations necessary to ensure compliance with the Clean Water Act and with any other appropriate requirement of state law. Section 401 further provides that state certification conditions shall become conditions of any federal license or permit for the project. The State Water Board Executive Director may issue a decision on a water quality certification application. (Cal. Code Regs., tit. 23, § 3838, subd. (a).) The California Regional Water Quality Control Boards have adopted, and the State Water Board has approved, water quality control plans (basin plans) for each watershed basin in the State. The basin plans designate the beneficial uses of waters within each watershed basin, and water quality objectives designed to protect those uses pursuant to Section 303 of the Clean Water Act. (33 U.S.C. § 1313.) The beneficial uses together with the water quality objectives that are contained in the basin plans constitute State water quality standards.

If a United States Army Corps of Engineers permit, or any other federal permit, is required for a future individual project due to the disturbance of waters of the United States (such as streams and wetlands), then a Water Quality Certification(s) must be obtained prior to initiation of project activities.

The California Regional Water Quality Control Boards have adopted, and the State Water Board has approved, water quality control plans (basin plans) for each watershed basin in the State. The basin plans designate the beneficial uses of waters within each watershed basin, and water quality objectives designed to protect those uses pursuant to Section 303 of the Clean Water Act. (33 U.S.C. § 1313.) The beneficial uses together with the water quality objectives that are contained in the basin plans constitute State water quality standards.

Section 401 water quality certifications are issued by the Regional Water Quality Control Boards, the State Water Resources Control Board's Division of Water Quality, and the State Water Board's Division

of Water Rights. Each entity has certification authority as defined by the California Code of Regulations, §3855.

- The Division of Water Quality is responsible for issuing water quality certifications for projects which may fall under the jurisdiction of more than one regional board.
- The Division of Water Rights is responsible for issuing water quality certifications associated with one or more of the following:
  - An appropriation of water;
  - A hydroelectric facility, and the proposed activity requires a Federal Energy Regulatory Commission (FERC) license or amendment to a FERC license; or
  - Any other diversion of water for domestic, irrigation, power, municipal, industrial, or other beneficial use.
- The Regional Boards are responsible for all other projects within their regions for which a discharge may occur.

Required items for issuance of a Clean Water Act Section 401 Water Quality Certification are based on Sections 3836 and 3856 of Title 23 of the California Code of Regulations.

Page D-2, Line 34 (Volume 2)

Section 402 of the CWA established the National Pollutant Discharge Elimination System (NPDES) permit program to regulate point source and non-point source discharges of pollutants into waters of the United States. An NPDES permit sets specific discharge limits for point and non-point sources discharging pollutants into waters of the United States and establishes monitoring and reporting requirements, as well as special conditions. Typically, NPDES permits are issued for a five-year period by the RWQCBs. The NPDES permits are issued for long-term discharges, including discharges from wastewater treatment plants, and temporary discharges, such as discharges during construction activities. For example, construction activities, depending upon the extent of disturbance, would require a General Permit for Storm Water Discharges Associated with Construction Activities, Construction General Permit Order No. 2009-009-DWQ and the Dewatering and other Low Threat Discharges to Surface Waters, Central Valley Regional Water Quality Control Board Order No. R5-2008-0085 (supersedes Order No. 5-00-175) NPDES permits.

Page D-3, Table D-1 (Volume 2)

Table D-1

Applicable Federal Criteria, State Standards/Objectives, and Other Relevant Effects Thresholds for Selected Water Quality Constituents (µg/L)

	Region 5 CV Basin Plan	Region 2 SFB Basin Plan	CTR (CCC/CMC)[p]	Drinking Water MCL	USEPA Recommended Criteria (CCC/CMC)[p]	Other Relevant Thresholds

Notes:
µg/L = microgram per liter
µS/cm = microSeimens per centimeter
BLM = biotic ligand model
CCC = Criteria Continuous Concentration
CMC = Criteria Maximum Concentration
CTR = California Toxics Rule
CV = Central Valley
D = dissolved
EC = electrical conductivity
FW = freshwater
MCL = maximum contaminant level
mg/L = milligram per liter
NTU = Nephelometric turbidity unit
SFB = San Francisco Bay
SW = saltwater
T = total recoverable

Region 5 Basin Plan (Central Valley RWQCB 2009)

a. Numerical water quality objectives are contained in Table III-1 in the Basin Plan; objectives are stated as dissolved concentrations. Objective is applicable to the maximum concentration in the Sacramento River from Keswick Dam to the I Street Bridge at City of Sacramento; American River from Folsom Dam to the Sacramento River; Folsom Lake; and the Sacramento–San Joaquin Delta.

b. Mean monthly boron objective (total recoverable) applicable to the San Joaquin River (mouth of Merced River to Vernalis) for March 15–September 15 (0.8 m g/L) and September 16–March 14 (1.0 mg/L); with relaxation to 1.3 mg/L for all months of a critical dry year.

c. Maximum boron objective (total recoverable) applicable to the San Joaquin River (mouth of Merced River to Vernalis) for March 15–September 15 (2.0 mg/L) and September 16–March 14 (2.6 mg/L).

d. Hardness-dependent cadmium, copper, and zinc objectives (dissolved) applicable to Sacramento River and its tributaries above State Route 32 Bridge at Hamilton City. The effects of these concentrations were measured by exposing test organisms to dissolved aqueous solutions of 40 mg/L hardness that had been filtered through a 0.45 micron membrane filter. Where deviations from 40 mg/L of water hardness occur, the objectives, in mg/L, shall be determined using formulas shown in Table III-1.

e. Chlorpyrifos and diazinon objectives expressed as (4-day average chronic concentration)/ (1-hour acute concentration), not to be exceeded more than once in a 3-year period. Objectives are applicable to the San Joaquin River from Mendota Dam to Vernalis (Reaches include Mendota Dam to Sack Dam, Sack Dam to mouth of Merced River, mouth of Merced River to Vernalis), Delta Waterways, Sacramento River from Shasta Dam to Colusa Basin Drain, Sacramento River from the Colusa Basin Drain to I Street Bridge, and Feather River from Fish Barrier Dam to Sacramento River.

Table D-1

Applicable Federal Criteria, State Standards/Objectives, and Other Relevant Effects Thresholds for Selected Water Quality Constituents (µg/L)

	Region 5 CV Basin Plan	Region 2 SFB Basin Plan	CTR (CCC/CMC)[p]	Drinking Water MCL	USEPA Recommended Criteria (CCC/CMC)[p]	Other Relevant Thresholds

f. A Basin Plan Amendment for the Delta Methylmercury TMDL is currently underway. Existing water quality goal is 0.06 ng/l translated from fish tissue mercury concentrations (Table 3.4.3.1-WQ-B).~~A Basin Plan Amendment for the Delta Methylmercury TMDL targets fish tissue mercury concentrations (Table 3.4.3.1-WQ-B) translated to methylmercury in water.~~

g. Objectives apply to the lower San Joaquin River from the mouth of the Merced River to Vernalis as 5 µg/L (4-day average) and 12 µg/L (maximum concentration) total selenium concentration (Central Valley RWQCB 2009, Chap. III, p. 4). For Mud Slough (north) and the San Joaquin River from the Mud Slough confluence to the mouth of the Merced River, the interim performance goal is 15 µg/L (monthly mean) by December 31, 2015, and the water quality objective to be achieved by December 31, 2019, is 5 µg/L (4-day average) (SWRCB 2010).

h. Except for periods of storm runoff, the turbidity of Delta waters shall not exceed 50 NTUs in the waters of the Central Delta and 150 NTUs in other delta waters (Chap. III, p. 9).

Region 2 Basin Plan (San Francisco Bay RWQCB 2007)

i. Numerical marine water quality objectives contained in Table 3-3 in the Basin Plan, expressed as (4-day average chronic concentration)/ (1-hour acute concentration). Marine waters are those in which the salinity is equal to or greater than 10 parts per thousand 95 percent of the time.

j. Numerical water quality objectives for agriculture based on the "Limit" values contained in Table 3-6 in the Basin Plan.

k. This objective may be met as total chromium.

l. Copper objectives expressed as (4-day average chronic concentration)/ (1-hour acute concentration). Objectives are applicable to the portion of the delta located in the San Francisco Bay Region, Suisun Bay, Carquinez Strait, San Pablo Bay, Central San Francisco Bay, and the portion of Lower San Francisco Bay north of the line representing the Hayward Shoals on Figure 7.1 of the Basin Plan.

m. Adopted from the SF Bay Mercury TMDL

n. Selenium criteria were promulgated as total recoverable concentrations for all San Francisco Bay/Delta waters in the National Toxics Rule (NTR) (USEPA 1992; San Francisco Bay RWQCB 2007, Chap. 3, pp. 71-72).

o. Numerical water quality objectives for agriculture based on the "Limit for Livestock Watering" value contained in Table 3-6 in the Basin Plan.

California Toxics Rule (USEPA 2000)

p. CMC equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. CCC equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects.

q. Criteria for these metals are expressed as a function of the water-effect ratio (WER). CMC = column B1 or C1 value x WER; CCC = column B2 or C2 value x WER.

r. These freshwater and saltwater criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column. Criterion values were calculated by using USEPA's Clean Water Act 304(a) guidance values (described in the total recoverable fraction) and then applying the conversion factors in #131.36(b)(1) and (2).

s. This criterion has been recalculated pursuant to the 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA-820-B-96-001, September 1996 (USEPA 1996). See also Great Lakes Water Quality Initiative Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA-80-B-95-004, March 1995 (USEPA 1995).

t. Criteria revised to reflect the Agency q1* or reference dose, as contained in the Integrated Risk Information System as of October 1, 1996. The fish tissue bioconcentration factor from the 1980 documents was retained in each case.

u. Criteria are based on carcinogenicity of 10(-6) risk. For consumption of water and organisms.

v. Freshwater aquatic life criteria for metals are expressed as a function of total hardness (in mg/L) in the water body. The equations are provided in the matrix at paragraph (b)(2) of this section. Values displayed above in the matrix correspond to a total hardness of 100 mg/L.

w. The State of California had adopted and USEPA has approved site-specific criteria for the Sacramento River (and tributaries) above Hamilton City; therefore, these criteria do not apply to these waters

x. These criteria were promulgated for specific waters in California in the NTR, at #131.36. The specific waters to which the NTR criteria apply include: Waters of the State defined as bays

Table D-1
Applicable Federal Criteria, State Standards/Objectives, and Other Relevant Effects Thresholds for Selected Water Quality Constituents (µg/L)

	Region 5 CV Basin Plan	Region 2 SFB Basin Plan	CTR (CCC/CMC)[p]	Drinking Water MCL	USEPA Recommended Criteria (CCC/CMC)[p]	Other Relevant Thresholds

or estuaries and waters of the State not ocean waters. These waters specifically include the San Francisco Bay upstream to and including Suisun Bay and the Sacramento–San Joaquin Delta. This section does not apply instead of the NTR for this criterion.

y. Standard is Criterion Continuous Concentration as 5 µg/L total recoverable selenium; California Toxics Rule deferred to the NTR for San Francisco Bay/Delta waters and San Joaquin River (USEPA 2000).

California Maximum Contaminant Levels

z. The Basin Plans for the Central Valley Regional Water Quality Control Board and San Francisco Bay RWQCB incorporate by reference the primary drinking water MCLs and secondary MCLs specified in Title 22 of the California Code of Regulations. Surface waters designated for use as domestic or MUN shall not contain concentrations of constituents in excess of the MCLs in Table 64431-A (Inorganic Chemicals), Table 64433.2-A (Fluoride), Table 64444-A (Organic Chemicals), and Table 64449-A (Consumer Acceptance Limits) and 64449-B (Ranges) of Title 22. Values displayed above in the table are primary MCLs unless specified.

aa. Secondary MCL

bb. Secondary MCLs for salinity parameters established as a range consisting of 0.9–2.2 µS/cm electrical conductivity, 250–600 mg/L chloride, 250–600 mg/L sulfate, and 500–1,500 mg/L total dissolved solids.

cc. Regulatory Action Level; if system exceeds, it must take certain actions such as additional monitoring, corrosion control studies and treatment and, for lead, a public education program; replaces MCL.

dd. In addition, the California Office of Environmental Health Hazard Assessment (OEHHA 2010, p. 3) has recommended a Public Health Goal of 30 µg/L.

National Recommended Water Quality Criteria (USEPA 2009)

ee. This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. In the arsenic criteria document (PDF) (74 pp., 3.2 MB) (EPA 440/5-84-033, January 1985 [USEPA 1985]), Species Mean Acute Values are given for both arsenic (III) and arsenic (V) for five species and the ratios of the SMAVs for each species range from 0.6 to 1.7. Chronic values are available for both arsenic (III) and arsenic (V) for one species; for the fathead minnow, the chronic value for arsenic (V) is 0.29 times the chronic value for arsenic (III). No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive.

ff. The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. Criteria values for other hardness may be calculated from the following: CMC (dissolved) = $\exp\{m_A[\ln(\text{hardness})]+ b_A\}$ (CF), or CCC (dissolved) = $\exp\{m_C[\ln (\text{hardness})]+ b_C$ and the parameters specified in Appendix B-Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent.

gg. Criterion value from the Gold Book (Quality Criteria for Water: 1986. EPA 440/5-86-001 [USEPA 1986]).

hh. This criterion has been revised to reflect The Environmental Protection Agency's q1* or reference dose, as contained in the Integrated Risk Information System (IRIS) as of May 17, 2002. The fish tissue bioconcentration factor from the 1980 Ambient Water Quality Criteria document was retained in each case.

ii. This criterion is based on carcinogenicity of 10^{-6} risk. For consumption of water and organisms.

jj. The available toxicity data, when evaluated using the procedures described in the "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" indicate that freshwater aquatic life should be protected if the 24-hour average and four-day average concentrations do not respectively exceed the acute and chronic criteria concentrations calculated by the BLM. Requires 10 parameters (temperature, pH, dissolved organic carbon, calcium, magnesium, sodium, potassium, sulfate, chloride, and alkalinity) to calculate.

kk. USEPA is actively working on this criterion and so this recommended water quality criterion may change substantially in the near future.

ll. This recommended water quality criterion was derived from data for inorganic mercury (II), but is applied here to total mercury. If a substantial portion of the mercury in the water column is methylmercury, this criterion will probably be under protective. In addition, even though inorganic mercury is converted to methylmercury and methylmercury

Table D-1
Applicable Federal Criteria, State Standards/Objectives, and Other Relevant Effects Thresholds for Selected Water Quality Constituents (µg/L)

	Region 5 CV Basin Plan	Region 2 SFB Basin Plan	CTR (CCC/CMC)[p]	Drinking Water MCL	USEPA Recommended Criteria (CCC/CMC)[p]	Other Relevant Thresholds

bioaccumulates to a great extent, this criterion does not account for uptake via the food chain because sufficient data were not available when the criterion was derived.

mm. Criteria for protection of freshwater aquatic life are 5 µg/L (continuous concentration, 4-day average) total recoverable selenium and they vary for the CMC (24-hour average) (USEPA 2010b). The CMC = 1/[(f1/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively.

nn. This human health criterion is the same as originally published in the Red Book (EPA 440/9-76-023, July, 1976 [USEPA 1976]) which predates the 1980 methodology and did not utilize the fish ingestion bioconcentration factor approach. This same criterion value is now published in the Gold Book (Quality Criteria for Water: 1986. EPA 440/5-86-001 [USEPA 1986]).

Other Relevant Thresholds

oo. Concentration as total recoverable selenium identified as a Level of Concern for the Grassland Bypass Project (Beckon et al. 2011, p. 130, Table 1)

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Section 401 of the CWA requires applicants for a federal license or permit for an activity that may result in the discharge of a pollutant into waters of the United States (including dredging or discharge from municipal, industrial, or power generating facilities) to obtain a certification that the activity would be compliant with the adopted basin plan water quality criteria. This type of federal permit includes a 404 permit issued by the U.S. Army Corps of Engineers and Federal Energy Regulatory Commission. In California, the water quality certification has been delegated to the State Water Resources Control Board, however the Section 401 certifications generally are completed by the applicable RWQCB.

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1.1.3 National Toxics Rule

National Toxics Rule was established by USEPA in 1992 to provide ambient water quality criteria for priority toxic pollutants to protect aquatic life and human health in accordance with Clean Water Act section 303.

1.1.4 Federal Antidegradation Policy

The Secretary of the Interior established the first antidegradation policy in 1968. In 1975, EPA included the antidegradation requirements in the Water Quality Standards Regulation (40 Code of Federal Regulations [CFR] 130.17, 40 CFR 55340-41). The requirements were included in the 1987 Clean Water Act amendment in section 303(d)(4(B). The Federal antidegradation policy requires states to develop regulations to allow increase in pollutant loadings or changes in surface water quality only if: 1) existing surface water uses are maintained and protected, and established water quality requirements are met; 2) if water quality requirements cannot be maintained by a project, water quality must be maintained to fully protect "fishable/swimmable" uses and other existing uses; and 3) for Outstanding National Resource Waters water quality criteria where "States may allow some limited activities which result in temporary and short-term changes in water quality" (Water Quality Standards Regulations) but would not impact existing uses or special use of these waters.

1.1.5 Federal Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974, to protect public health by regulating the nation's public drinking water supply. The SDWA authorizes USEPA to set national health-based standards for drinking water to protect against both naturally occurring and human-made contaminants that may be found in drinking water. The law was amended in 1986 and 1996, and requires many actions to protect drinking water and its sources, including rivers, lakes, reservoirs, springs, and groundwater wells.

