RLO033 SLDMWA and SWC

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By Regular and Electronic Mail
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RE: Recirculated Draft Delta Plan Environmental Impact Report, November 2012 [SCH #2010122028]

Dear Chairman Isenberg and Council Members:

The San Luis & Delta-Mendota Water Authority and State Water Contractors (collectively, the "Public Water Agencies")[1] write on their own behalf and on behalf of their member agencies to express continuing significant concerns with the Delta Plan Draft Environmental Impact Report as recirculated in November 2012 ("RDEIR"). The RDEIR does not address the deficiencies under the California Environmental Quality Act ("CEQA") identified in detail in the Public Water Agencies' prior letter regarding the Delta Plan Draft Program Environmental Impact Report, dated February 2, 2012 ("DEIR"). Those comments remain valid and relevant, and the Public Water Agencies incorporate them by reference as if set forth fully herein. Additionally, although the Delta Stewardship Council ("Council") requested that comments be limited to the RDEIR, CEQA does not prohibit the public from submitting comments on the DEIR, especially when the RDEIR incorporates so much of the DEIR. Thus, the following general comments, and the additional specific comments presented in the Attachment 2, incorporated herein by this reference, address deficiencies in both the DEIR and the RDEIR (collectively referred to as the "EIR"). RLO033-1

The RDEIR is legally deficient for the following reasons:

- The RDEIR does not identify or analyze the environmental impacts that would result from implementation of the proposed project. Further, the RDEIR does not adequately

[1] Descriptions of the San Luis & Delta-Mendota Water Authority and State Water Contractors are provided in Attachment 1 hereto. RLO033-2

Response to comment RLO033-1

Comment noted. Please also see response to commenter's letter on the DEIR, LO232.

Response to comment RLO033-2

Please see Master Responses 1 and 2.

RLO033-2

address issues of the Council's authority, and lack thereof, to implement the proposed project. The RDEIR perpetuates and compounds the fundamental defects identified in the Draft Program EIR.

Under CEQA, an environmental impact report must be prepared with a sufficient degree of analysis to provide decision makers with information that enables them to intelligently account for a proposed project's environmental consequences. (CEQA Guidelines, § 15151.) The document's conclusions must be supported by substantial evidence (i.e., facts and analysis). (*Laurel Heights Improvement Ass'n v. Regents of University of California* (1988) 47 Cal.3d 376.) Despite these standards, the RDEIR contains virtually no analysis of the environmental impacts of the proposed project and little or no substantial evidence to support most of the conclusions presented therein. Rather the RDEIR does not adequately support conclusions as to the significance of impacts in the RDEIR.

RLO033-3

The format of the RDEIR, like that of the DEIR, is extremely redundant. For each resource area, the narrative in the RDEIR says essentially the same thing using the same language – resulting in the excessive length of the document.

In addition to being unsupported by facts or analysis, the RDEIR's conclusions are conflicting and inconsistent. Throughout most of the RDEIR, the conclusions indicate that because future projects are mostly unknown, impacts could be "significant." At the same time, for each of these conclusions the RDEIR also states that due to the imposition of non-specific mitigation measures, the impacts also could be "not-significant." This dichotomy of possible conclusions does not satisfy the Council's CEQA duties to prepare meaningful impact analyses and identify enforceable mitigation measures.

RLO033-4

Many of the mitigation measures presented in the RDEIR are inadequate either because they do not constitute mitigation as defined under CEQA, are vague and uncertain, or are improperly deferred to future environmental documents without any performance standards or specific criteria to ensure effectiveness and enforceability. Additionally, many of the measures are so generic that they would apply to virtually any type of project. Overall, the document is far too general to enable decision-makers to make required CEQA findings as to whether particular mitigation measures would be effective, much less whether they would be feasible. The legal sufficiency of the mitigation measures is further in question because the language in them is repetitive – containing the exact same language irrespective of impact or resource area affected.

RLO033-5

- The RDEIR creates further confusion regarding the elements of the proposed project and fails to address critical issues concerning the project description, project objectives, and a reasonable range of alternatives, among others. In this manner, the RDEIR does not satisfy CEQA's core policy of informed public involvement and decision-making.[2]

[2] This comment letter and the attached specific comments refer to "proposed project," "original Proposed Project," and "Revised Project." As a result of the noted error, those terms may be used interchangeably at times.

Response to comment RLO033-3

Please see the responses to the commenter's prior letter, LO232. Regarding the EIR's programmatic approach to environmental analysis, please see Master Response 2. Regarding the adequacy of the EIR's identified mitigation measures, please see master Response 4.

Response to comment RLO033-4

Regarding the level of detail provided in the description of the Delta Plan, please see master Response 2. Regarding the range of alternatives considered in the EIR and the analysis of their ability to meet project objectives, please see Master Response 3.

Response to comment RLO033-5

The Revised Project is the 2012 Final Draft Delta Plan, which is analyzed in RDPEIR. 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). Because the Revised Project differs from the Proposed Project in specific, narrow aspects, and because the DPEIR provided thorough, programmatic analysis of the Proposed Project's potential environmental impacts, the RDPEIR efficiently compares the impacts of the two rather than repeat the DPEIR's analysis. Such an approach would have been cumbersome and largely repetitive. Please see Master Response 2 for a discussion of the EIR's programmatic approach.

In the RDEIR, the "Revised Project" is presented as a new alternative that apparently is the Council's preferred proposal. The "Revised Project" thus appears to be the actual project for purposes of CEQA. Yet the document continues to refer to the original proposal as the "Proposed Project". Characterization of the "Revised Project" as an alternative creates unnecessary confusion that compounds the concerns of clarity, accuracy and sufficiency, and stability of the project description identified in our previous comments. RLO033-5

The emphasis of the RDEIR is purportedly to illustrate the differences between the "Revised Project" and the "Proposed Project," yet the DEIR's and RDEIR's limited environmental analysis results in an inability to meaningfully compare these two iterations of the project. The qualitative "*greater than*" or "*less than*" comparisons in the RDEIR do not constitute the meaningful evaluation of alternatives CEQA requires. (*Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692.)