~~1.1.3~~1.1.6 Central Valley Project Improvement Act

~~1.1.4~~1.1.7 Coordinated Operations Agreement

~~1.1.5~~1.1.8 Rivers and Harbors Act of 1899

1.1.9 Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act designates qualifying free-flowing river segments as wild, scenic, or recreational. The Act establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory. Under the Act, a Federal agency may not assist the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values of a wild or scenic river. If the project would affect the free-flowing characteristics of a designated

river or unreasonably diminish the scenic, recreational and fish and wildlife values present in the area, such activities should be undertaken in a manner that would minimize adverse impacts and should be developed in consultation with the National Park Service.

~~1.1.6~~1.1.10 Implementation of the CALFED Bay-Delta ~~Implementation Act~~Record of Decision

~~1.1.7~~1.1.11 Trinity River Mainstem Fishery Restoration

~~1.1.8~~1.1.12 San Joaquin River Agreement

~~1.1.9~~1.1.13 Bay-Delta Accord of 1994

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California water rights also incorporate the constitutional principle of reasonable use and the Public Trust Doctrine, which form the foundation of California's water management policy and are particularly applicable to the Delta watershed and to the others areas that use Delta water as the basis for resolving water conflicts (Water Code section 85023). The constitutional principle of reasonable use is defined in Section 2 of Article X of the California Constitution as:

> *'The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water.'*

Water Code section 275 also directs the SWRCB to take all appropriate proceedings or actions to prevent waste or violations of the reasonable use standard.

The SWRCB is responsible for overseeing the water rights and water quality functions in California. It has jurisdiction to issue permits and licenses for appropriation from surface and ~~underground streams~~subterranean streams flowing through known and definite channels, whereas the California courts have jurisdiction over the use of infiltrating groundwater, riparian use of surface waters, and the appropriative use of surface waters from diversions begun before 1914.

To obtain a new appropriative water right, a person must file a water right application with the SWRCB to appropriate water and use it for a reasonable and beneficial purpose. In part, the water right application must identify the nature and amount of the proposed use, the proposed place of diversion, the type of the diversion works, the proposed place of use, and sufficient information to demonstrate a reasonable likelihood that the unappropriated water is available for the proposed appropriation. In acting on an application, the SWRCB must consider the relative benefit to be derived from all beneficial uses of water concerned, including the preservation and enhancement of fish and wildlife, and uses protected in a relevant water quality control plan. The State Water Board may impose terms and conditions that will best develop, conserve, and utilize in the public interest the water sought to be appropriated, protect fish and wildlife, and carry out water quality control plans. In issuing permits and licenses, or approving changes to those rights, the SWRCB may include terms and conditions to protect existing water rights, the public interest, and the public trust, and to ensure that water is put to beneficial use.

In determining the reasonableness of a particular use of water or method of diversion, other competing water demands and beneficial uses of water must be considered. A particular water use or method of diversion may be determined to be unreasonable based on its impact on fish, wildlife, or other instream beneficial uses. What constitutes a reasonable water use depends on the entire circumstances presented and varies as current conditions change. The SWRCB also has "an affirmative duty to take the public trust into account in the planning and allocation of water resources and to protect the public trust uses

whenever feasible." The purpose of the public trust doctrine is to protect navigation, fishing, recreation, environmental values, and fish and wildlife habitat. Under the public trust doctrine, the State is the administrator of the public trust for the people of California. The State retains supervisory control over the navigable waters of the State and the lands underlying those waters.

The State's public trust responsibilities extend to protecting navigable waters from harm caused by a diversion of nonnavigable tributaries. Before the SWRCB approves an appropriative water right diversion, it must consider the effect of such diversions on public trust resources and avoid or minimize any harm to those resources where feasible. In applying the public trust doctrine, the State Water Board has the power to reconsider past water allocations even if the SWRCB considered public trust impacts in its original water allocation decision. Thus, the SWRCB may exercise its authority under the doctrines of reasonable use and the public trust to address diversions of surface water or groundwater that reduce instream flows and thus adversely affect fish, wildlife, or other instream beneficial uses.

1.2.5 Delta Protection Act of 1959

The Delta Protection Act (Water Code section 12200 – 12205) was enacted in 1959 for the protection, conservation, development, control and use of the waters in the Delta for the public good. The Act was enacted at the same session of the Legislature at which the Burns-Porter Act financing the initial facilities of the State Water Resources Development System (now known as the State Water Project) was enacted. The Delta Protection Act of 1959 required the SWP, in conjunction with the federal Central Valley Project, to provide salinity control and an adequate water supply for the users of water in the Delta.

~~1.2.5~~1.2.6 Central Valley Regional Water Quality Control Board Drinking Water Policy

~~1.2.6~~1.2.7 1995 Water Quality Control Plan and Water Rights Decision D-1641

~~1.2.7~~1.2.8 Delta Protection Act of 1992

The Delta Protection Act (Public Resources Code [Pub. Resources Code] section ~~21080.22~~ 29700 - 29716) includes a series of findings and declarations related to the quality of the Delta environment and emphasizes the national, State, and local importance of protecting the unique resources of the Delta. The Act mandated a State-level planning effort to address the needs of Delta communities. The Delta Protection Commission (DPC) was made a permanent State agency in 2000 because a need for continued planning and management was identified. The DPC has planning jurisdiction over portions of five counties: Contra Costa, Sacramento, San Joaquin, Solano, and Yolo counties. It was charged with developing a comprehensive regional plan to guide land use and resource management, including wildlife habitat and recreation. The resulting Land Use and Resource Management Plan for the Primary Zone of the Delta was initially adopted by the DPC in February 1995 and updated in November 2010 (DPC 2010). The plan has 8 policy areas, including Environment, Utilities and Infrastructure, Land Use and Development, Water and Levees, Agriculture, Recreation and Access, Marine Patrol, and Boater Education and Safety Programs. With the adoption of the management plan, all local governments with incorporated areas in the Delta Primary Zone must submit proposed amendments to their general plans to the DPC. The DPC then reviews the proposed amendments to ensure they are consistent with the Land Use and Resource Management Plan for the Primary Zone of the Delta.

~~1.2.8~~1.2.9 Porter-Cologne Water Quality Control Act

The Porter Cologne Water Quality Control Act (Porter-Cologne Act) established the SWRCB and divided the state into nine regions, each overseen by a ~~the~~ RWQCB~~s~~. The nine regional boards have the primary responsibility for the coordination and control of water quality within their respective jurisdictional boundaries. Under the Porter-Cologne Water Quality Control Act, water quality objectives are limits or levels of water quality constituents or characteristics established for the purpose of protecting beneficial uses.

The Act requires the Regional Water Quality Control Boards to establish water quality objectives while acknowledging that water quality may be changed to some degree without unreasonably affecting beneficial uses. Designated beneficial uses, together with the corresponding water quality objectives, and an antidegradation policy also constitute water quality standards under the federal Clean Water Act. The water quality objectives provide requirements for water quality control.

~~as the principal State agencies with primary responsibility for the coordination and control of water quality (Wat. Code section 13001), including the enforcement of applicable laws and regulations. In addition to overseeing the efforts of the RWQCBs, the SWRCB is also responsible for allocating surface water rights.~~

~~Major areas of focus between the SWRCB and the RWQCBs' efforts include the following:~~

- ~~Stormwater~~
- ~~Wastewater treatment~~
- ~~Water quality monitoring~~
- ~~Wetlands protection~~
- ~~Ocean protection~~
- ~~Environmental education~~
- ~~Environmental justice~~
- ~~Clean up contaminated sites, including brownfields~~
- ~~Low impact development~~

If the United States Army Corps of Engineers determines that only nonjurisdictional waters of the State (i.e., "non-federal" waters of the State) are present in the Proposed Project area, the Proposed Project will require a Waste Discharge Requirement permit(s) to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation.

Dischargers whose project disturb one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction Activities, Construction General Permit Order No. 2009-009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan. Individuals, public agencies, private businesses, and other legal entities discharging relatively pollutant-free wastewaters that pose little or no threat to the quality of surface waters, for 4 months or less in duration or have an average dry weather flow less than 0.25 million gallons per day, may obtain authorization under this General Order to discharge.

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1.2.10 State Antidegradation Policy

The State's Antidegradation Policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Waters in California (State Water Board Resolution No. 68-16), restricts degradation of surface and ground waters. In particular, this policy protects water bodies where existing quality is higher than necessary for the protection of beneficial uses. Under the Antidegradation Policy, any actions that can adversely affect water quality in all surface and ground waters must:

- Meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that a pollution or nuisance will not occur and the highest water quality consistent with maximum benefit to the people of the State will be maintained;
- Not unreasonably affect present and anticipated beneficial use of the water; and
- Not result in water quality less than that prescribed in water quality plans and policies.

The State Antidegradation Policy meets the federal requirement that states adopt an antidegradation policy consistent with 40 Code of Federal Regulations section 131.12.

~~1.2.9~~1.2.11 ~~California Toxics Rule~~Water Quality Criteria for Toxics

The Policy for Implementing Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California is referred to as the State Implementation Policy. This state policy for water quality control, adopted by the State Water Resources Control Board on March 2, 2000 and effective by May 22, 2000, applies to discharges of toxic pollutants into the inland surface waters, enclosed bays, and estuaries of California subject to regulation under the State's Porter-Cologne Water Quality Control Act (Division 7 of the Water Code) and the federal Clean Water Act. Such regulation may occur through the issuance of National Pollutant Discharge Elimination System permits, or other relevant regulatory approaches. This Policy establishes: (1) implementation provisions for priority pollutant criteria promulgated by the United States Environmental Protection Agency through the National Toxics Rule (40 CFR 131.36) (promulgated on December 22, 1992 and amended on May 4, 1995) and through the California Toxics Rule (40 CFR 131.38) (promulgated on May 18, 2000 and amended on February 13, 2001), and for priority pollutant objectives established by Regional Water Quality Control Boards in their water quality control plans; (2) monitoring requirements for 2,3,7,8-TCDD equivalents; and (3) chronic toxicity control provisions. In addition, this Policy includes special provisions for certain types of discharges and factors that could affect the application of other provisions in this Policy.

The California Toxics Rule is applicable to all State waters, as are the USEPA advisory National Recommended Water Quality Criteria. Central Valley and Delta areas are subject to the 2006 Bay-Delta Water Quality Control Plan (SWRCB 2006), and the Central Valley, Tulare Basin, and San Francisco Bay regional plans (Central Valley RWQCB 2008, San Francisco RWQCB 2007). Freshwater criteria apply to waters of salinity less than 1 parts per thousand, seawater criteria are for water greater than 10 parts per thousand, and estuarine waters use the more stringent of the two possible criteria, in absence of estuary-specific criteria.

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1.2.12 Regional Water Quality Control Board Basin Plans

The Regional Water Quality Control Boards are required to formulate and adopt Basin Plans for all areas under their jurisdiction under Section 13240 of the Porter-Cologne Water Quality Control Act. Each Basin Plan must contain water quality objectives to ensure the reasonable protection of beneficial uses, as well as a program of implementation for achieving water quality objectives with the Basin Plans. Federal regulations require each state to adopt water quality standards to protect the public health or welfare, enhance the quality of water and serve the purposes of the Clean Water Act. In California, the beneficial uses, water quality objectives, and the Antidegradation Policy are the State's water quality standards. Water quality standards are also contained in the National Toxics Rule, 40 Code of Federal Regulation Section 131.36, and the California Toxics Rule, 40 Code of Federal Regulation Section 131.38.

The Basin Plans are subject to modification as necessary, considering applicable laws, policies, technologies, water quality conditions and priorities. Basin Plans are updated and revised periodically as required, using Basin Plan amendments. Once a Basin Plan amendment is adopted in noticed public

hearings, it must be approved by the State Water Resources Control Board, Office of Administrative Law and in some cases, the United States Environmental Protection Agency. Basin Plan amendments only become effective after they have been approved by the Office of Administrative Law and in some cases, the United States Environmental Protection Agency. Every three (3) years, a review of the Basin Plan is completed that assesses the appropriateness of existing standards and evaluates and prioritizes Basin Planning issues.

The RWQCBs also develop basin-specific programs, such as the Groundwater Quality Protection Strategy developed by the Central Valley Regional Board. The Groundwater Quality Protection Strategy is being developed to assure comprehensive, consistent, and coordinated protection of the beneficial uses of groundwater throughout the Central Valley, and to ensure a sustainable, high quality water supply for the Central Valley. Future projects proposed under the Delta Plan should be coordinated with any future groundwater management plans developed under the Groundwater Quality Protection Strategy.

~~*1.2.10*~~*1.2.13 State Water Quality Improvement Plans, including TMDLs*

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Table D-2
Federal and State Actions to Improve and Enhance Surface Water Quality Under Development in the Central Valley, Delta, and Suisun Marsh (in addition to promulgated Water Quality Criteria, as in Table WQ-1 and routine NPDES permitting and Waste Discharge Requirements)

State: TMDLs

Source: Central Valley RWQCB 2011; San Francisco Bay RWQCB 2011

Water Bodies	Pollutants (approval date)
Morrison Creek (tributary to Sacramento River)	Diazinon and Chlorpyrifos (2004)
Stockton Deep Water Ship Channel (Phase I)	Dissolved Oxygen (2005), Phase II ongoing
Sacramento-San Joaquin Delta Waterways and Tributaries (including Mosher Slough, 5 Mile Slough, Calaveras River, and Mormon Slough – tributaries to San Joaquin River)	Diazinon and Chlorpyrifos (2007)
San Joaquin River, upstream of Vernalis	Diazinon and Chlorpyrifos (~~2002~~2006)
Delta Tributaries (including French Camp Slough, Duck Slough, Paradise Cut, and Ulatis Creek)	Chlorpyrifos (2010)
Suisun Marsh	Nutrient, beginning
~~Stockton Deep Water Ship Channel (Phase II)~~	~~Dissolved Oxygen, ongoing~~
Other State or Local Programs	
CV-SALTS, Delta, San Joaquin Valley, Tulare Basin (see below)	Salinity, nitrate, ongoing

In 2006, the Central Valley Regional Water Quality Control Board, the State Water Resources Control Board, and stakeholders began a joint effort to address salinity and nitrate problems in California's Central Valley and adopt long-term solutions that will lead to enhanced water quality and economic sustainability. This effort is referred to as the CV-SALTS Initiative. The goal of CV-SALTS is to develop a comprehensive region-wide Salt and Nitrate Management Plan (SNMP) describing a water quality protection strategy that will be implemented through a mix of voluntary and regulatory efforts. The SNMP may include recommendations for numeric water quality objectives, beneficial use designation refinements, and/or other refinements, enhancements, or basin plan revisions. The Salt and Nitrate Management Plan and will serve as the basis for amendments to the three Basin Plans that cover the Central Valley Region (Sacramento River and San Joaquin River Basin Plan, the Tulare Lake Basin Plan and the Sacramento/San Joaquin Rivers Bay-Delta Plan). The basin plan "amendments" will likely

establish a comprehensive implementation plan to achieve water quality objectives for salinity (including nitrate) in the Region's surface waters and groundwater; and the Salt and Nitrate Management Plan may include recommendations for numeric water quality objectives, beneficial use designation refinements, and/or other refinements, enhancements, or basin plan revisions.

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~~*1.2.11*~~*1.2.14 Suisun Marsh Preservation Agreement*

~~*1.2.12*~~*1.2.15 Assembly Bill 3030: Groundwater Management Act (2002)*

~~*1.2.13*~~*1.2.16 Special Act Districts*

~~*1.2.14*~~*1.2.17 SB 1245 (Water Code Section 10756) (1997)*

1.2.18 State Water Resources Control Board Statement of Policy with Respect to Maintaining High Quality of Waters in California

In 1968, the SWRCB adopted a policy (Resolution No. 68-16, frequently referred to as the "Anti-degradation Policy") that if water quality is better than the requirements of adopted water quality requirements of the SWRCB, that the higher water quality shall be maintained until it is demonstrated that the change in water quality would be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses, and will not result in water quality less than prescribed in adopted polices. The policy also required that any activity that discharges or proposes to discharge wastes to waters that have higher water quality than adopted policies be required to implement best practicable treatment or provide that a pollution or nuance will not occur and that the highest water quality consistent with the maximum benefit to the people of the State be maintained.

In July 1990, an Administrative Procedures Update was issued by the SWRCB to the Regional Water Quality Control Boards that described procedures for findings that allow degradation of water quality if balanced against the benefit to the public of the activity that caused the water quality degradation. The Administrative Procedures Updated stated that the findings should indicated the pollutants that will lower water quality, socioeconomic and public benefit of the action, and the beneficial uses that will be affected.

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Counties also have adopted specific requirements for well construction. For example, wells constructed in San Joaquin County must comply with San Joaquin County Ordinance Code Title 5, Health and Sanitation Division 4 - Wells and Well Drilling; Title 9, Division 11, Infrastructure Standards and Requirements; and Chapter 9-1115, Water Well and Well Drilling Regulations - Standards for Well Construction and Destruction.

Page D-22, Line 564 (Volume 2)

2.1.16 Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act designates qualifying free-flowing river segments as wild, scenic, or recreational. The Act establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory. Under the Act, a Federal agency may not assist the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values of a wild or scenic river. If the project would affect the free-flowing characteristics of a designated river or unreasonably diminish the scenic, recreational and fish and wildlife values present in the area, such activities should be

undertaken in a manner that would minimize adverse impacts and should be developed in consultation with the National Park Service.

~~2.1.16~~2.1.17 CALFED Multi-Species Conservation Strategy

~~2.1.16.1~~2.1.17.1 Ecosystem Restoration Program

~~2.1.17~~2.1.18 Central Valley Project Improvement Act

Page D-99, Line 3595 (Volume 2)

8.1.2 Section~~s~~ 106 and 101(d) of the National Historic Preservation Act of 1966

Page D-100, Line 3638 (Volume 2)

The NHPA was amended in 1992 to increase participation of federally recognized Indian tribes in the preservation of significant historic properties on tribal lands. Section 101(d)(2) allows tribes to assume any or all functions of the a State Historic Preservation Officer on tribal lands, including identifying and maintaining inventories of culturally significant properties, nominating properties to national and tribal registers of historic places, conducting Section 106 reviews of federal agency projects on tribal lands, and conducting educational programs on the importance of preserving historic properties.