- The RDEIR continues to support a proposed project that would impede, rather than promote, achievement of the coequal goals. Illustrative of this deficiency is that through its administrative procedures related to review of covered actions the Council seeks to require that even projects undertaken pursuant to the BDCP must comply with Delta Plan certification requirements. Using simple logic, if the BDCP is incorporated into the Delta Plan, as the Legislature has directed, then by definition all of its actions are consistent with the Delta Plan of which they are a part. This is not a question necessitating review and would lead to unnecessary administrative process and could lead to unnecessary litigation. RLO033-6

- Because of the deficiencies identified in this letter, the attachment, and in the Public Water Agencies' February 2012 comment letter, the RDEIR does not satisfy CEQA's requirements. Accordingly, the Council should not certify the EIR. However, if it does, the Council must first revise the EIR to make it legally compliant with CEQA. Such revisions would constitute new information of substantial importance under CEQA and thus require recirculation before the Council considers certification of a subsequent, legally sufficient document. (State CEQA Guidelines, § 15088.5.) RLO033-7

Thank you for the opportunity to submit these additional comments.

Sincerely,

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San Luis & Delta-Mendota Water Authority

Terry L. Erlewine
General Manager
State Water Contractors

Response to comment RLO033-6

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

Response to comment RLO033-7

Comment noted.

ATTACHMENT 1

The SWC represents 27 public agencies that contract with the State of California for water from the State Water Project (SWP). These agencies are each organized under California law and provide water supplies to nearly 25 million Californians and 750,000 acres of prime farmland from Napa County to San Diego and points between.

The SLDMWA, which was formed in 1992 as a joint powers authority, consists of 29 member agencies, 27 of which contract with the United States Department of the Interior, Bureau of Reclamation (Reclamation), for supply of water from the federal Central Valley Project (CVP). The Authority's member agencies hold contracts with Reclamation for the delivery of approximately 3.3 million acre-feet of CVP water. CVP water provided to the Authority's member agencies supports approximately 1.2 million acres of agricultural land, as well as more than 100,000 acres of managed wetlands, private and public, in California's Central Valley. The Authority's member agencies also use CVP water to serve more than 1 million people in the Silicon Valley and the Central Valley.

San Luis & Delta-Mendota Water Authority Member Agencies:	State Water Contractors Member Agencies:
Banta-Carbona Irrigation District	Alameda County Flood Control and Water Conservation District Zone 7
Broadview Water District	Alameda County Water District
Byron Bethany Irrigation District (CVPSA)	Antelope Valley-East Kern Water Agency
Central California Irrigation District	Casitas Municipal Water District
City of Tracy	Castaic Lake Water Agency
Del Puerto Water District	Central Coast Water Authority
Eagle Field Water District	City of Yuba City
Firebaugh Canal Water District	Coachella Valley Water District
Fresno Slough Water District	County of Kings
Grassland Water District	Crestline-Lake Arrowhead Water Agency
Henry Miller Reclamation District #2131	Desert Water Agency
James Irrigation District	Dudley Ridge Water District
Laguna Water District	Empire-West Side Irrigation District
Mercey Springs Water District	Kern County Water Agency
Oro Loma Water District	Littlerock Creek Irrigation District
Pacheco Water District	Metropolitan Water District of Southern California
Pajaro Valley Water Management Agency	Mojave Water Agency
Panoche Water District	Napa County Flood Control and Water Conservation District
Patterson Irrigation District	Oak Flat Water District
Pleasant Valley Water District	Palmdale Water District
Reclamation District 1606	San Bernardino Valley Municipal Water District
San Benito County Water District	San Gabriel Valley Municipal Water District
San Luis Water District	San Gorgonio Pass Water Agency
Santa Clara Valley Water District	San Luis Obispo County Flood Control and Water Conservation District
Tranquility Irrigation District	Santa Clara Valley Water District
Turner Island Water District	Solano County Water Agency
West Side Irrigation District	Tulare Lake Basin Water Storage District
West Stanislaus Irrigation District	
Westlands Water District	

RLO033-8

Response to comment RLO033-8

Comment noted.

ATTACHMENT 2

THE PUBLIC WATER AGENCIES' SPECIFIC CONCERNS WITH THE DELTA PLAN RECIRCULATED AND DRAFT PROGRAM EIR

A. Project Description Deficiencies.[1]

An accurate, stable and finite project description is the *sine qua non* of CEQA. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193.) It allows the lead agency to identify the proper environmental baseline, to evaluate the no-project alternative, to develop a range of reasonable and viable alternatives, to consider mitigation measures, and to balance a project's benefits against its environmental costs. (*Id.*, pp. 192-93.) The Project description provided in the EIR does not meet CEQA's requirements for several reasons.

1. The Project Description Fails to Identify and Disclose Replacement Water Sources, Precluding Any Meaningful Analysis of Foreseeable Environmental Impacts.

First and foremost, the EIR states that the Delta Plan will result in an overall decrease of water conveyed through the Delta (often referred to as "exported" from the Delta). (*E.g.,* DEIR p. 2A-67 [The Plan asserts it would reduce water exports as compared to the current, "no project" conditions].) Second, the EIR concludes that, even though the Delta Plan will result in less water conveyed through the Delta, the total amount of water supplied to end users will remain the same because agencies other than the Council will offset the reduced supply conveyed through the Delta through increased groundwater use, development of desalination plants, development of recycled water facilities, and increased water transfers. However, although the EIR recognizes that these actions to offset the impacts of the Delta Plan are foreseeable impacts of the proposed project and all alternatives (except the No Project Alternative), there is no analysis of whether each of these actions is feasible, the amount of water these actions will need to produce to offset the impacts of the proposed project, or the environmental impacts of each action. Indeed, if such analysis were undertaken, the EIR would reflect that in many, if not most, areas, local supplies are utilized, and, in a few areas, have been over-utilized, sometimes resulting in groundwater overdraft. If the Council cannot quantify and analyze the amount of water affected, including the amount of local supplies that will need to be developed, where those supplies will likely come from, and the environmental impacts of developing and utilizing those supplies, then the Council's CEQA significance conclusions cannot be supported by substantial evidence. The Council's conclusions regarding impacts amount to little more than a speculative guess. (See State CEQA Guidelines, § 15384 [substantial evidence includes facts, but not speculation or unsubstantiated opinion].) RLO033-9

[1] In addition to the errors presented in this letter, the project description fails because the proposed project is unlawful. (See Appendix, which includes comments on the drafts of the Delta Plan and on the regulations the Council has proposed for adoption, all of which are incorporated herein by this reference.)

Response to comment RLO033-9

Please see the responses to the commenter's prior letter, LO232. Please also see Master Response 5.

2. *All Alternatives Focus on Decreasing Water Exports Without Analysis of Jurisdiction or Impacts of Increased Reliance on Local Supplies.*

The type of alternatives analyzed do not constitute a reasonable range of alternatives as required by CEQA (see State CEQA Guidelines, § 15126.6(a)), because they all focus on decreasing the quantity of water conveyed through the Delta without considering the Council's jurisdiction over management of that water or the Council's desired impacts of increased reliance on local supplies. This is problematic. For example, groundwater wells will not be an adequate replacement for water otherwise conveyed through the Delta since, as the EIR acknowledges, some areas that receive water conveyed through the Delta and utilize groundwater are in a state of overdraft and currently rely heavily on the water conveyed through the Delta to prevent the worsening of this overdraft. (See, e.g., DEIR pp. 2A-16, 3-29 to 3-31, 3-34, 3-37, 3-41, 3-44, 3-56, etc.; other pages fail to disclose the status of the relevant groundwater basins, see p. 3-58) The EIR recognizes this, and that surface water is needed to recharge existing wells, and yet, in direct contradiction, continues to claim establishing additional groundwater wells will help achieve a more secure water supply for California. In addition, in coastal areas where desalination could be considered, those plants take years—often, decades—to plan and develop. (See DEIR p. 3-49, noting that Marin Municipal Water District has been investigating desalination since the 1990s, with no resulting facilities, p. 3-74, noting that there are enormous obstacles to large-scale desalination, due to difficulties with land acquisition, treatment, operational costs, environmental review and permitting processes involving more than 20 local, state, and federal agencies, and that of all of the proposed desalination plants, only a single one has actually progressed to the construction phase, more than five years after the EIR was released [p. 4-61], and will only deliver 56,000 acre-feet once fully completed and operational). All of this, and additional realities and feasibility limitations of water management, directly contradicts the EIR's unsupported conclusion that sufficient, feasible replacement water sources exist. RLO033-10

3. *The EIR Does Not Analyze Foreseeable Impacts of Replacement Sources.*

The EIR does not analyze how many replacement sources of water would be required and the environmental impacts of developing those different types of replacement sources. For example, accepting for the sake of argument that the Council actually had the ability to reduce the quantity of water conveyed through the Delta, as discussed in the EIR, if the EIR anticipates the use of desalination plants as a replacement source, the EIR must analyze how many desalination plants would be required to replace the loss of supply; the time required to design, permit and construct such plants; and the energy requirements of desalination plants. Alternatively, if the EIR anticipates the use of local groundwater as a replacement supply, the EIR must analyze the number of wells required, the impacts of additional pumping on groundwater basins, including those already overdrafted, and the potential for subsidence and other relevant impacts. Similarly, the EIR's reliance on water transfers must be supported by a complete analysis of the amount of water available for transfer, and identify the areas water would be available for transfer from. (See *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 440-41.) RLO033-11

Where the EIR anticipates the use of recycled water in place of State Water Project (SWP) / Central Valley Project (CVP) water, CEQA requires that the EIR analyze the environmental impacts of doing so. In violation of CEQA, these foreseeable impacts that would directly and indirectly result from the imposition of the proposed Water Resources Policy 1 (WR

Response to comment RLO033-10

Please see Master Response 5.

Response to comment RLO033-11

The Reliable Water Supply subsections of EIR sections 3 through 21 describe the potential environmental impacts of the development of local and regional water supplies.

RLO033-11

P1), notwithstanding the Council's lack of authority to enforce it, are not disclosed in the EIR. Desalination, additional groundwater resources, and the other replacement sources the EIR identifies are available only in limited amounts and areas.

While recycled water facilities are a potential future source of water for some locales, many areas already recycle significant amount of wastewater. (See DEIR p. 3-74.) In addition, at this time, recycled water facilities often do not produce large amounts of potable water, and, because it is often high in salt content, the resulting recycled water has limited utility. Such recycled water may not be usable for drinking water, but may be limited in use to irrigation where purple pipes or other similar infrastructure is available, or for groundwater recharge. However, even these uses may be threatened without adequate amounts of imported water for blending, since water with higher salt content may need to be blended with higher quality water to allow its most beneficial use. Recycled water, much groundwater, and some other alternative sources (i.e., Colorado River water) may not be available to recharge groundwater (without blending with higher quality water) if the recycled water is too high in salts. (See, e.g., DEIR p. 3-63 ["Groundwater quality is degraded through increased salinity and other constituents…the use of imported Colorado River water with higher salinities has resulted in degradation of groundwater quality in much of Southern California."].) None of these issues are disclosed or analyzed in the EIR, in violation of CEQA. While the EIR states that (unidentified) Urban Water Management Plans describe the existing use of recycled water and identify the potential for increased use by 2020, there is no incorporation by reference of these documents or analysis of their contents, so the feasibility or amount of these is unknown. In addition, the EIR states that the State Water Resources Control Board mandates the increased use of recycled wastewater by 200,000 AFY by 2020 (DEIR p. 2A-21), so such increase would not be as a result of the proposed project, but would properly be part of the baseline or No Project alternative. RLO033-12

4. The Vague Project Description Fails to Disclose the Timeline or Detail Necessary for Future Modifications.

Even if the Council had the authority to curtail water exports as it asserts through WR P1, the EIR improperly fails to disclose as part of the Project description, or anywhere in the analysis, what the timeline would be for reductions in the quantity of water conveyed through the Delta. This violates CEQA's disclosure and analysis requirements. While the EIR refers to the dates 2100, 2030, and 2016 (DEIR p. 1-14), it is not disclosed whether the quantity of water conveyed through the Delta would be affected before that time, by which of those dates any or all of the supposed replacement water sources would be available, how much water those new sources could be producing by what date, etc. Also, while the EIR recognizes that small-scale storage projects may take 5-10 years and new major dams and larger projects more than 10 years to implement (DEIR p. 2A-11), specifics as to how many projects could be completed, the environmental effects of doing so, as well as when and how much water would be available are necessary to analyze the potential impacts of the Plan. RLO033-13

The EIR also confirms that there are "numerous studies and programs, the results of which should be considered in development of the Delta Plan" but that "those studies have not been completed and several are not anticipated to be completed before 2020." (DEIR p. 1-14.) The EIR goes on to imply that modifications in the Delta Plan may be necessitated by the result of these studies. If these studies must be considered in the Delta Plan because they have the potential to modify the Plan, they must be identified and analyzed. If they must be considered

Response to comment RLO033-12

Please see Master Response 5.

Response to comment RLO033-13

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. The EIR thus cannot provide a definitive timeline for Delta Plan implementation. The Delta Plan may be revised, with appropriate environmental review, in the future (see Water Code § 85300(c)).

RLO033-13

and are not, substantial evidence cannot support the Project description that was put forth in the EIR. The Council should explain what modifications are likely and then analyze those in the EIR.