Page D-103, Line 3745 (Volume 2)

8.2.3 California State Lands Commission

Pursuant to California Public Resources Code Sections 6309, 6313, and 6314, title to all abandoned shipwrecks, archaeological sites, and historic or cultural resources on or in the sovereign land of the State of California is vested in the State and under the jurisdiction of the State Lands Commission (SLC). The SLC administers the Shipwreck and Historic Maritime Resources Program, which consists of the SLC's activities under California Public Resources Code Sections 6309, 6313, and 6314.

~~8.2.3~~8.2.4 Native American Heritage Commission

~~8.2.4~~8.2.5 California Public Resources Code and California Health and Safety Code Provisions Regarding Human Remains

Page D-148, Line 5244 (Volume 2)

The Department of Public Health may authorize a local environmental health agency to regulate public small community water systems (15 to 199 connections), and has delegated this authority to 35 California counties.

Page D-154, Line 5371 (Volume 2)

16.2.8 Davis-Dolwig Act of 1961

The Davis-Dolwig Act (Water Code sections 11900-11925) establishes that State Water Project (SWP) facilities be constructed in a manner consistent with the full utilization of their potential for the enhancement of fish and wildlife and to meet recreational needs. The recreation facilities or fish and wildlife enhancements to be developed are not specified. Costs of fish and wildlife enhancements and recreation are not to be included in charges to SWP contractors. Costs are to be paid for by an annual appropriation from the General Fund. In planning for new SWP developments and related land acquisitions, planning and land acquisitions for fish and wildlife enhancements must occur simultaneously.

Page D-187, Line 6469 (Volume 2)

San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board). 2010. *Water Quality Control Plan for the San Francisco Bay Basin*.

Section 6
References

The following references are unique to the preparation of this Final PEIR (Volumes 4 and 5). This list does not repeat references previously published in Volumes 1, 2, and 3, although those references have been cited where necessary in responses to comments (Sections 3 and 4 of this Final PEIR) to reiterate information sources used in preparation of the Draft PEIR and the Recirculated Draft PEIR. For references not appearing in this list, refer to Volumes 1, 2, and 3 of the PEIR.

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Appendix A
Delta Plan Policies and Recommendations

Delta Plan Policies and Recommendations

The Delta Plan contains a set of regulatory policies that will be enforced by the Delta Stewardship Council's appellate authority and oversight. The Delta Plan also contains priority recommendations, which are nonregulatory but call out actions essential to achieving the coequal goals. This appendix contains the full text of the revisions to the policies and recommendations from the November 2012 Delta Plan (the EIR "Revised Project") in strikeout and underline format. This same appendix is attached to the May 2013 Final Delta Plan being provided to the Delta Stewardship Council members. Many of the changes to the policies shown below are mostly or fully underlined in order to aid the Delta Stewardship Council in its review of the revisions to the Delta Plan (i.e., reviewing non-interlineated text is easier) even when the actual change to the policy was limited to only a portion or word of a given paragraph, or even where a policy was simply split but no words changed (e.g., ER P1, RR P1). In other words, Appendix A shows more apparent text changes to policies than are actually proposed. The precise wording changes to the policies are shown in Appendix B (proposed *CCR Title 23, Division 6, Chapter 2*, which shows all of the additions to and deletions from the regulations/policies, in interlineated format, that will be adopted to implement the Delta Plan). This table also includes additional notes for clarification; these notes are unique to this Final PEIR and do not appear in the Proposed Final Delta Plan.

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
Chapter 2		
G P1 (23 CCR Section 5002)	Detailed Findings to Establish Consistency with the Delta Plan	(a) This policy specifies what must be addressed in a certification of consistency filed by a State or local public agency with regard to a covered action. This policy only applies after a "proposed action" has been determined by a State or local public agency to be a covered action because it among other things is covered by one or more of the policies contained in ~~Chapters 3 through 7~~Article 3. Inconsistency with this policy may be the basis for an appeal. (b) Certifications of Consistency must include detailed findings that address each of the following requirements: 1. Covered actions, in order to ~~must~~ be consistent with the ~~coequal goals~~Delta Plan, ~~as well as~~must be consistent with this regulatory policy and with each of the policies contained in ~~Chapters 3 through 7~~Article 3 implicated by the covered action. The Delta Stewardship Council acknowledges that in some cases, based upon the nature of the covered action, full consistency with all relevant regulatory policies may not be feasible. In those cases, the agency that files the certification of consistency may nevertheless determine that the covered action is consistent with the Delta Plan because on whole, that action is consistent with the coequal goals. That determination must include a clear identification of areas where consistency with relevant regulatory policies is not feasible, an explanation of the reasons why it is not feasible, and an explanation of how the covered

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
		action nevertheless, on whole, is consistent with the coequal goals. That determination is subject to review by the Delta Stewardship Council on appeal. 2. Covered actions not exempt from CEQA must include applicable feasible mitigation measures identified in the Delta Plan's Program EIR (unless the measure(s) are within the exclusive jurisdiction of an agency other than the proposing agency), or substitute mitigation measures that the proposing agency finds are equally or more effective. 3. As relevant to the purpose and nature of the project, all covered actions must document use of best available science ~~(as described in Appendix A)~~. 4. Ecosystem restoration and water management covered actions must include adequate provisions, appropriate to the scope of the covered action, to assure continued implementation of adaptive management. This requirement shall be satisfied through both of the following: A. An adaptive management plan that describes the approach to be taken consistent with the adaptive management framework in Appendix ~~A~~1B, and B. Documentation of access to adequate resources and delineated authority by the entity responsible for the implementation of the proposed adaptive management process. 5. ~~If the agency that files the certification of consistency will carry out the covered action, the certification of consistency must also include a certification from that agency that the covered action complies with all applicable laws pertaining to water resources, biological resources, flood risk, and land use and planning. If the agency that files the certification of consistency will not carry out the covered action (but will approve or fund the action), the certification of consistency must include a certification from that agency that the covered action complies with all applicable laws of the type listed above over which that agency has enforcement authority or with which that agency can require compliance.~~ (c) A conservation measure proposed to be implemented pursuant to a natural community conservation plan or a habitat conservation plan that was: 1. Developed by a local government in the Delta, and; 2. Approved and permitted by the Department of Fish and Wildlife prior to the date of the Delta Plan's adoption Is deemed to be consistent with Sections 5005 through 5009 of this chapter if the certification of consistency filed with regard to the conservation measure includes a statement confirming the nature of the conservation measure from the Department of Fish and Wildlife.
G R1	Development of a Delta Science Plan	The Delta Stewardship Council's Delta Science Program should develop a Delta Science Plan by December 31, 2013. The Delta Science Program should work with the Interagency Ecological Program, Bay Delta Conservation Plan, California Department of Fish and ~~Game~~Wildlife, and other agencies to develop the Delta Science Plan. To ensure that best science is used to develop the Delta Science Plan, the Delta Independent Science Board should review the draft Delta Science Plan.

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
		The Delta Science Plan should address the following: ♦ A collaborative institutional and organizational structure for conducting science in the Delta ♦ Data management, synthesis, scientific exchange, and communication strategies to support adaptive management and improve the accessibility of information ♦ Strategies for addressing uncertainty and conflicting scientific information ♦ The prioritization of research and balancing of the short-term immediate science needs with science that enhances comprehensive understanding of the Delta system over the long term ♦ Identification of existing and future needs for refining and developing numerical and simulation models along with enhancing existing Delta conceptual models (e.g., the Interagency Ecological Program (IEP) Pelagic Organism Decline (POD) and the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP) models) ♦ ~~Recommendations on a~~An integrated approach for monitoring that incorporates existing and future monitoring efforts ♦ An assessment of financial needs and funding sources to support science
Chapter 3		
WR P1 (23 CCR Section 5003)	Reduce Reliance on the Delta ~~and~~ through Improved Regional Water Self Reliance	(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply: (1) One or more water suppliers that would receive water as a result of the export, transfer or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c); (2) That failure has significantly caused the need for the export, transfer or use; and (3) The export, transfer, or use would have a significant adverse environmental impact in the Delta. (b) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action to export water from, transfer water through, or use water in the Delta, but does not cover any such action unless one or more water suppliers would receive water as a result of the proposed action. (c) (1) Water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy: (A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8; (B) Identified, evaluated and commenced implementation

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE

,consistent with the implementation schedule set forth in the management Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and,

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code Section 1011(a).

(2) Programs and projects that reduce reliance could include, but are not limited to, improvements in water use efficiency, water recycling, storm water capture and use, advanced water technologies, conjunctive use projects, local and regional water supply and storage projects, and improved regional coordination of local and regional water supply efforts.

~~The policy of the State of California is to reduce reliance on the Delta in meeting future water supply needs and that each region that depends on water from the Delta watershed shall improve its regional self-reliance. Success in achieving the statewide policy of reduced reliance on the Delta and improving regional self reliance will be demonstrated through a significant reduction in the amount of water used, or in the percentage of water used, from the Delta watershed.~~

~~The intent of WR P1 is to ensure that urban and agricultural water suppliers are taking appropriate actions to contribute to the achievement of reduced reliance on the Delta by complying with the statutory requirements of SB X7 7 and other water management laws, and by implementing programs and projects that are locally cost effective and technologically feasible for urban and agricultural water suppliers to increase water use efficiency and conservation and diversify local water supply portfolios.~~

~~WR P1: Water shall not be exported from, transferred through or used in the Delta if (1) one or more water suppliers that would receive water as a result of the export, transfer or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self reliance consistent with the three requirements stated below; (2) that failure has significantly caused the need for the export, transfer or use; and (3) the export, transfer or use would have a significant adverse environmental impact in the Delta.~~

~~For the purpose of Water Code section 85057.5 (a) (3), this policy covers a proposed action to export water from, transfer water through, or use water in the Delta.~~

~~Water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improved regional self reliance and are therefore consistent with WR P1:~~

~~1) Completed a current urban or agricultural water management plan which has been reviewed by DWR for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;~~

~~2) Identified, evaluated and commenced implementation, consistent with the implementation schedule set forth in the management plan, of all programs and projects that are locally cost effective and technically feasible that reduce reliance on the Delta; and~~

~~3) Included in the plan, commencing in 2015, the expected outcome for measurable~~

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
		~~reduction in Delta reliance and improvement in regional self-reliance.~~ ~~Programs and projects that reduce reliance could include, but are not limited to, improvements in water use efficiency, water recycling, stormwater capture and use, advanced water technologies, conjunctive use projects, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.~~
WR R1	Implement Water Efficiency and Water Management Planning Laws	All water suppliers should fully implement applicable water efficiency and water management laws, including urban water management plans (Water Code section 10610~~4~~ et seq.), the 20% reduction in statewide urban per capita water usage by 2020 (Water Code section 10608 et seq.), agricultural water management plans (Water Code section 10608 et seq. and 10800 et seq.), and other applicable water laws, regulations, or rules.
WR R2	Require SWP Contractors to Implement Water Efficiency and Water Management Laws	The Department of Water Resources should include a provision in all State Water Project contracts, contract amendments, contract renewals, and water transfer agreements that require the implementation of all State water efficiency and water management laws, goals, and regulations, including compliance with Water Code section 85021.
WR R3	Compliance with Reasonable and Beneficial Use	The State Water Resources Control Board should evaluate all applications and petitions for a new water right or a new or changed point of diversion, place of use, or purpose of use that would result in new or increased long-term average use of water from the Delta watershed for consistency with the constitutional principle of reasonable and beneficial use. The State Water Resources Control Board should conduct its evaluation consistent with Water Code sections 85021, 85023, 85031, and other provisions of California law. An applicant or petitioner should submit to the State Water Resources Control Board sufficient information to support findings of consistency, including, as applicable, its urban water management plan, agricultural water management plan, and environmental documents prepared pursuant to CEQA.
WR R4	Expanded Water Supply Reliability Element	Water suppliers that receive water from the Delta watershed should include an expanded water supply reliability element, starting in 2015, as part of the update of an urban water management plan, agricultural water management plan, integrated water management plan, or other plan that provides equivalent information about the supplier's planned investments in water conservation and water supply development. The expanded water supply reliability element should detail how water suppliers are reducing reliance on the Delta and improving regional self-reliance consistent with Water Code section 85201 through investments in local and regional programs and projects, and should document the expected outcome for a measurable reduction in reliance on the Delta and improvement in regional self-reliance. At a minimum, these plans should include a plan for possible interruption of ~~Delta~~ water supplies for up to 36 months due to catastrophic events impacting the Delta, evaluation of the regional water balance, a climate change vulnerability assessment, and an evaluation of the extent to which the supplier's rate structure promotes and sustains efficient water use.
WR R5	Develop Water Supply Reliability Element Guidelines	The Department of Water Resources, in consultation with the Delta Stewardship Council, the State Water Resources Control Board, and others, should develop and approve, by December 31, 2014, guidelines for the preparation of a water supply reliability element so that water suppliers can begin implementation of WR R4 by 2015.
WR R6	Update Water Efficiency Goals	The Department of Water Resources and the State Water Resources Control Board should establish an advisory group with other state agencies and stakeholders to identify and implement measures to reduce impediments to achievement of statewide water conservation, recycled water, and stormwater goals by 2014. This group should evaluate and recommend updated goals for additional water efficiency and water resource development by 2018. Issues such as water distribution system leakage

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		should be addressed. Evaluation should include an assessment of how regions are achieving their proportional share of these goals.
WR R7	Revise State Grant and Loan Priorities	The Department of Water Resources, the State Water Resources Control Board, the Department of Public Health, and other agencies, in consultation with the Delta Stewardship Council, should revise State grant and loan ranking criteria by December 31, 2013, to be consistent with Water Code section 85021 and to provide a priority for water suppliers that includes an expanded water supply reliability element in their adopted urban water management plans, agricultural water management plans, and/or integrated regional water management plans.
WR R8	Demonstrate State Leadership	All State agencies should take a leadership role in designing new and retrofitted State owned and leased facilities, including buildings and Caltrans facilities, to increase water efficiency, use recycled water, and incorporate stormwater runoff capture and low impact development strategies.
WR R9	Update Bulletin 118, California's Groundwater Plan	The Department of Water Resources, in consultation with the Bureau of Reclamation, U.S. Geological Survey, the State Water Resources Control Board, and other agencies and stakeholders should update Bulletin 118 information using field data, California Statewide Groundwater Elevation Monitoring (CASGEM), groundwater agency reports, satellite imagery, and other best available science by December 31, 2014, so that this information can be included in the next California Water Plan Update and be available for inclusion in 2015 urban water management plans and agricultural water management plans. The Bulletin 118 update should include a systematic evaluation of major groundwater basins to determine sustainable yield and overdraft status, a projection of California's groundwater resources in 20 years if current groundwater management trends remain unchanged, anticipated impacts of climate change on surface water and groundwater resources, and recommendations for State, federal, and local actions to improve groundwater management. In addition, the Bulletin 118 update should identify groundwater basins in a critical condition of overdraft.
WR R10	Implement Groundwater Management Plans in Areas that Receive Water from the Delta Watershed	Water suppliers that receive water from the Delta watershed and that obtain a significant percentage of their long-term average water supplies from groundwater sources should develop and implement sustainable groundwater management plans that are consistent with both the required and recommended components of local groundwater management plans identified by the Department of Water Resources Bulletin 118 (Update 2003) by December 31, 2014.
WR R11	Recover and Manage Critically Overdrafted Groundwater Basins	Local and regional agencies in groundwater basins that have been identified by the Department of Water Resources as being in a critical condition of overdraft should develop and implement a sustainable groundwater management plan, consistent with both the required and recommended components of local groundwater management plans identified by the Department of Water Resources Bulletin 118 (Update 2003), by December 31, 2014. If local or regional agencies fail to develop and implement these plans, the State Water Resources Control Board should take action to determine if the continued overuse of a groundwater basin constitutes a violation of the State's Constitution Article X, Section 2, prohibition on unreasonable use of water and whether a groundwater adjudication is necessary to prevent the destruction of or irreparable injury to the quality of the groundwater, consistent with Water Code sections 2100-2101.
WR R12	Complete Bay Delta Conservation Plan	The relevant federal, State, and local agencies should complete the Bay Delta Conservation Plan, consistent with the provisions of the Delta Reform Act, and receive required incidental take permits by December 31, 2014.
WR R13	Complete Surface Water Storage Studies	The Department of Water Resources should complete surface water storage investigations of proposed off-stream surface storage projects by December 31, 2012, including an evaluation of potential additional benefits of integrating operations of new