5. Assumptions for the No Project Alternative Are Contradictory.

The No Project alternative is arbitrary and illogical. In one paragraph, the EIR states that state law requires urban water supplies to reduce statewide urban per capita water use by 2020. Accordingly, the expectation that per capita water usage will be reduced as required by law should be assumed as part of the No Project alternative. It is not. In addition, the No Project alternative assumes there will be no additional regional or local supplies. However, the EIR states that local agencies are today already increasing their recycled water availability and expanding and building recycled water facilities. (DEIR pp. 2A-11, 2A-86.) Therefore, the DEIR's No Project alternative does not assume current plans will be continued, contrary to what is stated in the EIR and in violation of CEQA. (See State CEQA Guidelines, § 15126.6(e)(2) ["The 'no project' analysis shall discuss the existing conditions at the time the notice of preparation is published… **based on current plans** and consistent with available infrastructure and community services"] [Emphasis added].) RLO033-14

6. The Project Description Lacks Identification of Necessary Agency Approvals.

CEQA requires that a project description include a list of other agency approvals that may be necessary to implement the project. (State CEQA Guidelines, § 15124.) However, the project description does not appear to include any such list. For example, the EIR states that some federal agencies may consider the EIR in their review processes (DEIR p. 1-14), but there is no indication of what federal agency approvals are necessary or in what capacity the federal agencies may be considering the EIR. Similarly, the EIR does not identify whether approvals from other state or local agencies are required. Given that the EIR repeatedly states that the bulk of Plan implementation will fall on the shoulders of local agencies, failing to identify which agencies may be relying upon the EIR or issuing approvals to implement the Plan is improper. RLO033-15

7. The RDEIR Proposes a Changed Project Description Without the Requisite Detailed Analysis.

The "alternative" discussed in the RDEIR is problematic because it appears to, in reality, be a change in the project description rather than a potential alternative. To the extent an "alternative" is approved rather than the project as proposed, all of the requirements for the project description must still be met, and that alternative must have received the same level of analysis as the proposed project. (See *Sierra Club v. City of Orange* (2008) 163 Cal.App.4th 523, 533 [an action that is more limited than a proposed project may be approved, but not vice versa]; *Dusek v. Redevelopment Agy.* (1985) 173 Cal.App.3d 1029, 1041.) RLO033-16

B. Baseline Deficiencies.

Under CEQA, an EIR must have a clear statement of what baseline was used for purposes of determining the significance of environmental impacts. (See, e.g., State CEQA Guidelines, § 15125.) The EIR states that, "[t]he baseline for assessing the significance of impacts of the proposed project is the existing environmental setting." (DEIR p. 2A-85.) However, the EIR gives no description of what those existing conditions actually are or how those existing RLO033-17

Response to comment RLO033-14

Please see Master Response 1. As described on page 2A-67 and Section 2.3.2 of the Draft Program EIR and as required by CEQA Guidelines section 15126.6(e), the No Project Alternative, consists of the environment if no Delta Plan is adopted and assumes that existing relevant plans and policies would continue. The No Project Alternative also includes physical activities and projects that were permitted and funded at the time of the Notice of Preparation of the EIR, including recycled water projects and any specific, adopted water conservation and efficiency programs to meet the state goal of reducing per-capita water usage. Because the state statute SB X7 7 only establishes a goal, but requires further local action for implementation, the No project Alternative does not assume its overall achievement.

Response to comment RLO033-15

CEQA Guidelines section 15124(d)(1) requires the EIR to include, "to the extent the information is known to the lead agency…A list of permits and other approvals required to implement the project." Table 2B-1 lists the specific named projects encouraged by the Delta Plan and the lead agencies for those projects. Beyond the named projects however, any of a very large number of agencies could propose a covered action or could take actions encouraged by the Delta Plan. The Delta Stewardship Council cannot direct any agency to take such actions. The identity of all the agencies whose permits or other actions will implement the Delta Plan is thus not known to the Council.

Response to comment RLO033-16

Please see Master Response 1. The Revised Project is the 2012 Final Draft Delta Plan, which is analyzed in RDPEIR and fully described in Section 2A of the DPEIR in combination with Section 2 of the RDPEIR.

Response to comment RLO033-17

Please see the responses to the commenter's prior letter, LO232. Also please see Master Response 1. In light of the EIR's programmatic approach to the analysis of environmental impacts, the largely qualitative discussion of existing conditions in each impact-analysis section (several of which discuss variable conditions, such as Section 3), is sufficient.

conditions were determined on a state-wide basis. Specifically, the EIR does not make clear whether it assumes that the "existing conditions" are drought conditions or "average" conditions, whether the ability to convey water through the Delta was assumed to be curtailed by various biological opinions or not, or what assumptions were made regarding the storage capacity and conveyance capabilities. Absent such a description, the EIR's baseline usage cannot be supported by substantial evidence because it is not based on any discrete facts. (See State CEQA Guidelines, § 15384 ["substantial evidence" includes facts, but not mere opinions or unsupported conclusions].)

The inadequate baseline described above is also impermissible under CEQA because no account was taken of the rapidly changing circumstances affecting water supply within the State of California. Where, as here, changing conditions may affect an agency's significance conclusions, courts have held that it is appropriate for the lead agency to take account of those changing conditions by considering a range of circumstances in the baseline. (See *Pfeiffer v. City of Sunnyvale City Council* (2011) 200 Cal.App.4th 1552, 1570.) A baseline should entail "a realistic description of existing conditions" without the project and whether that baseline would be "an illusory basis" for analyzing project impacts. (*Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310, 322; *Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 121 [appropriate baseline for determining "real conditions on the ground" included a range of years of water usage].) Accordingly, the Council's baseline is legally insufficient since it both (1) fails to describe the physical baseline conditions used and (2) compounds this problem by apparently using one illusory moment in time for the baseline, even though such a "snapshot" is not representative of overall water supply conditions in California. The EIR should instead consider overall water supply conditions and use a baseline based on a range of water year types. RLO033-17

Although the Public Water Agencies provided this same comment on the DEIR, it is equally applicable to the RDEIR, because the RDEIR repeatedly states that it uses the same environmental setting as that set forth in the DEIR. (E.g., RDEIR, pp. 3-1, 4-1, 5-1, etc.)

C. Project Features and Mitigation Measure Deficiencies.

1. Delta Plan Policies and Mitigation Measures, Which Are the Basis of the Impacts Analysis, Are Not Mandatory or Enforceable by the Council.