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
		storage with proposed Delta conveyance improvements, and recommend the critical projects that need to be implemented to expand the State's surface storage.
WR R14	Identify Near-term Opportunities for Storage, Use, and Water Transfer Projects	The Department of Water Resources, in coordination with the California Water Commission, Bureau of Reclamation, State Water Resources Control Board, California Department of Public Health, the Delta Stewardship Council, and other agencies and stakeholders, should conduct a survey to identify projects throughout California that could be implemented within the next 5 to 10 years to expand existing surface and groundwater storage facilities, create new storage, improve operation of existing Delta conveyance facilities, and enhance opportunities for conjunctive use programs and water transfers in furtherance of the coequal goals. The California Water Commission should hold hearings and provide recommendations to DWR on priority projects and funding.
WR R15	Improve Water Transfer Procedures	The Department of Water Resources and the State Water Resources Control Board should work with stakeholders to identify and recommend measures to reduce procedural and administrative impediments to water transfers and protect water rights and environmental resources by ~~July~~ December 31, 2016~~4~~. These recommendations should include measures to address potential issues with recurring transfers of up to 1 year in duration and improved public notification for proposed water transfers.
WR P2 (23 CCR Section 5004)	Transparency in Water Contracting	(a) The contracting process for water from the State Water Project (SWP) and/or the Central Valley Project (CVP) must be done in a publicly transparent manner consistent with applicable polices of the Department of Water Resources and the Bureau of Reclamation referenced below. (b) For purposes of Water Code section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers the following: (1) With regard to water from the State Water Project, a proposed action to enter into or amend a water supply or water transfer contract subject to Department of Water Resources Guidelines 03-09 and/or 03-10 (each dated July 3, 2003), which are attached as Appendix 2A; and, (2) With regard to water from the Central Valley Project, a proposed action to enter into or amend a water supply or water transfer contract subject to Section 226 of P.L. 97-293, as amended or Section 3405(a)(2)(B) of the Central Valley Project Improvement Act, Title XXXIV of Public Law 102-575, as amended, which are attached as Appendix 2B, and Rules and Regulations promulgated by the Secretary of the Interior to implement these laws. **NOTE:** Authority cited: Section 85210(i), Water Code. **Reference:** Sections 85020, 85021, 85300 and 85302, Water Code. ~~The contracting process for water from the State Water Project (SWP) and/or the Central Valley Project (CVP) must be done in a publicly transparent manner consistent with applicable policies of the Department of Water Resources and the Bureau of Reclamation referenced below.~~ ~~For purposes of Water Code section 85057.5(a)(3), this policy "covers" the following:~~ ~~a. With regard to water from the SWP, a proposed action to enter into or amend a water supply or water transfer contract subject to DWR Guidelines 03-09 and/or 03-10 (each dated July 3, 2003), which are included in Part 1 of Appendix F.~~ ~~b.~~a. ~~With regard to water from the CVP, a proposed action to enter into or amend a water supply or water transfer contract subject to Section 226 of P.L. 97-293 or Section 3405(a)(2)(B) of the Central Valley Project~~

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
		~~Improvement Act, which are included in Part 2 of Appendix F.~~
WR R16	Supplemental Water Use Reporting	The State Water Resources Control Board should require water rights holders submitting supplemental statements of water diversion and use or progress reports under their permits or licenses to report on the development and implementation of all water efficiency and water supply projects and on their net (consumptive) use.
WR R17	Integrated Statewide System for Water Use Reporting	The Department of Water Resources, in coordination with the State Water Resources Control Board, the Department of Public Health, Public Utilities Commission, Energy Commission, Bureau of Reclamation, California Urban Water Conservation Council, and other stakeholders, should develop a coordinated statewide system for water use reporting. This system should incorporate recommendations for inclusion of data needed to better manage California's water resources. The system should be designed to simplify reporting, reduce the number of required reports where possible, be made available to the public online and be integrated with the reporting requirements for the urban water management plans, agricultural water management plans, and integrated regional water management plans. Water suppliers that export water from, transfer water through, or use water in the Delta watershed should be full participants in the data base.
WR R18	California Water Plan	The Department of Water Resources, in consultation with the State Water Resources Control Board, and other agencies and stakeholders, should evaluate and include in the next and all future California Water Plan updates information needed to track water supply reliability performance measures identified in the Delta Plan, including an assessment of water efficiency and new water supply development, regional water balances, improvements in regional self-reliance, reduced regional reliance on the Delta, and reliability of Delta exports, and an overall assessment of progress in achieving the coequal goals.
WR R19	Financial Needs Assessment	As part of the California Water Plan Update, the Department of Water Resources should prepare an assessment of the State's water infrastructure. This should include the costs of rehabilitating/replacing existing infrastructure, an assessment of the costs of new infrastructure, and an assessment of needed resources for monitoring and adaptive management for these projects. The department should also consider a survey of agencies that may be planning small-scale projects (such as storage or conveyance) that improve water supply reliability.
Chapter 4		
ER P1 (23 CCR Section 5005)[a]	~~Update~~ Delta Flow Objectives	(a) The State Water Resources Control Board's Bay Delta Water Quality Control Plan flow objectives shall be used to determine consistency with the Delta Plan. If and when the flow objectives are revised by the State Water Resources Control Board, the revised flow objectives shall be used to determine consistency with the Delta Plan. (b) For purposes of Water Code section 85057.5(a)(3) and Section 50031(j)(1)(E) of this Chapter, the policy set forth in subsection (a) covers a proposed action that could significantly affect flow in the Delta.
ER P2 (23 CCR Section 5006)	Restore Habitats at Appropriate Elevations	(a) Habitat restoration must be carried out consistent with Appendix 3, which is Section II of the Draft Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions (Department of Fish and

[a] This policy was revised from the previous version of the Delta Plan, and is not a new policy. The changes were provided in underline fashion to the DSC for convenience in review. Specific changes to all policies are shown in proposed *CCR Title 23, Division 23, Chapter 2* (Appendix B), which includes all additions and strikeouts of the regulations that will be adopted to implement the Delta Plan.

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
		Wildlife 2011). The elevation map attached as Appendix 4 should be used as a guide for determining appropriate habitat restoration actions based on an area's elevation. If a proposed habitat restoration action is not consistent with Appendix 4, the proposal shall provide rationale for the deviation based on best available science. (b) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that includes habitat restoration. ~~Habitat restoration must be carried out consistent with the text of Appendix H, which is based on the *Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011), with minor alterations. Figure 4-5 should be used as a guide for determining appropriate habitat restoration actions based on an area's elevation.~~ ~~This policy covers a proposed action that includes habitat restoration.~~
ER P3 (23 CCR Section 5007)	Protect Opportunities to Restore Habitat	(a) Within the priority habitat restoration areas depicted in Appendix 5, significant adverse impacts to the opportunity to restore habitat as described in Section 5006, must be avoided or mitigated. (b) Significant impacts referenced in subsection (a) will be deemed to be avoided or mitigated if the project is designed and implemented so that it will not preclude or otherwise interfere with the ability to restore habitat as described in Section 5006. (c) Mitigation shall be determined, in consultation with the Department of Fish and Wildlife, considering the size of the area impacted by the covered action and the type and value of habitat that could be restored on that area, taking into account existing and proposed restoration plans, landscape attributes, the elevation map shown in Appendix 4 and other relevant information about habitat restoration opportunities of the area. (c) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers proposed actions in the priority habitat restoration areas depicted in Appendix 5. It does not cover proposed actions outside those areas. ~~Significant impacts to the opportunity to restore habitat at the elevations shown in Figure 4-5 must be avoided or mitigated. Mitigation shall be determined, in consultation with the Department of Fish and Game, considering the size of the area impacted by the covered action and the type and value of habitat that could be restored on that area, taking into account existing and proposed restoration plans, landscape attributes, the elevation map shown in Figure 4-5, and other relevant information about habitat restoration opportunities of the area. Mitigation may include the restoration and/or permanent protection of other areas to provide habitats that could have been restored at the site.~~ ~~This policy covers proposed actions in the priority habitat restoration areas depicted in Figure 4-6. It does not cover actions outside those areas.~~
ER P4 (23 CCR Section 5008)	Expand Floodplains and Riparian Habitats in Levee Projects	(a) Levee projects must evaluate and where feasible incorporate alternatives, including the use of setback levees, to increase floodplains and riparian habitats. Evaluation of setback levees in the Delta shall be required only in the following areas (shown in Appendix 8): (1) The Sacramento River between Freeport and Walnut Grove, the San Joaquin River from the Delta boundary to Mossdale, Paradise Cut, Steamboat Slough, Sutter Slough; and the North and South Forks of the Mokelumne River, and (2) Urban levee improvement projects in the cities of West Sacramento and Sacramento.

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		(b) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action to construct new levees or substantially rehabilitate or reconstruct existing levees. ~~Levee projects must evaluate and where feasible incorporate alternatives, including use of setback levees, to increase floodplains and riparian habitats. When available, the criteria developed under RR R7 must be used to determine appropriate locations for setback levees.~~ ~~This policy covers a proposed action to construct new levees or substantially rehabilitate or reconstruct existing levees.~~
ER R1[b]	Update Delta Flow Objectives	Development, implementation, and enforcement of new and updated flow objectives for the Delta and high priority tributaries are key to the achievement of the coequal goals. The State Water Resources Control Board should update the Bay-Delta Water Quality Control Plan objectives as follows: (a) By June 2, 2014, adopt and implement updated flow objectives for the Delta that are necessary to achieve the coequal goals. (b) By June 2, 2018, adopt, and as soon as reasonably possible, implement flow objectives for high-priority tributaries in the Delta watershed that are necessary to achieve the coequal goals. Flow objectives could be implemented through several mechanisms including negotiation and settlement, FERC relicensing, or ~~water rights hearing~~adjudicative proceeding. Prior to the establishment of revised flow objectives identified above, the existing Bay Delta Water Quality Control Plan objectives shall be used to determine consistency with the Delta Plan. After the flow objectives are revised, the revised objectives shall be used to determine consistency with the Delta Plan. ~~This policy covers a proposed action that could affect flow in the Delta.~~
ER R2~~1~~	Prioritize and Implement Projects that Restore Delta Habitat	Bay Delta Conservation Plan implementers, Department of Fish and ~~Game~~Wildlife, Department of Water Resources, and the Delta Conservancy should prioritize and implement habitat restoration projects in the areas shown in Figure 4-8~~6~~. Habitat restoration projects should ensure connections between areas being restored and existing habitat areas and other elements of the landscape needed for the full life cycle of the species that will benefit from the restoration project. Where possible, restoration projects should also emphasize the potential for improving water quality. Restoration project proponents should ~~coordinate with local mosquito abatement districts~~ consult the California Department of Public Health's *Best Management Practices for Mosquito Control in California*. ♦ **Yolo Bypass.** Enhance the ability of the Yolo Bypass to flood more frequently to provide more opportunities for migrating fish, especially Chinook salmon, to use this system as a migration corridor that is rich in cover and food. ♦ **Cache Slough Complex.** Create broad nontidal, freshwater, emergent plant-dominated wetlands that grade into tidal freshwater

[b] This recommendation consists of identical text from the previous version of Policy ER P1, but with the minor word changes as noted in underline/strikeout.
[1] SWRCB staff ~~will~~ should work with the Council and DF~~G~~W to determine priority streams. As an illustrative example, priority streams could include the Merced River, Tuolumne River, Stanislaus River, Lower San Joaquin River, Deer Creek (tributary to Sacramento River), Lower Butte Creek, Mill Creek (tributary to Sacramento River), Cosumnes River, and American River (SWRCB 2011a, SWRCB 2011b).Implementation through hearings is expected to take longer than the deadline shown here.
[2] Implementation through ~~water rights hearings~~ adjudicative proceedings or FERC relicensing is expected to take longer than the deadline shown here.

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		wetlands, and shallow subtidal and deep open water habitats. Also, return a significant portion of the region to uplands with vernal pools and grasslands. ♦ **Cosumnes River–Mokelumne River confluence.** Allow these unregulated and minimally regulated rivers to flood over their banks during winter and spring frequently and regularly to create seasonal floodplains and riparian habitats that grade into tidal marsh and shallow subtidal habitats. ♦ **Lower San Joaquin River floodplain.** Reconnect the floodplain and restore more natural flows, to stimulate food webs that support native species. Integrate habitat restoration with flood management actions, when feasible. ♦ **Suisun Marsh.** Restore significant portions of Suisun Marsh to brackish marsh with land-water interactions to support productive, complex food webs to which native species are adapted and to provide space to adapt to rising sea level action. Use information from adaptive management processes during the Suisun Marsh Habitat Management, Preservation, and Restoration Plan's implementation to guide future habitat restoration projects and to inform future tidal marsh management. ♦ **Western Delta/Eastern Contra Costa County.** Restore tidal marsh and channel margin habitat at Dutch Slough and western islands to support food webs and provide habitat for native species.
ER R3~~2~~	Complete and Implement Delta Conservancy Strategic Plan	As part of its Strategic Plan and subsequent Implementation Plan or annual work plans, the Delta Conservancy should: ♦ Develop and adopt criteria for prioritization and integration of large-scale ecosystem restoration in the Delta and Suisun Marsh, with sustainability and use of best available science as foundational principles. ♦ Develop and adopt processes for ownership and long-term operations and management of land in the Delta and Suisun Marsh acquired for conservation or restoration. ♦ Develop and adopt a formal mutual agreement with the Department of Water Resources, Department of Fish and ~~Game~~Wildlife, federal interests, and other State and local agencies on implementation of ecosystem restoration in the Delta and Suisun Marsh. ♦ Develop, in conjunction with the Wildlife Conservation Board, the Department of Water Resources, Department of Fish and ~~Game~~Wildlife, Bay Delta Conservation Plan implementers, and other State and local agencies, a plan and protocol for acquiring the land necessary to achieve ecosystem restoration consistent with the coequal goals and the Ecosystem Restoration Program Conservation Strategy. ♦ Lead an effort, working with State and federal fish agencies, to investigate how to better use habitat credit agreements to provide credit for each of these steps: (1) acquisition for future restoration; (2) preservation, management, and enhancement of existing habitat; (3) restoration of habitat; and (4) monitoring and evaluation of habitat restoration projects. ♦ Work with the Department of Fish and ~~Game~~ Wildlife and the U.S. Fish and Wildlife Service to develop rules for voluntary safe harbor agreements with property owners in the Delta whose actions contribute to the recovery of listed threatened or endangered

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		species.
ER R~~4~~3	Exempt Delta Levees from the U.S. Army Corps of Engineers' Vegetation Policy	Considering the ecosystem value of remaining riparian and shaded riverine aquatic habitat along Delta levees, the U.S. Army Corps of Engineers should agree with the Department of Fish and ~~Game~~ Wildlife and the Department of Water Resources on a variance that exempts Delta levees from the U.S. Army Corps of Engineers' levee vegetation policy where appropriate.
ER R~~5~~4	Update the Suisun Marsh Protection Plan	The San Francisco Bay Conservation and Development Commission should update the Suisun Marsh Protection Plan and relevant components of the Suisun Marsh Local Protection Program to adapt to sea level rise and ensure consistency with the Suisun Marsh Preservation Act, the Delta Reform Act, and the Delta Plan.
ER P5 (23 CCR Section 5009)	Avoid Introductions of and Habitat Improvements ~~that Enhance Survival and Abundance of~~for Invasive Nonnative ~~Invasive~~ Species	(a) The potential for new introductions of, or improved habitat conditions for, nonnative invasive species, striped bass, or bass must be fully considered and avoided or mitigated in a way that appropriately protects the ecosystem. (b) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that has the reasonable probability of introducing, or improving habitat conditions for, nonnative invasive species. ~~The potential for new introductions of, or improved habitat conditions for, nonnative invasive species must be fully considered and avoided or mitigated in a way that appropriately protects the ecosystem.~~ ~~This policy covers a proposed action that has the reasonable probability of introducing, or improving habitat conditions for, nonnative invasive species.~~
ER R~~6~~5	Regulate Angling for Nonnative Sport Fish to Protect Native Fish	The Department of Fish and ~~Game~~ Wildlife should develop, for consideration by the Fish and Game Commission, proposals for new or revised fishing regulations designed to increase populations of listed fish species through reduced predation by introduced sport fish. The proposals should be based on sound science that demonstrates these management actions are likely to achieve their intended outcome and include the development of performance measures and a monitoring plan to support adaptive management.
ER R~~7~~6	Prioritize and Implement Actions to Control Nonnative Invasive Species	The Department of Fish and ~~Game~~ Wildlife and other appropriate agencies should prioritize and fully implement the list of "Stage 2 Actions for Nonnative Invasive Species" and accompanying text shown in Appendix I taken from the *Conservation Strategy for Restoration of the Sacramento–San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions* (DFG 2011). Implementation of the Stage 2 actions should include the development of performance measures and monitoring plans to support an adaptive management.
ER R~~8~~7	Manage Hatcheries to Reduce Genetic Risk	As required by the National Marine Fisheries Service, all hatcheries providing listed fish for release into the wild should continue to develop and implement scientifically sound Hatchery and Genetic Management Plans (HGMPs) to reduce risks to those species. The Department of Fish and ~~Game~~ Wildlife should provide annual updates to the Council on the status of HGMPs within its jurisdiction.
ER R~~9~~8	Implement Marking and Tagging Program	By December 2014, the Department of Fish and ~~Game~~Wildlife, in cooperation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, should revise and begin implementing its program for marking and tagging hatchery salmon and steelhead to improve management of hatchery and wild stocks based on recommendations of the California Hatchery Scientific Review Group, which considered mass marking, reducing hatchery programs, and mark selective fisheries in developing its recommendations.

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Chapter 5		
DP R1	Designate the Delta as National Heritage Area	The Delta Protection Commission should complete its application for designation of the Delta and Suisun Marsh as a National Heritage Area and the federal government should complete the process in a timely manner.
DP R2	Designate State Route 160 as a National Scenic Byway	The California Department of Transportation should seek designation of State Route 160 as a National Scenic Byway and prepare and implement a scenic byway plan for it.
DP P1 (23 CCR Section 5010)	Locate New Urban Development Wisely	(a) New residential, commercial, and industrial development must be limited to the following areas, as shown in Appendix 6 and Appendix 7: (1) Areas that city or county general plans as of the date of the Delta Plan's adoption, designate for residential, commercial, and industrial development in cities or their spheres of influence; (2) Areas within Contra Costa County's 2006 voter-approved urban limit line, except no new residential, commercial, and industrial development may occur on Bethel Island unless it is consistent with the Contra Costa County general plan effective as of the date of the Delta Plan's adoption; (3) Areas within the Mountain House General Plan Community Boundary in San Joaquin County; or, (4) The unincorporated Delta towns of Clarksburg, Courtland, Hood, Locke, Ryde, and Walnut Grove. (b) Notwithstanding subsection (a), new residential, commercial, and industrial development is permitted outside the areas described in subsection (a) if it is consistent with the land uses designated in county general plans as of the date of the Delta Plan's adoption, and is otherwise consistent with this Chapter. (c) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers proposed actions that involve new residential, commercial, and industrial development that is not located within the areas described in subsection (a). In addition, this policy covers any such action on Bethel Island that is inconsistent with the Contra Costa County general plan effective as of the date of the Delta Plan's adoption. This policy does not cover commercial recreational visitor-serving uses or facilities for processing of local crops or that provide essential services to local farms, which are otherwise consistent with this chapter. (d) This policy is not intended in any way to alter the concurrent authority of the Delta Protection Commission to separately regulate development in the Delta's Primary Zone. ~~New urban development, including residential, commercial, and industrial uses, must be limited to the following areas (as shown in Figure 5-1 or Appendix K):~~ ~~1. areas that city or county general plans, as of the date of the Delta Plan's adoption, designate for development in cities or their spheres of influence;~~ ~~2. areas within Contra Costa County's 2006 voter-approved urban limit line, except no new urban development may occur on Bethel Island unless it is consistent with the Contra Costa County general plan effective as of the date of the Delta Plan's adoption;~~ ~~3. areas within the Mountain House General Plan Community Boundary in~~

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		~~San Joaquin County; or~~ ~~4. the unincorporated Delta towns of Clarksburg, Courtland, Hood, Locke, Ryde, and Walnut Grove.~~ ~~For purposes of Water Code section 85057.5(a)(3), this policy covers proposed actions that involve new urban development, including residential, commercial, and industrial uses, that is not located within the areas described in the previous paragraph. In addition, this policy covers any such action on Bethel Island that is inconsistent with the Contra Costa County general plan effective as of the date of the Delta Plan's adoption. This policy does not cover commercial recreational visitor serving uses or facilities for processing of local crops or that provide essential services to local farms and are otherwise consistent with the Delta Plan.~~ ~~This policy is not intended in any way to alter the concurrent authority of the Delta Protection Commission to separately regulate development in the Delta's Primary Zone~~.
DP P2 (23 CCR Section 5011)	Respect Local Land Use When Siting Water or Flood Facilities or Restoring Habitats	(a) Water management facilities, ecosystem restoration, and flood management infrastructure must be sited to avoid or reduce conflicts with existing uses or those uses described or depicted in city and county general plans for their jurisdictions or spheres of influence when feasible, considering comments from local agencies and the Delta Protection Commission. Plans for ecosystem restoration must consider sites on existing public lands, when feasible and consistent with a project's purpose, before privately owned sites are purchased. Measures to mitigate conflicts with adjacent uses may include, but are not limited to, buffers to prevent adverse effects on adjacent farmland. (b) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers proposed actions that involve the siting of water management facilities, ecosystem restoration, and flood management infrastructure. ~~Water management facilities, ecosystem restoration, and flood management infrastructure must be sited to avoid or reduce conflicts with existing or planned uses when feasible, considering comments from local agencies and the Delta Protection Commission. Plans for ecosystem restoration must consider sites on existing public lands, when feasible and consistent with a project's purpose, before privately owned sites are purchased. Measures to mitigate conflicts with adjacent uses may include, but are not limited to, buffers to prevent adverse effects on adjacent farmland.~~ ~~This policy covers proposed actions that involve the siting of water management facilities, ecosystem restoration, and flood management infrastructure.~~
DP R3	Plan for the Vitality and Preservation of Legacy Communities	Local governments, in cooperation with the Delta Protection Commission and Delta Conservancy, should prepare plans for each community that emphasize its distinctive character, encourage historic preservation, identify opportunities to encourage tourism, serve surrounding lands, or develop other appropriate uses, and reduce flood risks.
DP R4	Buy Rights of Way from Willing Sellers When Feasible	Agencies acquiring land for water management facilities, ecosystem restoration, and flood management infrastructure should purchase from willing sellers, when feasible, including consideration of whether lands suitable for proposed projects are available at fair prices.
DP R5	Provide Adequate Infrastructure	The California Department of Transportation, local agencies, and utilities should plan infrastructure, such as roads and highways, to meet needs of development consistent with sustainable community strategies, local plans, Delta Protection Commission's *Land Use and Resource Management Plan for the Primary Zone of the Delta*, and the Delta Plan.

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DP R6	Plan for State Highways	The Delta Stewardship Council, as part of the prioritization of State levee investments called for in Water Code 85306~~RR P1~~, should consult with the California Department of Transportation as provided in Water Code section 85307(c) to consider the effects of flood hazards and sea level rise on State highways in the Delta.
DP R7	Subsidence Reduction and Reversal	The following actions should be considered by the appropriate State agencies to address subsidence reversal: ♦ State agencies should not renew or enter into agricultural leases on Delta or Suisun Marsh islands if the actions of the lessee promote or contribute to subsidence on the leased land, unless the lessee participates in subsidence-reversal or reduction programs. ♦ State agencies currently conducting subsidence reversal projects in the Delta on State-owned lands should investigate options for scaling up these projects if they have been deemed successful. The Department of Water Resources should develop a plan, including funding needs, for increasing the extent of their subsidence reversal and carbon sequestration projects to 5,000 acres by January 1, 2017. ♦ The Council, in conjunction with the California Air Resources Board (CARB) and the Delta Conservancy, should investigate the opportunity for the development of a carbon market whereby Delta farmers could receive credit for carbon sequestration by reducing subsidence and growing native marsh and wetland plants. This investigation should include the potential for developing offset protocols applicable to these types of plants for subsequent adoption by the CARB.
DP R8	Promote Value-Added Crop Processing	Local governments and economic development organizations, in cooperation with the Delta Protection Commission and the Delta Conservancy, should encourage value-added processing of Delta crops in appropriate locations.
DP R9	Encourage Agritourism	Local governments and economic development organizations, in cooperation with the Delta Protection Commission and the Delta Conservancy, should support growth in agritourism, particularly in and around legacy communities. Local plans should support agritourism where appropriate.
DP R10	Encourage Wildlife-Friendly Farming	The Department of Fish and ~~Game~~Wildlife, the Delta Conservancy, and other ecosystem restoration agencies should encourage habitat enhancement and wildlife-friendly farming systems on agricultural lands to benefit both the environment and agriculture.
DP R11	Provide New and Protect Existing Recreation Opportunities	Water management and ecosystem restoration agencies should provide recreation opportunities, including visitor-serving business opportunities, at new facilities and habitat areas whenever feasible, and existing recreation facilities should be protected, using California State Parks' *Recreation Proposal for the Sacramento-San Joaquin Delta and Suisun Marsh* and Delta Protection Commission's *Economic Sustainability Plan* as guides.
DP R12	Encourage Partnerships to Support Recreation and Tourism	The Delta Protection Commission and Delta Conservancy should encourage partnerships between other State and local agencies, and local landowners and business people to expand recreation, including boating, promote tourism, and minimize adverse impacts to non-recreational landowners.
DP R13	Expand State Recreation Areas	California State Parks should add or improve recreation facilities in the Delta in cooperation with other agencies. As funds become available, it should fully reopen Brannan Island State Recreation Area, complete the park at Delta Meadows-Locke Boarding House, and consider adding new State parks at Barker Slough, Elkhorn Basin, the Wright-Elmwood Tract, and south Delta.

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DP R14	Enhance Nature-Based Recreation	The Department of Fish and ~~Game~~Wildlife, in cooperation with other public agencies, should collaborate with nonprofits, private landowners, and business partners to expand wildlife viewing, angling, and hunting opportunities.
DP R15	Promote Boating Safety	The Department of Boating and Waterways should coordinate with the U.S. Coast Guard and State and local agencies on an updated marine patrol strategy for the region.
DP R16	Encourage Recreation on Public Lands	Public agencies owning land should increase opportunities, where feasible, for bank fishing, hunting, levee-top trails, and environmental education.
DP R17	Enhance Opportunities for Visitor-Serving Businesses	Cities, counties, and other local and State agencies should work together to protect and enhance visitor-serving businesses by planning for recreation uses and facilities in the Delta, providing infrastructure to support recreation and tourism, and identifying settings for private visitor-serving development and services.
DP R18	Support the Ports of Stockton and West Sacramento	The ports of Stockton and West Sacramento should encourage maintenance and carefully designed and sited development of port facilities.
DP R19	Plan for Delta Energy Facilities	The Energy Commission and Public Utilities Commission should cooperate with the Delta Stewardship Council as described in Water Code section 85307(d) to identify actions that should be incorporated in the Delta Plan by 2017 to address the needs of Delta energy development, storage, and distribution.
Chapter 6		
WQ R1	Protect Beneficial Uses	Water quality in the Delta should be maintained at a level that supports, enhances, and protects beneficial uses identified in the applicable State Water Resources Control Board or regional water quality control board water quality control plans.
WQ R2	Identify Covered Action Impacts	Covered actions should identify any significant impacts to water quality.
WQ R3	Special Water Quality Protections for the Delta	The State Water Resources Control Board or regional water quality control board should evaluate and, if appropriate, propose special water quality protections for priority habitat restoration areas identified in recommendation ER R2~~1~~ or other areas of the Delta where new or increased discharges of pollutants could adversely impact beneficial uses.
WQ R4	Complete Central Valley Drinking Water Policy	The Central Valley Regional Water Quality Control Board should complete the Central Valley Drinking Water Policy by July 2013.
WQ R5	Complete North Bay Aqueduct Alternative Intake Project	The Department of Water Resources should complete the North Bay Aqueduct Alternate Intake Project EIR by December 31, 2012, and begin construction as soon as possible thereafter.
WQ R6	Protect Groundwater Beneficial Uses	The State Water Resources Control Board should complete development of a Strategic Workplan for protection of groundwater beneficial uses, including groundwater use for drinking water, by December 31, 2012.
WQ R7	Participation in CV-SALTS	The State Water Resources Control Board and Central Valley Regional Water Quality Control Board should consider requiring participation by all relevant water users that are supplied water from the Delta or the Delta Watershed or discharge wastewater to the Delta or the Delta Watershed to participate in the Central Valley Salinity Alternatives for Long-Term Sustainability Program.

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WQ R8	Completion of Regulatory Processes, Research, and Monitoring for Water Quality Improvement	The State Water Resources Control Board and the San Francisco Bay and Central Valley Regional Water Quality Control Boards are currently engaged in regulatory processes, research, and monitoring essential to improving water quality in the Delta. In order to achieve the coequal goals, it is essential that these ongoing efforts be completed and if possible accelerated, and that the Legislature and Governor devote sufficient funding to make this possible. The Delta Stewardship Council specifically recommends that: ♦ The State Water Resources Control Board should complete development of the proposed Policy for nutrients for Inland Surface Waters of the State of California by January 1, 2014. ♦ The State Water Resources Control Board and the San Francisco Bay and Central Valley Regional Water Quality Control Boards should prepare and begin implementation of a study plan for the development of objectives for nutrients in the Delta and Suisun Marsh by January 1, 2014. Studies needed for development of Delta and Suisun Marsh nutrient objectives should be completed by January 1, 2016. The Water Boards should adopt and begin implementation of nutrient objectives, either narrative or numeric, where appropriate, for the Delta and Suisun Marsh by January 1, 2018. ♦ The State Water Resources Control Board and the Central Valley Regional Water Quality Control Board should complete the Central Valley Pesticide Total Maximum Daily Load and Basin Plan Amendment for diazinon and chlorpyrifos by January 1, 2013. ♦ The State Water Resources Control Board and the Central Valley Regional Water Quality Control Board prioritize and accelerate the completion of the Central Valley Pesticide Total Maximum Daily Load and Basin Plan Amendment for pyrethroids by January 1, 2016. ♦ The State Water Resources Control Board, San Francisco Bay and Central Valley Regional Water Quality Control Boards have completed Total Maximum Daily Load and Basin Plan Amendments for methylmercury and efforts to support their implementation should be coordinated. Parties identified as responsible for current methylmercury loads or proponents of projects that may increase methylmercury loading in the Delta or Suisun Marsh should participate in control studies or implement site-specific study plans that evaluate practices to minimize methylmercury discharges. The Central Valley Regional Water Quality Control Board should review these control studies by December 31, 2018 and determine control measures for implementation starting in 2020.
WQ R9	Implement Delta Regional Monitoring Program	The State Water Resources Control Board and Regional Water Quality Control Boards should work collaboratively with the Department of Water Resources, Department of Fish and ~~Game~~Wildlife, and other agencies and entities that monitor water quality in the Delta to develop and implement a Delta Regional Monitoring Program that will be responsible for coordinating monitoring efforts so Delta conditions can be efficiently assessed and reported on a regular basis.
WQ R10	Evaluate Wastewater Recycling, Reuse, or Treatment	The Central Valley Regional Water Quality Control Board, consistent with existing water quality control plan policies and water rights law, should require responsible entities that discharge wastewater treatment plant effluent or urban runoff to Delta waters to evaluate whether all or a portion of the discharge can be recycled, otherwise used, or treated in order to reduce contaminant loads to the Delta by January 1, 2014.

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WQ R11	Manage Dissolved Oxygen in Stockton Ship Channel	The State Water Resources Control Board and the Central Valley Regional Water Quality Control Board should complete Phase 2 of the Total Maximum Daily Load and Basin Plan Amendment for dissolved oxygen in the Stockton Ship Channel by January 1, 2015.
WQ R12	Manage Dissolved Oxygen in Suisun Marsh	The State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board should complete the Total Maximum Daily Load and Basin Plan Amendment for dissolved oxygen in Suisun Marsh Wetlands by January 1, 2014.
Chapter 7		
RR R1	Implement Emergency Preparedness and Response	The following actions should be taken by January 1, 2014, to promote effective emergency preparedness and response in the Delta: ♦ Responsible local, State, and federal agencies with emergency response authority should consider and implement the recommendations of the Delta Multi-Hazard Coordination Task Force (Water Code section 12994.5). Such actions should support the development of a regional response system for the Delta. ♦ In consultation with local agencies, the Department of Water Resources should expand its emergency stockpiles to make them regional in nature and usable by a larger number of agencies in accordance with Department of Water Resources' plans and procedures. The Department of Water Resources, as a part of this plan, should evaluate the potential of creating stored material sites by "over-reinforcing" west Delta levees. ♦ Local levee maintaining agencies should consider developing their own emergency action plans, and stockpiling rock and flood fighting materials. ♦ State and local agencies and regulated utilities that own and/or operate infrastructure in the Delta should prepare coordinated emergency response plans to protect the infrastructure from long-term outages resulting from failures of the Delta levees. The emergency procedures should consider methods that also would protect Delta land use and ecosystem.
RR R2	Finance Local Flood Management Activities	The Legislature should create a Delta Flood Risk Management Assessment District with fee assessment authority (including over State infrastructure) to provide adequate flood control protection and emergency response for the regional benefit of all beneficiaries, including landowners, infrastructure owners, and other entities that benefit from the maintenance and improvement of Delta levees, such as water users who rely on the levees to protect water quality. This district should be authorized to: ♦ Identify and assess all beneficiaries of Delta flood protection facilities. ♦ Develop, fund, and implement a regional plan of flood management for both project and non project levees of the Delta, including the maintenance and improvement of levees, in cooperation with the existing reclamation districts, cities, counties, and owners of infrastructure and other interests protected by the levees. ♦ Require local levee maintaining agencies to conduct annual levee inspections per the Department of Water Resources subventions program guidelines, and update levee improvement plans every 5 years. ♦ Participate in the collection of data and information necessary for the

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		prioritization of State investments in Delta levees consistent with RR P1. ♦ Notify residents and landowners of flood risk, personal safety information, and available systems for obtaining emergency information before and during a disaster on an annual basis. ♦ Potentially implement the recommendations of the Delta Multi-Hazard Coordination Task Force (Water Code section 12994.5) in conjunction with local, State, and federal agencies and maintain the resulting regional response system and components and procedures on behalf of SEMS jurisdictions (reclamation district, city, county, and State) that would jointly implement the regional system in response to a disaster event. ♦ Identify and assess critical water supply corridor levee operations, maintenance, and improvements.
RR R3	Fund Actions to Protect Infrastructure from Flooding and Other Natural Disasters	♦ The Public Utilities Commission should immediately commence formal hearings to impose a reasonable fee for flood and disaster prevention on regulated privately owned utilities with facilities located in the Delta. Publicly owned utilities should also be encouraged to develop similar fees. The Public Utilities Commission, in consultation with the Delta Stewardship Council, the Department of Water Resources, and the Delta Protection Commission, should allocate these funds between State and local emergency response and flood protection entities in the Delta. If a new regional flood management agency is established by law, a portion of the local share would be allocated to that agency. ♦ The Public Utilities Commission should direct all regulated public utilities in their jurisdiction to immediately take steps to protect their facilities in the Delta from the consequences of a catastrophic failure of levees in the Delta, in order to minimize the impact on the State's economy. ♦ The Governor, by Executive Order, should direct State agencies with projects or infrastructure in the Delta to set aside a reasonable amount of funding to pay for flood protection and disaster prevention. The local share of these funds should be allocated as described above.
RR P1 (23 CCR Section 5012)[a]	Prioritization of State Investments in Delta Levees and Risk Reduction	(a) Prior to the completion and adoption of the updated priorities developed pursuant to Water Code Section 85306, the interim priorities listed below shall, where applicable and to the extent permitted by law, guide discretionary State investments in Delta flood risk management. Key priorities for interim funding include emergency preparedness, response, and recovery as described in Paragraph (1), as well as Delta levees funding as described in Paragraph (2). (1) Delta Emergency Preparedness, Response, and Recovery: Develop and implement appropriate emergency preparedness, response, and recovery strategies, including those developed by the Delta Multi-Hazard Task Force pursuant to Water Code Section 12994.5. (2) Delta Levees Funding: The priorities shown in the following table are meant to guide budget and funding allocation strategies for levee improvements. The goals for funding priorities are all important, and it is expected that over time, the Department of Water Resources

[a] This policy was revised from the previous version of the Delta Plan, and is not a new policy. The changes were provided in underline fashion to the DSC for convenience in review. Specific changes to all policies are shown in proposed *CCR Title 23, Division 23, Chapter 2* (Appendix B), which includes all additions and strikeouts of the regulations that will be adopted to implement the Delta Plan.