The newly revised November 2012 draft Delta Plan (like earlier draft Delta Plans) includes dozens of policies that are allegedly "mandatory." (E.g., RDEIR p. ES-2 ["The Delta Plan is a suite of regulatory policies that would have the force of law and nonbinding recommendations…."].) Those policies are shown in the revised draft Delta Plan (November 2012) on pages xiii through xxxi and in Appendix C of the RDEIR. The RDEIR for the revised draft Delta Plan makes the same mistake as the DEIR by determining the Plan's impacts assuming that the policies will be implemented. Specifically, the RDEIR "assumes that the Delta Plan will be successful and will lead to other agencies taking the encouraged actions" through the "Revised Project's policies and recommendations." (RDEIR p. ES-2.) What a plain reading of these policies actually shows, however, is that they are far from mandatory, and thus it is error for the EIR to assume their implementation. For example, the policies are full of non-binding language stating that certain agencies "should" undertake certain tasks "where feasible" to implement the Plan. (E.g., Policies ER P1, ER P2, ER P4, etc.) Likewise, the policies are RLO033-18

Response to comment RLO033-18

Master Response 2 discusses the EIR's appropriate assumption that the Delta Plan's polices and recommendations are implemented.

unenforceable insofar as they seek to command other public agencies, over which the Council has no clear authority (such as the State Water Resources Control Board and Caltrans), to take certain actions to implement the Plan. (E.g., Policies ER P1, DP P1, etc.) The EIR does not account for or explain what impacts may result if the Policies are not implemented. The Council cannot offer up a "wish list" of future actions that may or may not occur, and then evaluate the Plan's impacts by assuming that this "wish list" will be granted. RLO033-18

As with the DEIR, the application of the Mitigation Measures proposed in the RDEIR is unclear. On the one hand, the EIR states that "covered activities" must include the mitigation measures identified in the EIR. On the other hand, however, the EIR is replete with statements that the implementation of mitigation measures and Delta Plan policies may or may not be feasible, calling into question whether these mitigation measures are actually required when the Plan is implemented. The EIR should be clarified in that regard, and the consequences of potential incompatibility with the Delta Plan should be presented. If it is reasonably foreseeable that the Council's mitigation measures will be infeasible for implementing agencies, then the Council has the obligation to disclose to the public what the potentially significant and unavoidable impacts actually are. It is not enough to merely state that impacts may be significant, because CEQA's information disclosure requirement is only satisfied by a detailed discussion of what the impacts may be. (*Keep Jets Over the Bay Comm. v. Bd of Port Commrs.* (2001) 91 Cal.App.4th 1344, 1371 [an EIR cannot simply state an impact is significant without first providing its analysis].)

Moreover, and again as with the DEIR, the mitigation measures proposed in the RDEIR are unenforceable. As the Public Water Agencies pointed out in their February 2, 2012 letter, mitigation measures must be specific and mandatory, such that they are "fully enforceable." (State CEQA Guidelines, § 15126.4.) To that end, under CEQA, the formulation of mitigation measures may not be deferred until a later time, although an agency is allowed to provide specific performance standards that specify the extent to which impacts will be mitigated. (State CEQA Guidelines, § 15126.4; *Dry Creek Citizens Coalition v. County of Tulare* (1999) 70 Cal.App.4th 20.) To the extent that it is infeasible to impose enforceable mitigation measures, the lead agency must "reference that fact and briefly explain the reasons underlying the Lead Agency's [infeasibility] determination." (*Ibid.*) Just as with the DEIR, the RDEIR fails to provide enforceable mitigation and does not impose mitigation that will actually avoid or lessen the identified impacts. Furthermore, and again as explained more fully in the Public Water Agencies' comments on the DEIR, the Council fails to explain why it is infeasible to make the mitigation measures enforceable or to fund additional mitigation that might ease the burden on local agencies while also reducing the significant impacts caused by the Council's proposed project. Additionally, the proposed project and the proposed mitigation are inconsistent with each other, in that they encourage ocean desalination facilities and other water treatment facilities to assure adequate water supply (Recirculated EIR p. ES-2), but at the same time forbid, throughout the State, the siting of all future projects to improve water supply *anywhere* that would result in a substantial reduction in fish and wildlife species habitat. (See DEIR pp. 4-71 [Impact 4-2a] and 4-83 [Mitigation Measure 4-1].) This could potentially apply as well to ocean desalination facilities. The mitigation measures are even internally inconsistent, in that they are worded one way in the main text and worded in another way (with important elements absent) in the Executive Summary (examples provided below). Again, information that is contradictory and that gives with one hand what the other takes away, is not substantial evidence. (See State CEQA Guidelines, § 15384.) RLO033-19

Response to comment RLO033-19

Please see the responses to the commenter's prior letter, LO232. Please also see Master Response 4 regarding the enforceability of the mitigation measures. Mitigation Measure 4-1 does not create an absolute bar on siting projects in any place where they might cause a substantial reduction in fish or wildlife habitat. Rather, it provides a series of options to be implemented, as feasible and appropriate in a project's circumstances, to reduce or avoid impacts to sensitive natural communities. The EIR nonetheless concludes that the Delta Plan could have a significant and unavoidable impact on such communities.

2. Vague and Unenforceable Mitigation Measures.

The following are several examples of the vagueness and unenforceability of the mitigation measures included in the EIR. Because they are vague, unenforceable, and inadequate under CEQA, the Council should delete them.

Biological Resources

- MM 4-2 requires scheduling construction to avoid special status species' breeding, spawning, or migration locations, yet cannot identify when and where construction must be halted.
- MM 4-2 also requires preconstruction surveys for special-status species but cannot mandate how close in time to construction these surveys must occur, the species that must be surveyed, or the seasons in which the surveys may or may not occur. RLO033-20
- MM 4-2 also requires relocation of special-status species "when appropriate," yet cannot identify any specific or enforceable criteria for determining appropriateness.
- MM 4-2 and 4-3 require that unavoidable impacts to special status species or substantial loss of habitat be compensated by restoring or preserving in-kind suitable habitat, but cannot identify any specific or enforceable performance standards for the ecological value or location of the in-kind habitat.
- MM 4-4 requires that connectivity of habitats be protected, restored and enhanced, but cannot identify specific and enforceable performance standards.

Delta Flood Risk

- MM 5-1, 5-2, 5-4, and 5-5 require a future drainage study to assess the need for drainage-related mitigations, improperly deferring mitigation.
- MM 5-1 and 5-5 require setback levees or bypass channels where in-stream construction sites "might reduce channel capacity" yet cannot identify performance standards. Similarly, they require a sediment management program where low channel velocities "might result from construction."
- MM 5-1 also requires a long-term sediment removal program at in-river structures, but cannot provide performance standards, time frame, or other necessary specifics for enforcing this measure. RLO033-21
- MM 5-4 requires future preparation of evacuation and emergency response plans, but cannot identify specific and enforceable criteria for these plans.
- MM 5-4 also requires future research and settlement analyses to assess the need for settlement-related mitigations, improperly deferring mitigation.

Response to comment RLO033-20

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 4. 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. Master Response 4 further explains that the EIR's mitigation measures are not inappropriately vague, but are designed to be tailored to the circumstances of the specific action requiring the mitigation.

Response to comment RLO033-21

Please refer to the response to comment RLO033-20.

- MM 5-4 also requires construction of new evacuation roads and access roads "as necessary" but cannot identify where, when, or how to determine whether these roads are necessary. RLO033-21

- MM 5-4 also requires a seepage and stability analyses to assess the need and act as a basis for design of seepage and stability related mitigations, improperly deferring mitigation.

Land Use and Planning

- MM 6-1 provides examples of methods of minimizing physical division of residential areas (i.e. burying or masking new facilities, restoring disturbed landscapes, etc.) but cannot require any of these measures, making this measure impermissibly uncertain. RLO033-22

- MM 6-2 requires compensation for the loss or reduction in environmental values protected by an applicable land use plan and identifies potential mitigation actions for compensation (deed restrictions, buffers, project redesign, and restoration). However, none of these potential compensation methods can be mandated by the measure.

Agricultural and Forestry Resources

- MM 7-1 and 7-2 require that proposed projects minimize "to the greatest extent feasible" the loss of agricultural land, but measures conditioned on feasibility rather than applied directly, are impermissibly uncertain. RLO033-23

Visual Resources

- MM 8-1 requires development of turnouts and scenic vista points "where appropriate" but cannot identify these locations.

- MM 8-1 also reads, "Consider developing aesthetically well-designed [visitor facilities]", which is vague, uncertain, and unenforceable. RLO033-24

- MM 8-2 requires replacement of scenic resources "when feasible." The measure is impermissibly uncertain because it is based on feasibility.

Air Quality

- MM 9-1 requires use of "lower emitting alternative fuels… where feasible" without defining lower emitting fuels. The measure is also impermissibly uncertain because it is based on feasibility.

- MM 9-1 also requires implementation of "applicable BMPs to reduce potential dust emissions" from agricultural operations, but does not identify any specific BMPs or other requirements. RLO033-25

- MM 9-2 says, "Applicants should development and implement a project-specific Odor Management Plan" making this measure uncertain and voluntary.

Response to comment RLO033-22

Please refer to the response to comment RLO033-20.

Response to comment RLO033-23

Please refer to the response to comment RLO033-20.

Response to comment RLO033-24

Please refer to the response to comment RLO033-20.

Response to comment RLO033-25

Please refer to the response to comment RLO033-20.

Cultural Resources

- MM 10-3 requires that projects "identify measures to avoid significant historic resources", impermissibly deferring identification of mitigation measures. RLO033-26

Noise

- MM 15-1 limits idling of construction equipment "to the extent feasible to reduce the time that noise is emitted" yet cannot set specific idling time, making this measure impermissibly uncertain. RLO033-27

Transportation

- MM 19-2 requires avoidance of modifications to roadways and bridges that may reduce vehicle capacity "to the extent feasible" but cannot identify any specific capacity criteria or thresholds. RLO033-28

3. Internally Inconsistent Mitigation Measures.

As limited examples of the EIR's internal inconsistency, the following mitigation measure components identified in the main EIR's text are not included in the Executive Summary:

- As part of MM 3-2: Conduct a survey of all wells located adjacent to the construction site.
- As part of MM 3-2: Install monitoring wells adjacent to any necessary dewatering wells or pumps.
- As part of MM 4-4: For new or expanded wildlife refuges, establish vegetation, hydrology and other habitat components for optimized use by migratory waterfowl and shorebirds.
- As part of MM 4-5: Acquire areas with the potential to increase connectivity between habitats, and protect these areas with conservation easements, deed restrictions, and similar tools. RLO033-29
- As part of MM 7-1: Require that project proponents ensure through easements, lot line adjustments, and parcel mergers, that any non-project areas be of sufficient size and otherwise able to sustain farming operations.
- As part of MM 7-1: Require that project proponents acquire easements or provide compensation for indirect effects on sensitive species or habitats.
- As part of MM 7-1: Require easements for temporary or intermittent interruption in farming activities.

Response to comment RLO033-26

Please refer to the response to comment RLO033-20.

Response to comment RLO033-27

Please refer to the response to comment RLO033-20.

Response to comment RLO033-28

Please refer to the response to comment RLO033-20.

Response to comment RLO033-29

The executive summary contains an abbreviated list of mitigation measures; the EIR's impact analysis sections (sections 3 through 21) include the full text of the measures. Readers are directed to see resource sections for full text.

- As part of MM 7-1: Require acquisition or compensation for any permanent or significant loss of economically viable operations. RLO033-29

- As part of MM 9-1: Implement conservation cropping sequences and wind erosion protection measures; apply soil stabilization chemicals; re-apply drain water to establish protective vegetation; reuse irrigation return flows to irrigate windbreaks. (Note: these are identified just as BMPs that "could" be used, but are not required, making them unenforceable mitigation in any case.)

D. Environmental Analysis Deficiencies.

The RDEIR states that the analysis of the new alternative presented in the RDEIR was based on the same methodology presented in the DEIR. (E.g., RDEIR pp. 3-1, 4-1, etc.) Accordingly, the RDEIR's analysis of the revised project is invalid for all the reasons presented in the Public Water Agencies' comment letter (dated February 2, 2012) on the DEIR. In addition, both the DEIR and the RDEIR's analyses are invalid because they fail to account for major changes in water supply issues that have arisen in the last year and because they rely upon inaccurate information and Biological Opinions that have been found legally deficient.

1. DEIR and RDEIRs Fail to Account for Major Changes in Water Supply Issues Arising Over the Past Year.

Coordinated Quantification Settlement Agreement Cases.