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must balance achievement of those goals. Except on islands planned for ecosystem restoration, improvement of non-project Delta levees to the Hazard Mitigation Plan (HMP) standard may be funded without justification of the benefits. Improvements to a standard above HMP, such as that set by the U.S. Army Corps of Engineers under Public Law 84-99 (P.L. 84-99), may be funded as befits the benefits to be provided, consistent with the Department of Water Resource's current practices and any future adopted investment strategy.

Priorities for State Investment in Delta Integrated Flood Management
Categories of Benefit Analysis

Goals	Localized Flood Protection	Levee Network	Ecosystem Conservation
1	Protect existing urban and adjacent urbanizing areas by providing 200-year flood protection.	Protect water quality and water supply conveyance in the Delta, especially levees that protect freshwater aqueducts and the primary channels that carry fresh water through the Delta.	Protect existing and provide for a net increase in channel-margin habitat.
2	Protect small communities and critical infrastructure of Statewide importance (located outside of urban areas).	Protect flood water conveyance in and through the Delta to a level consistent with the State Plan of Flood Control for project levees.	Protect existing and provide for net enhancement of floodplain habitat.
3	Protect agriculture and local working landscapes.	Protect cultural, historic, aesthetic, and recreational resources (Delta as Place).	Protect existing and provide for net enhancement of wetlands.

(b) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that involves discretionary State investments in Delta flood risk management, including levee operations, maintenance, and improvements. Nothing in this policy establishes or otherwise changes existing levee standards.

~~This policy covers a proposed action that involves discretionary State investments in Delta flood risk management, including levee operations, maintenance, and improvements.~~

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
RR P2 (23 CCR Section 5013)[a]	Require Flood Protection for Residential Development in Rural Areas	(a) New residential development of five or more parcels shall be protected through floodproofing to a level 12 inches above the 100 year base flood elevation, plus sufficient additional elevation to protect against a 55-inch rise in sea level at the Golden Gate, unless the development is located within: (1) Areas that city or county general plans, as of the date of the Delta Plan's adoption, designate for development in cities or their spheres of influence; (2) Areas within Contra Costa County's 2006 voter-approved urban limit line, except Bethel Island; (3) Areas within the Mountain House General Plan Community Boundary in San Joaquin County; or (4) The unincorporated Delta towns of Clarksburg, Courtland, Hood, Locke, Ryde, and Walnut Grove, as shown in Appendix 7. (b) For purposes of Water Code Section 85057.5(a)(3) and Section 5003(j)(1)(E) of this Chapter, this policy covers a proposed action that involves new residential development of five or more parcels that is not located within the areas described in subsection (a).
RR P3 (23 CCR Section 5014)[a]	Protect Floodways	(a) No encroachment shall be allowed or constructed in a floodway, unless it can be demonstrated by appropriate analysis that the encroachment will not unduly impede the free flow of water in the floodway or jeopardize public safety. (b) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that would encroach in a floodway that is not either a designated floodway or regulated stream.
RR P4 (23 CCR Section 5015)[a]	~~Protect~~ Floodplain~~s~~ Protection	(a) No encroachment shall be allowed or constructed in any of the following floodplains unless it can be demonstrated by appropriate analysis that the encroachment will not have a significant adverse impact on floodplain values and functions: (1) The Yolo Bypass within the Delta; (2) The Cosumnes River-Mokelumne River Confluence, as defined by the North Delta Flood Control and Ecosystem Restoration Project (McCormack-Williamson), or as modified in the future by the Department of Water Resources or the U.S. Army Corps of Engineers (Department of Water Resources 2010a); and, (3) The Lower San Joaquin River Floodplain Bypass area, located on the Lower San Joaquin River upstream of Stockton immediately southwest of Paradise Cut on lands both upstream and downstream of the Interstate 5 crossing. This area is described in the Lower San Joaquin River Floodplain Bypass Proposal, submitted to the Department of Water Resources by the partnership of the South Delta Water Agency, the River Islands Development Company,

[a] This policy was revised from the previous version of the Delta Plan, and is not a new policy. The changes were provided in underline fashion to the DSC for convenience in review. Specific changes to all policies are shown in proposed *CCR Title 23, Division 23, Chapter 2* (Appendix B), which includes all additions and strikeouts of the regulations that will be adopted to implement the Delta Plan.

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
		Reclamation District 2062, San Joaquin Resource Conservation District, American Rivers, the American Lands Conservancy, and the Natural Resources Defense Council, March 2011. This area may be modified in the future through the completion of this project. (b) For purposes of Water Code Section 85057.5(a)(3) and Section 5001(j)(1)(E) of this Chapter, this policy covers a proposed action that would encroach in any of the floodplain areas described in subsection (a). (c) This policy is not intended to exempt any activities in any of the areas described in subsection (a) from applicable regulations and requirements of the Central Valley Flood Protection Board.
RR R4[c]	Actions for the Prioritization of State Investments in Delta Levees	The Delta Stewardship Council, in consultation with the Department of Water Resources, the Central Valley Flood Protection Board, the Delta Protection Commission, local agencies, and the California Water Commission, should develop funding priorities for State investments in Delta levees by January 1, 2015. These priorities shall be consistent with the provisions of the Delta Reform Act in promoting effective, prioritized strategic State investments in levee operations, maintenance, and improvements in the Delta for both levees that are a part of the State Plan of Flood Control and non-project levees. Upon completion, these priorities shall be considered for incorporation into the Delta Plan. The priorities should identify guiding principles, constraints, recommended cost share allocations, and strategic considerations to guide Delta flood risk reduction investments, supported by, at a minimum, the following actions to be conducted by the Department of Water Resources, consistent with available funding: ♦ An assessment of existing Delta levee conditions. This should include the development of a Delta levee conditions map based on sound data inputs, including, but not limited to: • Geometric levee assessment • Flow and updated stage-frequency analysis ♦ An island-by-island economics-based risk analysis. This analysis should consider, but not be limited to, values related to protecting: • Island residents/life safety • Property • Value of Delta islands' economic output, including agriculture • State water supply • Critical local, State, federal, and private infrastructure, including aqueducts, state highways, electricity transmission lines, gas/petroleum pipelines, gas fields, railroads, and deepwater shipping channels • Delta water quality • Existing ecosystem values and ecosystem restoration opportunities • Recreation • Systemwide integrity ♦ An ongoing assessment of Delta levee conditions. This should

[c] This recommendation consists of identical text from the previous version of Policy RR P1.

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
		include a process for updating Delta levee assessment information on a routine basis. This methodology should provide the basis for the prioritization of State investments in Delta levees. It should include, but not be limited to, the public reporting of the following items: ♦ Tiered ranking of Delta islands, based on economics-based risk analysis values ♦ Delta levee conditions status report, including a levee conditions map ♦ Inventory of Delta infrastructure assets
RR R5~~4~~	Fund and Implement San Joaquin River Flood Bypass	The Legislature should fund the Department of Water Resources and the Central Valley Flood Protection Board to evaluate and implement a bypass and floodway on the San Joaquin River near Paradise Cut that would reduce flood stage on the mainstem San Joaquin River adjacent to the urban and urbanizing communities of Stockton, Lathrop, and Manteca in accordance with Water Code section 9613(c).
RR R6~~5~~	Continue Delta Dredging Studies	The current efforts to maintain navigable waters in the Sacramento River Deep Water Ship Channel and Stockton Deep Water Ship Channel, led by the U.S. Army Corps of Engineers and described in the Delta Dredged Sediment Long-Term Management Strategy (USACE 2007, Appendix L), should be continued in a manner that supports the Delta Plan and the coequal goals. Appropriate dredging throughout other areas in the Delta for maintenance purposes, or that would increase flood conveyance and provide potential material for levee maintenance or subsidence reversal should be implemented in a manner that supports the Delta Plan and coequal goals. Coordinated use of dredged material in levee improvement, subsidence reversal, or wetland restoration is encouraged.
RR R7~~6~~	Designate Additional Floodways	The Central Valley Flood Protection Board should evaluate whether additional areas both within and upstream of the Delta should be designated as floodways. These efforts should consider the anticipated effects of climate change in its evaluation of these areas.
RR R8~~7~~	Develop Setback Levee Criteria	The Department of Water Resources, in conjunction with the Central Valley Flood Protection Board, the Department of Fish and ~~Game~~Wildlife, and the Delta Conservancy, should develop criteria to define locations for future setback levees in the Delta and Delta watershed.
RR R9~~8~~	Require Flood Insurance	The Legislature should require an adequate level of flood insurance for residences, businesses, and industries in floodprone areas.
RR R10~~9~~	Limit State Liability	The Legislature should consider statutory and/or constitutional changes that would address the State's potential flood liability, including giving State agencies the same level of immunity with regard to flood liability as federal agencies have under federal law.
Chapter 8		
FP R1	Conduct Current Spending Inventory	An inventory of current State and federal spending on programs and projects that do or may achieve the coequal goals will be conducted. Data sources to be used include the CALFED crosscut budget, State bond balance reports, and the annual State budget, among others. Consideration will be given to selecting an independent agency (which could include a non- governmental organization) to conduct the inventory.

POLICY OR RECOMMENDATION NUMBER	SHORT TITLE	POLICY/RECOMMENDATION LANGUAGE
FP R2	Develop Delta Plan Cost Assessment	Costs will be assigned to the projects and programs proposed in the Delta Plan (Chapters 2 through 7) and sources of funding will be identified.
FP R3	Identify Funding Gaps	Current State and federal funding gaps will be identified that are determined to hinder progress towards meeting the coequal goals.

Appendix B
Proposed California Code of Regulations
Title 23, Division 6, Chapter 2

CALIFORNIA CODE OF REGULATIONS
TITLE 23. WATERS.
DIVISION 6. DELTA STEWARDSHIP COUNCIL.
CHAPTER 2. CONSISTENCY WITH REGULATORY POLICIES CONTAINED IN THE DELTA PLAN.

Note: The originally proposed regulation text, sections 5001 through 5016, is set forth in normal type. The modifications are shown in underline to indicate additions and strikeout to indicate deletions

Article 1. Definitions.

§ 5001. ~~General~~ Definitions.

As used in this division, the terms listed below shall have the meanings noted:

(a) "Adaptive management" means a framework and flexible decision making process for ongoing knowledge acquisition, monitoring, and evaluation leading to continuous improvement in management planning and implementation of a project to achieve specified objectives.

(b) "Agricultural water management plan" means a plan prepared, adopted, and updated by an agricultural water supplier pursuant to the Agricultural Water Management Planning Act, Water Code section 10800 et seq.

(c) "Agricultural water supplier" refers to both "agricultural retail water suppliers" and "agricultural wholesale water suppliers" under the Water Code, but not the Department of Water Resources or the United States Bureau of Reclamation, and includes both of the following:

(1) A water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water; and,

(2) A water supplier or contractor for water, regardless of the basis of the water right, that distributes or sells water for ultimate resale to customers.

(d) "Base Flood" means the flood that has a 1-percent probability of being equaled or exceeded in any given year (also referred to as the 100-year flood).

(e) "Base Flood Elevation" (BFE) means the water surface elevation associated with the base flood.

(f~~d~~) "Best available science" means the best scientific information and data for informing management and policy decisions. Best available science shall be consistent with the guidelines and criteria found in Appendix 1A.~~Best available science has all of the following attributes:~~

~~(1) It is specific to the decision being made and the time frame available for making that decision; and,~~

~~(2) It is consistent with the scientific process, including the following elements:~~

~~(A) Well-stated objectives;~~

~~(B) A clear conceptual or mathematical model;~~

~~(C) A good experimental design with standardized methods for data collection;~~

~~(D) Statistical rigor and sound logic for analysis and interpretation; and,~~

~~(E) Clear documentation of methods, results, and conclusions.~~

~~(3) It is developed and applied in a manner that meets all of the following criteria:~~

~~(A) Relevance;~~

~~(B) Inclusiveness;~~

~~(C) Objectivity;~~

~~(D) Transparency and Openness;~~

~~(E) Timeliness; and,~~

~~(F) Peer Review.~~

~~A more detailed description of best available science, along with guidelines and criteria for identifying or developing best available science, is hereby attached as Appendix 1A.~~

(g) "Central Valley Flood Protection Board" or "Board" means the Central Valley Flood Protection Board (formerly The Reclamation Board) of the California Resources Agency of the State of California as provided in Water Code Section 8521.

(h~~e~~)"Coequal goals" means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. In addition, "achievement" for ~~these respective purposes~~the purpose of determining whether a plan, program, or project meets the definition of a "covered action" under Section 5001(j) is further defined as follows:

(1) "Achieving the coequal goal of providing a more reliable water supply for California" means all of the following:

(A) Better matching the state's demands for reasonable and beneficial uses of water to the available water supply. This will be done by promoting, improving, investing in, and implementing projects and programs that improve the resiliency of the state's water systems, increase water efficiency and conservation, increase water recycling and use of advanced water technologies, improve groundwater management, expand storage, and improve Delta conveyance and operations. The evaluation of progress toward improving reliability will take into account the inherent variability in water demands and supplies across California;

(B) Regions that use water from the Delta watershed will reduce their reliance on this water for reasonable and beneficial uses, and improve regional self-reliance, consistent with existing water rights and the State's area of origin statutes and Reasonable Use and Public Trust Doctrines. This will be done by improving, investing in, and implementing local and regional projects and programs that increase water conservation and efficiency, increase water recycling and use of advanced water technologies, expand storage, improve groundwater management, and enhance regional coordination of local and regional water supply development efforts; and,

(C) Water exported from the Delta will more closely match water supplies available to be exported, based on water year type and consistent with the coequal goal of protecting, restoring, and enhancing the Delta ecosystem. This will be done by improving conveyance in the Delta and expanding groundwater and surface storage both north and south of the Delta to optimize diversions in

wet years when more water is available and conflicts with the ecosystem less likely, and limit diversions in dry years when conflicts with the ecosystem are more likely. Delta water that is stored in wet years will be available for water users during dry years, when the limited amount of available water must remain in the Delta, making water deliveries more predictable and reliable. In addition, these improvements will decrease the vulnerability of Delta water supplies to disruption by natural disasters, such as, earthquakes, floods, and levee failures.

(2) "Achieving the coequal goal of protecting, restoring, and enhancing the Delta ecosystem" means successfully establishing a resilient, functioning estuary and surrounding terrestrial landscape capable of supporting viable populations of native resident and migratory species with diverse and biologically appropriate habitats, functional corridors, and ecosystem processes.

(3) "Achieving the coequal goals in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place" means accepting that change, including change associated with achieving the coequal goals, will not cease, but that the fundamental characteristics and values that contribute to the Delta's special qualities and that distinguish it from other places can be preserved and enhanced while accommodating these changes. In this regard, the following are core strategies for protecting and enhancing the unique values that distinguish the Delta and make it a special region:

(A) Designate the Delta as a special place worthy of national and state attention;
(B) Plan to protect the Delta's lands and communities;
(C) Maintain Delta agriculture as a primary land use, a food source, a key economic sector, and a way of life;
(D) Encourage recreation and tourism that allow visitors to enjoy and appreciate the Delta and that contribute to its economy;
(E) Sustain a vital Delta economy that includes a mix of agriculture, tourism, recreation, ~~commercial and other~~ related industries and business, and vital components of state and regional infrastructure; and,
(F) Reduce flood and other risks to people, property, and other interests in the Delta.

(i~~f~~) "Commercial recreational visitor-serving uses" means a land use designation that describes visitor serving uses, accommodations, restaurants, and shops, that respect the rural character and natural environmental setting. These uses also include campgrounds and commercial recreational facilities.

(j)(1) "Covered action" means a plan, program, or project that meets all of the following criteria (which are collectively referred to as covered action screening criteria):

(A) Is a "project," as defined pursuant to Section 21065 of the Public Resources Code;

(B) Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh;

(C) Will be carried out, approved, or funded by the state or a local public agency;

(D) Will have a significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and state interests in the Delta; and,

(E) Is covered by one or more provisions of the Delta Plan, which for these purposes, means one or more of the regulatory policies contained in Article 3.

(2) "Covered action" does not include any plan, program, or project that is exempted pursuant to Water Code Section 85057.5(b).

(3) A state or local public agency that proposes to carry out, approve, or fund a plan, program, or project that may be subject to this chapter must determine whether that proposed plan, program, or project is a covered action. That determination, which is subject to judicial review, must be reasonable, made in good faith, and consistent with the Delta Reform Act and this chapter.

(4) Nothing in the application of the definition of a "covered action" shall be interpreted to authorize the abrogation of any vested right whether created by statute or by common law.

(k~~g~~) "Delta" means the Sacramento-San Joaquin Delta as defined in Section 12220 of the Public Resources Code and the Suisun Marsh, as defined in Section 29101 of the Public Resources Code.

(l~~h~~) "Delta Plan" means the comprehensive, long-term management plan for the Delta to further the achievement of the coequal goals, as adopted by the Delta Stewardship Council in accordance with the Sacramento-San Joaquin Delta Reform Act of 2009.

(m) "Designated Floodway" means those floodways, as defined in California Code of Regulations, Title 23, Section 4 (i), under the jurisdiction of the Central Valley Flood Protection Board.

(n~~i~~) "Encroachment" means any obstruction or physical intrusion by construction of works or devices, planting or removal of vegetation, or by any means for any purpose, into or otherwise affecting a floodway or floodplain.

(o~~j~~) "Enhancement" or "enhancing", for purposes of section 5001(h~~e~~)(2), means improving existing desirable habitat and natural processes. Enhancement may include, by way of example, flooding the Yolo Bypass more often to support native species or to expand or better connect existing habitat areas. Enhancement includes many fish and wildlife management practices, such as managing wetlands for waterfowl production or shorebird habitat, installing fish screens to reduce entrainment of fish at water diversions, or removing barriers that block migration of fish to upstream spawning habitats.

(p~~k~~)"Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

(q~~l~~) "Floodplain" means any land area susceptible to being inundated by flood waters from any source.

(r~~m~~) "Floodplain values and functions" has the same meaning as set forth in 33 Code of Federal Regulations Section 320.4(l)(1).

(s) "Floodproofing" means any combination of structural and nonstructural additions, changes or adjustments appropriate for residential structures, which reduce or eliminate risk of flood damage to real estate, improved real property, or structures with their contents.

(t~~n~~) "Floodway" means the portion of the floodplain that is effective in carrying flow (that is, the channel of a river or other watercourse and the adjacent land areas that convey flood waters.)

(u~~o~~) "Government-sponsored flood control program to reduce risks to people, property , and State interests in the Delta" means any state or federal strategy, project, approval, funding, or other effort

that is intended to reduce the likelihood and/or consequences of flooding of real property and/or improvements, including risks to people, property, and State interests in the Delta, that is carried out pursuant to applicable law, including, but not limited to the following:

(1) State Water Resources Law of 1945, Water Code Section 12570 et seq.;

(2) Sacramento-San Joaquin River Flood Control Projects (Flood Control Act of 1941, P.L. 77-228);

(3) Local Plans of Flood Protection prepared pursuant to the Local Flood Protection Planning Act (Water Code Section 8200 et seq.), that are consistent with the Central Valley Flood Protection Plan pursuant to Water Code Section 9612 ~~(Water Code Section 8201)~~;

(4) Central Valley Flood Protection Plan (Water Code Section 9600 et seq.);

(5) Subventions Program, Special Projects Program (Water Code Section 12300 et seq.);

(6) Way Bill 1973-Subventions Program, Special Projects Program (Water Code Section 12980 et seq.);

(7) Central Valley Flood Protection Board Authority (California Code of Regulations, Title 23, Division 1); and,

(8) National Flood Insurance Program (National Flood Insurance Act of 1968, 42 U.S.C. 4001 et seq., P.L. 90-448).

(v) "Nonnative invasive species", for purposes of Section 5009, means species that establish and reproduce rapidly outside of their native range and may threaten the diversity or abundance of native species through competition for resources, predation, parasitism, hybridization with native populations, introduction of pathogens, or physical or chemical alteration of the invaded habitat.

(w) "Non-project levee" means a local levee owned or maintained by a local agency or private owner that is not a project facility under the State Water Resources Law of 1945. Chapter 1 (commencing with Water Code Section 12570) and Chapter 2 (commencing with Section 12639 of Part 6 of the Water Code).

(x) "Project levee" means a federal flood control levee that is a project facility under the State Water Resources Law of 1945 Chapter 1 (commencing with Water Code Section 12570) and Chapter 2 (commencing with Section 12639 of Part 6 of the Water Code).

(y) "Proposed action" means a plan, program, or project that meets the covered action screening criteria listed in Section 5001(j)(1)(A) through (E). Proposed action is also a "covered action", and therefore, subject to compliance with the regulatory policies contained in Articles 2 and 3—if the proposed action meets the covered action screening criterion listed in Section 5001(j)(1)(E).

(z~~p~~) "Protection" or "protecting", for purposes of Section 5001(g~~e~~)(2), means preventing harm to the ecosystem, which could include preventing the conversion of existing habitat, the degradation of water quality, irretrievable conversion of lands suitable for restoration, or the spread of invasive nonnative species.

(aa) "Regulated stream" means those streams identified in Table 8.1 of California Code of Regulations, Title 23, Section 112, under the jurisdiction of the Board.

(bb~~q~~) “Restoration” or “restoring,” for purposes of Section 5001(h~~e~~)(2), has the same meaning as in Water Code Section 85066. Restoration actions may include restoring interconnected habitats within the Delta and its watershed, restoring more natural Delta flows, or improving ecosystem water quality.

(cc~~r~~) “Setback levee” means a new levee constructed behind an existing levee which allows for removal of a portion of the existing levee and creation of additional floodplain connected to the stream. In the Delta, a “setback levee” may not necessarily result in removal of the existing levee.

(dd~~s~~) “Significant Impact” for purpose of determining whether a project meets the definition of a “covered action” under Section 5001(j)(1)(D), means a substantial positive or negative impact on the achievement of one or both of the coequal goals or the implementation of a government-sponsored flood control program to reduce risks to people, property, and state interests in the Delta, that is directly or indirectly caused by a project on its own or when the project’s incremental effect is considered together with the impacts of other closely-related past, present, or reasonably foreseeable future projects. ~~“Significant impact” means a change in baseline conditions that is directly or indirectly caused by a project and that, on its own, or when considered “cumulatively” in connection with the effects of past projects, other current projects, and probable future projects, will have a substantial impact on the achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and State interests in the Delta. The substantial impact may be positive (for example, an ecosystem restoration action that would provide benefits to endangered fish species), negative (for example, a water management action that would result in the pollution of Delta waters or increase the risk of introducing harmful nonnative species), or both positive and negative (for example, a flood protection action that would remove vegetation on levees in an effort to strengthen them, but in so doing, would also reduce riparian habitat critical to recovery of native fish species).~~ The following categories of projects will not have a significant impact for this purpose:

(1) “Ministerial” projects exempted from CEQA, pursuant to Public Resources Code Section 21080(b)(1);

(2) “Emergency” projects exempted from CEQA, pursuant to Public Resources Code Section 21080(b)(2)-(4);

(3) Temporary water transfers of up to one year in duration. This provision shall remain in effect only through December 31, 2016, and as of January 1, 2017, is repealed, unless the Council acts to extend the provision prior to that date. The Council contemplates that any extension would be based upon the Department of Water Resources and the State Water Resources Control Board’s participation with stakeholders to identify and implement transfer measures, as recommended in the Delta Plan’s Water Resources Recommendation Number 15 (WRR 15);

(4) Other projects exempted from CEQA, unless there are unusual circumstances indicating a reasonable possibility that the project will have a significant impact under Water Code Section 85057.5(a)(4), as further defined by Section 5001(dd) of this Chapter. Examples of unusual circumstances could arise in connection with, among other things:

(A) Local government general plan amendments for the purpose of achieving consistency with the Delta Protection Commission’s Land Use and Resource Management Plan; and,

(B) Small-scale habitat restoration projects, as referred to in CEQA Guidelines 15333, proposed in important restoration areas, but which are inconsistent with the Delta Plan’s policy related to appropriate habitat restoration for a given land elevation (Section 5006 of this Chapter).

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(ee~~t~~) “Urban area” means a developed area in which there are 10,000 residents or more.

(ff~~u~~) “Urbanizing area” means a developed area or an area outside of a developed area that is planned or anticipated to have 10,000 residents or more within the next 10 years.

(gg~~v~~) “Urban water management plan” means a plan prepared, adopted, and updated by an urban water supplier pursuant to the Urban Water Management Planning Act, Water Code Section 10610 et seq.

(hh~~w~~) “Urban water supplier” refers to both “urban retail water suppliers” and “urban wholesale water suppliers”:

(1) “Urban retail water supplier” means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annual at retail for municipal purposes.

(2) “Urban wholesale water supplier” means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of potable water annually at wholesale for municipal purposes.

(ii~~x~~) “Water supplier” refers to both “urban water suppliers” and “agricultural water suppliers”, but for purposes of Section 5003~~5~~, does not include agricultural water suppliers during the time that they may be exempted by Section 10853 of the Water Code from the requirements of Parts 2.55 and 2.8 of Division 6 of the Water Code.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85057.5, 85059, 85058, 85066, 85020, 85054, 85052, 85302(g), 85308, 85300, and 10608.12, Water Code.

~~§ 5002. Proposed Action Defined.~~

~~(a) “Proposed action” means a plan, program, or project that meets the covered action screening criteria listed in Section 5003 (a)(1) through (4).~~

~~(b) A proposed action is also a “covered action”, and therefore, subject to compliance with the regulatory policies contained in Articles 2 and 3—if the proposed action meets the covered action screening criterion listed in Section 5003(a)(5).~~

~~NOTE: Authority cited: Section 85210(i), Water Code.~~

~~Reference: Section 85057.5, Water Code.~~

~~§ 5003. Covered Action Defined.~~

~~(a) “Covered action” means a plan, program, or project that meets all of the following criteria (which are collectively referred to as covered action screening criteria):~~

~~(1) Is a “project,” as defined pursuant to Section 21065 of the Public Resources Code;~~

~~(2) Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh;~~

~~(3) Will be carried out, approved, or funded by the state or a local public agency;~~

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(4) Will have a significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and state interests in the Delta; and,

(5) Is covered by one or more provisions of the Delta Plan, which for these purposes, means one or more of the regulatory policies contained in Article 3.

(b) "Covered action" does not include any of the following:

(1) A plan, program, or project that is exempted pursuant to Water Code Section 85057.5(b);

(2) A plan, program, or project that is exempted pursuant to one or more of the following administrative exemptions, as listed in Chapter 2 of the Delta Plan, because they will not have a significant impact under Water Code Section 85057.5(a)(4), as further defined by Section 5001(s) of this Chapter :

(A) "Ministerial" projects exempted from CEQA, pursuant to Public Resources Code Section 21080(b)(1);

(B) "Emergency" projects exempted from CEQA, pursuant to Public Resources Code Section 21080(b)(2)-(4);

(C) Temporary water transfers of up to one year in duration. This exemption shall remain in effect only through December 31, 2014, and as of January 1, 2015, is repealed, unless the Council acts to extend the exemption prior to that date. The Council contemplates that any extension would be based upon the Department of Water Resources and the State Water Resources Control Board's participation with stakeholders to identify and implement transfer measures, as recommended in the Delta Plan's Water Resources Recommendation Number 15;

(D) Other projects that are exempt under CEQA statutes or guidelines, unless there are unusual circumstances indicating that the project may have a significant impact under Water Code Section 85057.5(a)(4), as further defined by Section 5001(n) of this Chapter. Examples of unusual circumstances could arise in connection with, among other things:

(i) Local government general plan amendments for the purpose of achieving consistency with the Delta Protection Commission's Land Use and Resource Management Plan; and,

(ii) Small-scale habitat restoration projects proposed in important restoration areas, but which are inconsistent with the Delta Plan's policy related to appropriate habitat restoration for a given land elevation (Section 5008 of this Chapter).

(c) A state or local public agency that proposes to carry out, approve, or fund a plan, program, or project that may be subject to this chapter must determine whether that proposed plan, program, or project is a covered action. That determination, which is subject to judicial review, must be reasonable, made in good faith, and consistent with the Delta Reform Act and this chapter.

(d) Nothing in the application of the definition of a "covered action" shall be interpreted to authorize the abrogation of any vested right whether created by statute or by common law.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Section 85057.5, Water Code.

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Article 2. Certifications of Consistency

§ 5002~~4~~4. Detailed Findings to Establish Consistency with the Delta Plan~~Contents of Certifications of Consistency~~.

(a) This policy specifies what must be addressed in a certification of consistency filed by a state or local public agency with regard to a covered action. This policy only applies after a "proposed action" has been determined by a state or local public agency to be a covered action because it is covered by one or more of the regulatory policies contained in Article 3. Inconsistency with this policy may be the basis for an appeal.

(b) Certifications of consistency must include detailed findings that address each of the following requirements:

(1) Covered actions, in order to ~~must~~ be consistent with the Delta Plan~~coequal goals~~, must be consistent~~as well as~~ with this regulatory policy and with each of the regulatory policies contained in Article 3 implicated by the covered action. The Delta Stewardship Council acknowledges that in some cases, based upon the nature of the covered action, full consistency with all relevant regulatory policies may not be feasible. In those cases, the agency that files the certification of consistency may nevertheless determine that the covered action is consistent with the Delta Plan because on whole, that action is consistent with the coequal goals. That determination must include a clear identification of areas where consistency with relevant regulatory policies is not feasible, an explanation of the reasons why it is not feasible, and an explanation of how the covered action nevertheless, on whole, is consistent with the coequal goals. That determination is subject to review by the Delta Stewardship Council on appeal;

(2) Covered actions not exempt from CEQA must include applicable feasible mitigation measures identified in the Delta Plan's Program Environmental Impact Report (unless the measure(s) are within the exclusive jurisdiction of an agency other than the agency that files the certification of consistency), or substitute mitigation measures that the agency that files the certification of consistency finds are equally or more effective;

(3) As relevant to the purpose and nature of the project, all covered actions must document use of best available science ~~(as described in Appendix 1A)~~;

(4) Ecosystem restoration and water management covered actions must include adequate provisions, appropriate to the scope of the covered action, to assure continued implementation of adaptive management. This requirement shall be satisfied through both of the following:

(A) An adaptive management plan that describes the approach to be taken consistent with the adaptive management framework in Appendix 1B; and

(B) Documentation of access to adequate resources and delineated authority by the entity responsible for the implementation of the proposed adaptive management process.

(c) A conservation measure proposed to be implemented pursuant to a natural community conservation plan or a habitat conservation plan that was:

(1) Developed by a local government in the Delta, and;

(2) Approved and permitted by the Department of Fish and Wildlife prior to the date of the Delta Plan's adoption

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Is deemed to be consistent with Sections ~~5007~~ 5005 through ~~5011~~ 5009 of this chapter if the certification of consistency filed with regard to the conservation measure includes a statement confirming the nature of the conservation measure from the Department of Fish and Wildlife.

~~(5) If the agency that files the certification of consistency will carry out the covered action, the certification of consistency must also include a certification from that agency that the covered action complies with all applicable laws pertaining to water resources, biological resources, flood risk, and land use and planning. If the agency that files the certification of consistency will not carry out the covered action (but will approve or fund the action), the certification of consistency must include a certification from that agency that the covered action complies with all applicable laws of the type listed above over which that agency has enforcement authority or with which that agency can require compliance.~~

NOTE: Authority cited: Sections 85210(i), Water Code.

Reference: Sections 85225, 85020, 85054, 85302(g) and 85308, Water Code.

Article 3. Consistency with the Regulatory Policies Contained in the Delta Plan.

§ 5003~~5~~. Reduce Reliance on the Delta through Improved Regional Water Self-Reliance.

~~(a) The policy of the State of California is to reduce reliance on the Delta in meeting future water supply needs and that each region that depends on water from the Delta watershed shall improve its regional self-reliance. Success in achieving the statewide policy of reduced reliance on the Delta and improving regional self-reliance will be demonstrated through a significant reduction in the amount of water used, or in the percentage of water used, from the Delta watershed.~~

~~(b) The intent of the policy set forth in subsection (c) is to ensure that urban and agricultural water suppliers are taking appropriate actions to contribute to the achievement of reduced reliance on the Delta by complying with the statutory requirements of SB X7 7 (Water Code, Division 6, Parts 2.55, 2.6, and 2.8) and other water management laws, and by implementing programs and projects which are locally cost effective and technologically feasible for urban and agricultural water suppliers to increase water use efficiency and conservation and diversify local water supply portfolios.~~

(a~~c~~) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

(1) One or more water suppliers that would receive water as a result of the export, transfer or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c~~e~~);

(2) That failure has significantly caused the need for the export, transfer or use; and

(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.

(b~~d~~)For purposes of Water Code Section 85057.5(a)(3) and Section 500~~13~~(j~~a~~)(~~15~~)(E) of this Chapter, this policy covers a proposed action to export water from, transfer water through, or use water in the Delta, but does not cover any such action unless one or more water suppliers would receive water as a result of the proposed action.

(c~~e~~)(1) Water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

(B) Identified, evaluated and commenced implementation ,consistent with the implementation schedule set forth in the management ~~p~~Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and,

(C) Included in the ~~p~~Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code Section 1011(a).

(2) Programs and projects that reduce reliance could include, but are not limited to, improvements in water use efficiency, water recycling, storm water capture and use, advanced water technologies, conjunctive use projects, local and regional water supply and storage projects, and improved regional coordination of local and regional water supply efforts.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 10608, 10610.2, 10610.4, 10801, 10802, 85001(c), 85004(b), 85020(a), 85020(d), 85020(h), 85021, 85023, 85054, 85300, 85302(d), 85303, and 85304, Water Code.

§ 5004~~5~~6. ~~Improved~~ Transparency in Water Contracting.

(a) The contracting process for water from the State Water Project (SWP) and/or the Central Valley Project (CVP) must be done in a publicly transparent manner consistent with applicable polices of the Department of Water Resources and the Bureau of Reclamation referenced below.

(b) For purposes of Water Code section 85057.5(a)(3) and Section 5001~~3~~(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers the following:

(1) With regard to water from the State Water Project, a proposed action to enter into or amend a water supply or water transfer contract subject to Department of Water Resources Guidelines 03-09 and/or 03-10 (each dated July 3, 2003), which are attached as Appendix 2A; and,

(2) With regard to water from the Central Valley Project, a proposed action to enter into or amend a water supply or water transfer contract subject to Section 226 of P.L. 97-293, as amended or Section 3405(a)(2)(B) of the Central Valley Project Improvement Act, Title XXXIV of Public Law 102-575, as amended, which are attached as Appendix 2B, and Rules and Regulations promulgated by the Secretary of the Interior to implement these laws.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85021, 85300 and 85302, Water Code.