The Coordinated Quantification Settlement Agreement ("QSA") cases have been remanded to the trial court for determination of the CEQA claims against the Transfer Project EIR and the Programmatic EIR (see *Quantification Settlement Agreement Cases* (2011) 201 Cal.App.4th 758). The district court's decision to uphold the Colorado River Water Delivery Agreement (which is interrelated with the QSA and other QSA-related agreements) against challenges under the National Environmental Policy Act and Clean Air Act is currently on appeal to the Ninth Circuit. (See *Cal. ex rel. Imperial County Air Pollution Control Dist. v. United States DOI* (S.D. Cal. 2012) 2012 U.S.Dist.LEXIS 49020.) The outcome of these cases could adversely affect the delivery of Colorado River water to Southern California. Since the Legislative command to the Council is to provide coequal consideration to environmental issues and to water supply reliability (Delta Reform Act of 2009), the failure to address this issue means that the EIR's analysis and consideration of water availability cannot be supported by substantial evidence. RLO033-30

Invalidation of the December 2008 and June 2009 Biological Opinions

Both the USFWS December 2008 and the NMFS June 2009 Biological Opinions for the long-term operations of the CVP and SWP have been found by the courts to be arbitrary and capricious and were remanded to the Services for reconsideration. The DEIR inaccurately states that the court challenge to the NMFS June 2009 is still pending, (DEIR, § 3.3 at p. 3-15). The DEIR should be updated to appropriately characterize the status of the Biological Opinions. Of greater concern, however, is how the Biological Opinions were considered within the baseline and thus relied upon by both the DEIR and RDEIR for purposes of determining project-related impacts. It impossible to discern how the Biological Opinions were factored into the baseline and the assessment of project effects. Inappropriate consideration could result in significant

Response to comment RLO033-30

Please see Master Response 1. 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. The description of the Environmental Setting and Regulatory Framework are therefore unchanged in the RDPEIR. The environmental baseline for the analysis of impacts related to water supply in Section 3, Water Resources, includes implementation of the Quantification Settlement Agreement and the criteria of SWRCB Decision 1641 and the current biological opinions issued by the U.S. Fish and Wildlife Service and National Marine Fisheries Service. The US District Court for the Eastern District of California remanded, but did not vacate, the Biological Opinions and Reasonable and Prudent Alternative on the Coordinated Long-Term Operation of the CVP and SWP. Speculating on the future outcomes of the Coordinated Quantification Settlement Agreement cases or the remanded biological opinions would be inappropriate under CEQA.

RLO033-30

inaccuracies in many of the resource categories analyzed in the DEIR and RDEIR. This is a deficiency that must be corrected throughout the documents to ensure the legally adequate disclosure of existing conditions and potential project environmental impacts.

Studies Cited In The Delta Plan Were Previously Found To Have Been Used Improperly To Justify Measures That Would Restrict The Quantity Of Water Conveyed Through The Delta

The Council's conclusion that studies, particularly those outlined below, demonstrate the need for reduced quantities of water conveyed through the Delta is foundational to various aspects of the revised Delta Plan. Simply put, those studies do not support the Council's conclusion. The United States District Court found that they did not justify the reductions on water provided in the biological opinions (BiOps) issued for long-term operations of the Central Valley Project and State Water Project.

The revised Delta Plan cites to and relies upon various studies and articles prepared by Wim Kimmerer and Frederick Feyrer for propositions related to the impacts of Delta turbidity and salinity on fish rearing (Revised Delta Plan p. 139); invasive plants and bass predation on fish population (Revised Delta Plan p. 152); and the correlation, alleged by Feyrer, between the location of X2 and Delta smelt population abundance (Revised Delta Plan p. 231). Mr. Feyrer's work is especially suspect, as the court found it scientifically unacceptable in many respects, especially regarding X2. (See *Consol. Delta Smelt Cases* (E.D. Cal. 2011) 812 F.Supp.2d 1133.) These pervasive problems include Mr. Feyrer's: (1) attempt to prove a correlation in a graph, while improperly using the same data on both axes (which itself induces a correlation); (2) using the "scientifically improper" "chaining" of the results of multiple modeling efforts together without accounting statistically for the error introduced at each step; (3) considering abiotic habitat alone rather than any of the biotic factors that have a greater impact; (4) failing to separate salinity from turbidity; and (5) failing to recognize and account for a significant portion of the delta smelt population that lived in the Cache Slough. (*Id.* at 1153-1156.) Ultimately, in considering all the evidence, including Kimmerer's and Feyrer's work, the court concluded that there was "no support for a direct link between X2 and smelt abundance." (*Id.* at 1202, emphasis added.) Kimmerer's work must also be used with caution, as the court also found that it did not support some of the propositions for which it was being used in the BiOps. (*Consol. Salmonid Cases v. Locke* (E.D. Cal. 2011) 791 F.Supp.2d 802, 903 [salmonid BiOp's "interpretation and use of Kimmerer and Nobriga (2008) was not accurate"]; see also *Delta Smelt Consol. Cases v. Salazar* (E.D. Cal. 2010) 760 F.Supp.2d 855, 877 [noting Kimmerer (2008) has a number of disclaimers and caveats, limiting the purposes for which it can be cited], 893 [delta smelt BiOp inappropriately relied on Kimmerer regarding specific flow measures that reduced water exports].) The Delta Plan and supporting EIR should not make the same mistakes.

RLO033-31

2. ***Lack of Authority Notwithstanding, the EIR Avoids Analysis of Impacts by Limiting the Geographical Scope of Analysis and Deferring Analysis to an Unspecified Future Date.***

One of CEQA's fundamental purposes is to ensure that public agencies take responsibility for the impacts that their projects have on the environment and the public. Courts have held that CEQA "requires public officials, in approving environmentally detrimental projects, to justify their decisions based on counterbalancing social, economic or other benefits, and to point to substantial evidence in support." (*Communities for a Better Environment v.*

RLO033-32

Response to comment RLO033-31

This is a comment on the project, not on the EIR. The studies cited in the comment did not serve as the basis for the significance criteria or the impact conclusions in the PEIR.

Response to comment RLO033-32

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 encourage other agencies to reduce their reliance on the Delta and develop local and regional water supplies. Other agencies will propose such projects and will control their development and environmental review. This EIR cannot, practically or legally, speculate about the particular projects that may be developed or about those projects' environmental impacts. Accordingly, 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. The Water Supply Reliability subsection of sections 3 through 21 analyzes the impacts of local and regional water supply projects. Please refer to Master Response 2 concerning the EIR's programmatic approach to analyzing environmental impacts, and Master Response 5 concerning Delta Plan Policy WR P1.