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§ 5005~~7~~. Update Delta Flow Objectives.

~~(a) Development, implementation, and enforcement of new and updated flow objectives for the Delta and high priority tributaries are key to the achievement of the coequal goals. The State Water Resources Control Board should update the Bay-Delta Water Quality Control Plan objectives as follows:~~

~~(1) By June 2, 2014, adopt and implement updated flow objectives for the Delta that are necessary to achieve the coequal goals;~~

~~(2) By June 2, 2018, adopt, and as soon as reasonably possible, implement flow objectives for high-priority tributaries in the Delta watershed that are necessary to achieve the coequal goals; and,~~

~~(3) For purposes of paragraph (2), State Water Resources Control Board staff will work with the Delta Stewardship Council and the Department of Fish and Game to determine priority streams. As an example, priority streams could include the Merced River, Tuolumne River, Stanislaus River, Lower San Joaquin River, Deer Creek (tributary to Sacramento River), Lower Butte Creek, Mill Creek (tributary to Sacramento River), Cosumnes River, and American River.~~

~~(b) Flow objectives could be implemented through several mechanisms including negotiation and settlement, Federal Energy Regulatory Commission ("FERC") relicensing, or water rights hearing. Implementation through water rights hearings or FERC relicensing is expected to take longer than the deadlines listed in paragraphs (1) and (2) of subsection (a).~~

(a~~c~~) ~~Prior to the establishment of revised flow objectives as described in subsections (a) and (b), the existing~~The State Water Resources Control Board's Bay Delta Water Quality Control Plan flow objectives shall be used to determine consistency with the Delta Plan. If and when the flow objectives are revised by the State Water Resources Control Board~~After the flow objectives are revised~~, the revised flow objectives shall be used to determine consistency with the Delta Plan.

(b~~d~~)For purposes of Water Code section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, the policy set forth in subsection (c) covers a proposed action that could significantly affect flow in the Delta.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85054, 85086, 85087, 85300 and 85302, Water Code.

§ 5006~~8~~. Restore Habitats at Appropriate Elevations.

(a) Habitat restoration must be carried out consistent with Appendix 3, which is Section II of the Draft Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions (Department of Fish and Wildlife~~Game~~ 2011)~~, with minor alterations. It is hereby attached as Appendix 3~~. The elevation map attached as Appendix 4 should be used as a guide for determining appropriate habitat restoration actions based on an area's elevation. If a proposed habitat restoration action is not consistent with Appendix 4, the proposal shall provide rationale for the deviation based on best available science.

(b) For purposes of Water Code Section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers a proposed action that includes habitat restoration.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85054, 85300 and 85302, Water Code.

§ 5007~~9~~. Protect Opportunities to Restore Habitat.

(a) Within the priority habitat restoration areas depicted in Appendix 5, ~~S~~significant adverse impacts to the opportunity to restore habitat ~~at the elevations shown in Appendix 4~~as described in Section 5006, must be avoided or mitigated.

~~(b)(1) Mitigation shall be determined, in consultation with the Department of Fish and Game, considering the size of the area impacted by the covered action and the type and value of habitat that could be restored on that area, taking into account existing and proposed restoration plans, landscape attributes, the elevation map shown in Appendix 4 and other relevant information about habitat restoration opportunities of the area.~~

~~(2) Mitigation may include the restoration and/or permanent protection of other areas to provide habitats that could have been restored at the site.~~

(b) Impacts referenced in subsection (a) will be deemed to be avoided or mitigated if the project is designed and implemented so that it will not preclude or otherwise interfere with the ability to restore habitat as described in Section 5006.

(c) Impacts referenced in subsection (a) shall be mitigated to a point where the impacts have no significant effect on the opportunity to restore habitat as described in Section 5006. Mitigation shall be determined, in consultation with the Department of Fish and Wildlife, considering the size of the area impacted by the covered action and the type and value of habitat that could be restored on that area, taking into account existing and proposed restoration plans, landscape attributes, the elevation map shown in Appendix 4 and other relevant information about habitat restoration opportunities of the area.

(d~~c~~) For purposes of Water Code Section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers proposed actions in the priority habitat restoration areas depicted in Appendix 5. It does not cover proposed actions outside those areas.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85054, 85300, 85302 and 85305, Water Code.

§ 50~~10~~8. Expand Floodplains and Riparian Habitats in Levee Projects.

(a) Levee projects must evaluate and where feasible incorporate alternatives, including the use of setback levees, to increase floodplains and riparian habitats. Evaluation of setback levees in the Delta shall be required only in the following areas (shown in Appendix 8): (1) The Sacramento River between Freeport and Walnut Grove, the San Joaquin River from the Delta boundary to Mossdale, Paradise Cut, Steamboat Slough, Sutter Slough; and the North and South Forks of the Mokelumne River, and (2) Urban levee improvement projects in the cities of West Sacramento and Sacramento.~~When available and incorporated into this policy, criteria developed by the Department of Water Resources, in conjunction with the Central Valley Flood Protection Board, the Department of Fish and Game, and the Sacramento-San Joaquin Delta Conservancy—as recommended in Recommendation Number 7 of Chapter 7 of the Delta Plan—must be used to determine appropriate locations for setback levees for purposes of this policy.~~

(b) For purposes of Water Code Section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers a proposed action to construct new levees or substantially rehabilitate or reconstruct existing levees.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85054, 85300, 85302 and 85305, Water Code.

§ 5009~~11~~. Avoid Introductions of and Habitat Improvements for Invasive Nonnative Species.

(a) The potential for new introductions of, or improved habitat conditions for~~,~~ nonnative invasive species, striped bass, or bass must be fully considered and avoided or mitigated in a way that appropriately protects the ecosystem.

(b) For purposes of Water Code Section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers a proposed action that has the reasonable probability of introducing, or improving habitat conditions for, nonnative invasive species.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85054, 85300, and 85302, Water Code.

§ 5010~~2~~. Locate New Urban Development Wisely.

(a) New ~~urban~~residential, commercial, and industrial development~~, including residential, commercial, and industrial uses,~~ must be limited to the following areas, as shown in Appendix 6 and Appendix 7:

(1) Areas that city or county general plans as of the date of the Delta Plan's adoption, designate for residential, commercial, and industrial development in cities or their spheres of influence;

(2) Areas within Contra Costa County's 2006 voter-approved urban limit line, except no new ~~urban~~ residential, commercial, and industrial development may occur on Bethel Island unless it is consistent with the Contra Costa County general plan effective as of the date of the Delta Plan's adoption;

(3) Areas within the Mountain House General Plan Community Boundary in San Joaquin County; or,

(4) The unincorporated Delta towns of Clarksburg, Courtland, Hood, Locke, Ryde, and Walnut Grove.

(b) Notwithstanding subsection (a), new residential, commercial, and industrial development is permitted outside the areas described in subsection (a) if it is consistent with the land uses designated in county general plans as of the date of the Delta Plan's adoption, and is otherwise consistent with this chapter.

(c~~b~~) For purposes of Water Code Section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers proposed actions that involve new ~~urban~~ residential, commercial, and industrial development~~, including residential, commercial, and industrial uses,~~ that is not located within the areas described in subsection (a). In addition, this policy covers any such action on Bethel Island that is inconsistent with the Contra Costa County general plan effective as of the date of the Delta Plan's adoption. This policy does not cover commercial recreational visitor-serving uses or facilities for processing of local crops or that provide essential services to local farms, which are otherwise consistent with this chapter.

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(d~~c~~)This policy is not intended in any way to alter the concurrent authority of the Delta Protection Commission to separately regulate development in the Delta's Primary Zone.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85300, 85302, and 85305, Water Code.

§ 5011~~3~~. Respect Local Land Use When Siting Water or Flood Facilities or Restoring Habitats.

(a) Water management facilities, ecosystem restoration, and flood management infrastructure must be sited to avoid or reduce conflicts with existing uses or those~~planned~~ uses described or depicted in city and county general plans for their jurisdictions or spheres of influence when feasible, considering comments from local agencies and the Delta Protection Commission. Plans for ecosystem restoration must consider sites on existing public lands, when feasible and consistent with a project's purpose, before privately owned sites are purchased. Measures to mitigate conflicts with adjacent uses may include, but are not limited to, buffers to prevent adverse effects on adjacent farmland.

(b) For purposes of Water Code Section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers proposed actions that involve the siting of water management facilities, ecosystem restoration, and flood management infrastructure.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85022, 85054, 85300, and 85305, Water Code.

§ 5012~~4~~. Prioritization of State Investments in Delta Levees and Risk Reduction.

~~(a) The Delta Stewardship Council, in consultation with the Department of Water Resources, the Central Valley Flood Protection Board, the Delta Protection Commission, local agencies, and the California Water Commission, shall develop funding priorities for State investments in Delta levees by January 1, 2015. These priorities shall be consistent with the provisions of the Delta Reform Act in promoting effective, prioritized strategic State investments in levee operations, maintenance, and improvements in the Delta for both levees that are a part of the State Plan of Flood Control and non-project levees. Upon completion, these priorities shall be considered for incorporation into the Delta Plan and these regulations.~~

~~(b) The priorities developed pursuant to subsection (a) shall identify guiding principles, constraints, recommended cost share allocations and strategic considerations to guide Delta flood risk reduction investments, supported by, at a minimum, the following actions to be conducted by the Department of Water Resources, consistent with available funding:~~

~~(1) An assessment of existing Delta levee conditions. This shall include the development of a Delta levee conditions map based on sound data inputs, including, but not limited to, both of the following:~~

~~(A) Geometric levee assessment; and,~~

~~(B) Flow and updated stage-frequency analysis.~~

~~(2) An island-by-island economics-based risk analysis. This analysis shall consider, but not be limited to, values related to protecting all of the following:~~

~~(A) Island residents/life safety;~~

~~(B) Property;~~

~~(C) Value of Delta islands' economic output, including agriculture;~~

~~(D) State water supply;~~

~~(E) Critical local, State, federal, and private infrastructure, including aqueducts, state highways, electricity transmission lines, gas/petroleum pipelines, gas fields, railroads, and deepwater shipping channels;~~

~~(F) Delta water quality;~~

~~(G) Existing ecosystem values and ecosystem restoration opportunities;~~

~~(H) Recreation; and,~~

~~(I) Systemwide integrity.~~

~~(3) An ongoing assessment of Delta levee conditions. This shall include a process for updating Delta levee assessment information on a routine basis.~~

~~(c) The methodology described in subsection (b) shall provide the basis for the prioritization of State investments in Delta levees. It shall include, but not be limited to, the public reporting of all of the following items:~~

~~(1) Tiered ranking of Delta islands based on economics-based risk analysis values;~~

~~(2) Delta levee conditions status report, including a levee conditions map; and,~~

~~(3) Inventory of Delta infrastructure assets.~~

(a~~d~~)Prior to the completion and adoption of the updated priorities developed pursuant to Water Code Section 85306~~subsection (a)~~, the interim priorities listed below shall, where applicable and to the extent permitted by law, guide discretionary State investments in Delta flood risk management. Key priorities for interim funding include emergency preparedness, response, and recovery as described in Paragraph (1), as well as Delta levees funding as described in Paragraph (2).

(1) Delta Emergency Preparedness, Response, and Recovery: Develop and implement appropriate emergency preparedness, response, and recovery strategies, including those developed by the Delta Multi-Hazard Task Force pursuant to Water Code Section 12994.5.

(2) Delta Levees Funding: The priorities shown in the following table are meant to guide budget and funding allocation strategies for levee improvements.~~The State Legislature makes allocations to the Delta Levees Subventions Program, which because it funds local agency levee maintenance, is not a covered action.~~ The goals for funding priorities are all important, and it is expected that over time, the Department of Water Resources must balance achievement of those goals. Except on islands planned for ecosystem restoration, improvement of non-project Delta levees to the Hazard Mitigation Plan (HMP) standard may be funded without justification of the benefits. Improvements to a standard above HMP, such as that set by the U.S. Army Corps of Engineers under Public Law 84-99 (P.L. 84-99), may be funded as befits the benefits to be provided, consistent with the Department of Water Resource's current practices and any future adopted investment strategy.

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Priorities for State Investment in Delta Integrated Flood Management

Categories of Benefit Analysis

Goals	Localized Flood Protection	Levee Network	Ecosystem Conservation
1	Protect existing urban and adjacent urbanizing areas by providing 200-year flood protection.	Protect water quality and water supply conveyance in the Delta, especially levees that protect freshwater aqueducts and the primary channels that carry fresh water through the Delta.	Protect existing and provide for a net increase in channel-margin habitat.
2	Protect small communities and critical infrastructure of Statewide importance (located outside of urban areas).	Protect flood water conveyance in and through the Delta to a level consistent with the State Plan of Flood Control for project levees.	Protect existing and provide for net enhancement of floodplain habitat.
3	Protect agriculture and local working landscapes.	Protect cultural, historic, aesthetic, and recreational resources (Delta as Place).	Protect existing and provide for net enhancement of wetlands.

(be)For purposes of Water Code Section 85057.5(a)(3) and Section 5003~~1~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers a proposed action that involves discretionary State investments in Delta flood risk management, including levee operations, maintenance, and improvements. Nothing in this policy establishes or otherwise changes existing levee standards.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85300, 85305 and 85306, Water Code.

§ 5013~~5~~. Require Flood Protection for Residential Development in Rural Areas.

(a) New residential development of five or more parcels shall ~~provide for a minimum of 200-year flood protection, such as through the use of adequate levees or flood proofing, if it~~ be protected through floodproofing to a level 12 inches above the 100 year base flood elevation, plus sufficient additional elevation to protect against a 55-inch rise in sea level at the Golden Gate, unless the development is located within~~outside of~~:

(1) Areas that city or county general plans, as of the date of the Delta Plan's adoption, designate for development in cities or their spheres of influence;

(2) Areas within Contra Costa County's 2006 voter-approved urban limit line, except Bethel Island;

(3) Areas within the Mountain House General Plan Community Boundary in San Joaquin County; or

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(4) The unincorporated Delta towns of Clarksburg, Courtland, Hood, Locke, Ryde, and Walnut Grove, as shown in Appendix 7.

(b) For purposes of Water Code Section 85057.5(a)(3) and Section 5003(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers a proposed action that involves new residential development of five or more parcels that is not located within the areas described in subsection (a).

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85300, 85305 and 85306, Water Code.

§ 5014~~6~~. Protect Floodways ~~Protection~~.

(a) No encroachment shall be allowed or constructed~~permitted~~ in a floodway, unless it can be demonstrated by appropriate analysis that the encroachment will not unduly impede the free flow of water in the floodway or jeopardize public safety.

(b) For purposes of Water Code Section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers a proposed action that would encroach in a floodway that is not either a designated floodway or regulated stream.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85300, 85302 and 85305, Water Code.

§ 5015~~7~~. Floodplain Protection.

(a) No encroachment shall be allowed or constructed~~permitted~~ in any of the following floodplains unless it can be demonstrated by appropriate analysis that the encroachment will not have a significant adverse impact on floodplain values and functions:

(1) ~~Areas located in t~~The Yolo Bypass ~~from~~within the Delta; ~~Fremont Weir through Cache Slough to the Sacramento River including the confluence of Putah Creek into the bypass;\.~~

(2) The Cosumnes River-Mokelumne River Confluence, as defined by the North Delta Flood Control and Ecosystem Restoration Project (McCormack-Williamson), or as modified in the future by the Department of Water Resources or the U.S. Army Corps of Engineers (Department of Water Resources 2010a); and,

(3) The Lower San Joaquin River Floodplain Bypass area, located on the Lower San Joaquin River upstream of Stockton immediately southwest of Paradise Cut on lands both upstream and downstream of the Interstate 5 crossing. This area is described in the Lower San Joaquin River Floodplain Bypass Proposal, submitted to the Department of Water Resources by the partnership of the South Delta Water Agency, the River Islands Development Company, Reclamation District 2062, San Joaquin Resource Conservation District, American Rivers, the American Lands Conservancy, and the Natural Resources Defense Council, March 2011. This area may be modified in the future through the completion of this project.

(b) For purposes of Water Code Section 85057.5(a)(3) and Section 500~~3~~1(j~~a~~)(1~~5~~)(E) of this Chapter, this policy covers a proposed action that would encroach in any of the floodplain areas described in subsection (a).

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(c) This policy is not intended to exempt any activities in any of the areas described in subsection (a) from applicable regulations and requirements of the Central Valley Flood Protection Board.

NOTE: Authority cited: Section 85210(i), Water Code.

Reference: Sections 85020, 85300, 85302 and 85305, Water Code.

Article 4. General Provisions.

§ 5016~~8~~. Miscellaneous Provisions~~Just Compensation~~.

(a) The provisions in this Chapter are not intended and shall not be construed as authorizing the Delta Stewardship Council or any entity to exercise its power in a manner that will take or damage private property for public use without the payment of just compensation.

~~NOTE: Authority cited: Section 85210(i), Water Code.~~

~~§ 5019. Property Owner Rights.~~

(b) The provisions in this Chapter are not intended to affect the rights of any owner of property under the Constitution of the State of California or the United States.

~~NOTE: Authority cited: Section 85210(i), Water Code.~~

~~§ 5020. No Increase in State's Flood Liability.~~

(c) The provisions in this Chapter shall not increase the State's flood liability.

NOTE: Authority cited: Sections 85032(j) and 85210(i), Water Code.

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Delta Plan Program Environmental Impact Report
Volume 5, Binder 2 of 2: Section 4, Responses to Comments on the Recirculated Draft PEIR, Organizations, through Appendix B

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