California Resources Agency (2002) 103 Cal.App.4th 98, 124.) CEQA includes such a purpose in order to "enable the public to determine the environmental and economic values of their elected and appointed officials, thus allowing for appropriate action come election day should a majority of the voters disagree." (State CEQA Guidelines, § 15003(e) [citing *People v. County of Kern* (1974) 39 Cal.App.3d 830].) Despite these requirements, both the DEIR and the RDEIR attempt to obfuscate the true impacts of the Delta Plan, by repeatedly claiming that the Council's action is merely the adoption of the Plan and that it is really only the later activities of "other agencies" that will cause impacts on the environment. (E.g., EIR p. 2B-1 et seq.) Although both the DEIR and RDEIR do acknowledge significant and unavoidable impacts in numerous resource areas, the repeated attempt to deflect responsibility for those impacts onto other agencies is improper under CEQA. The EIR states that the connection between the Plan and future activities is "complex" and "unclear." Contrary to these statements, it is plainly evident that, should the Delta Plan's WR P1 be enforced notwithstanding the Council's lack of authority to do so, local agencies may need to look at and develop alternative sources of water. That simple and clear connection should be set forth in both the DEIR and RDEIR. Finally, it is not enough to merely say that impacts may be significant and then forego any detailed discussion of what the exact impacts may be. (*Keep Jets Over the Bay Comm. v. Bd of Port Commrs.* (2001) 91 Cal.App.4th 1344, 1371 [an EIR cannot simply state an impact is significant without first providing its analysis].) The foreseeable development of these other sources is a direct result of the proposed project, and the environmental impacts of developing these sources must be disclosed and analyzed in the Delta Plan EIR. The Council has the obligation to make a good faith effort to determine what the potentially significant impacts may be related to this and to disclose them. RLO033-32

Every section of the DEIR states that the analysis focuses on a "study area defined as the geographic area in which the majority of the potential impacts are expected to occur." (E.g., DEIR pp. 9-1, 10-1, 11-1.) The DEIR goes on to make clear that this area of analysis consists of the "Delta and Suisun Marsh." (E.g., DEIR pp. 9-1, 10-1, 11-1.) The RDEIR, then, refers back to and incorporates the DEIR's methodology, such that any defects in the DEIR are incorporated into the RDEIR as well. Although the EIR claims to also take a general look at areas outside the Delta, the EIR states that those areas are analyzed "to a lesser extent." (E.g., EIR p. 9-1.) For example, visual resources and geology, among other sections, have no analysis for areas outside of the Delta, despite the high likelihood of significant impacts in those areas due to Delta Plan's effort to restrict the quantity of water conveyed through the Delta; water conservation methods, which would likely reduce landscaping and greenery; and subsidence which may result from increased pumping of groundwater. The repeated admission that the impacts within the Delta region are the ones upon which the EIR focuses constitutes a violation of CEQA. Specifically, CEQA case law makes it very clear that a lead agency has the obligation to analyze all reasonably foreseeable impacts, even if they occur hundreds of miles away. (E.g., *County Sanitation District v. Kern County* (2005) 127 Cal.App.4th 1544.) For the Council to imply that impacts further away from the Delta are somehow less important and thus in less need of analysis or mitigation is improper and seeks to obscure the true impact of the proposed project. The EIR must be revised to correctly identify all impacts at the same level of detail, without regard for where they occur. RLO033-33

Additionally, the RDEIR – like the DEIR – defers analysis of nearly every single impact. The entire analysis is premised on the assumption that other agencies will conduct additional CEQA review at a later time and will work out what the Plan's impacts are and what mitigation RLO033-34

Response to comment RLO033-33

Please see Master Response 2.

Response to comment RLO033-34

Please see Master Response 2. Please also see response to comment RLO033-32.

is appropriate for those impacts at a future date. This failure to provide any meaningful or detailed analysis of the proposed project's impacts violates CEQA. (See, e.g., *Stanislaus Natural Heritage Project v. County of Stanislaus* (1996) 48 Cal.App.4th 182, 206.) Since the Council's proposed project assumes reduced water conveyed through the Delta, it is incumbent upon the Council to fully analyze the impacts that will occur as a result of water suppliers having to obtain substitute water from other sources and/or implement enhanced conservation efforts if feasible. Both the DEIR and the RDEIR fail to do this, instead repeatedly deferring the analysis to other agencies. (See, e.g., DEIR pp. 3-85 [water supply impacts may be determined to be significant by other agencies at a future date]; 9-35 [construction impacts would be analyzed by other agencies at a later time]; 9-41 [odors to be analyzed at a later time]; 9-41 [health risks to be analyzed at a later time]; 10-46 [cultural impacts to be determined at a later time].) The RDEIR commits the same error under CEQA. (RDEIR pp. 6-8 [land use impacts to be determined at a later time]; 6-10 [construction impacts to be determined at a later time]; 6-12 [water quality impacts to be determined at a later time].) RLO033-34

CEQA states that a program EIR should include "a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action." (State CEQA Guidelines, § 15168(b), emphasis added.) In fact, the purpose behind a program EIR is to "deal with the effects of the program as specifically and comprehensively as possible" in order to allow other agencies to perform a more focused and limited review of project-specific impacts. (*Ibid.*) Instead of providing that more exhaustive consideration of impacts, the DEIR and RDEIR defer meaningful analysis of water supply and other impacts to other agencies at a future time. This is impermissible under CEQA. RLO033-35

3. The DEIR and RDEIR Fail to Make Factually Supported Significance Conclusions.

Both the DEIR and RDEIR fail to provide a good faith disclosure of potential environmental impacts. The DEIR and RDEIR repeatedly state that the proposed project's impacts may be mitigated to a level of less than significant or may be significant and unavoidable. And following this discussion, the Council calls most impacts potentially significant. As one example, the DEIR states that, "it is possible that air quality impacts of projects encouraged by the Delta Plan may be less than significant, or could be mitigated to a less-than-significant level…. and it is possible that significant and unavoidable impacts on air quality could occur." (DEIR p. 9-27.) The RDEIR, likewise, repeatedly states that it "is possible that biological resource impacts of projects encouraged by the Revised Project may be less than significant, or could be mitigated to a less than significant level [but that] the details of many of the aspects of projects encouraged by the Revised Project are not currently known." (E.g., RDEIR p. 4-3.) Accordingly, "it is possible that significant and unavoidable biological resource impacts could occur." (*Ibid.*) The public cannot be expected to intelligently comment upon an EIR that cannot definitely identify whether a given impact would be significant or insignificant. The Council, as the lead agency, has the obligation under CEQA to analyze the impacts of its proposed project and to make a good faith effort obtain the information needed to reach a factually-supported significance conclusion rather than put forth an EIR that merely speculates as to any number of potential outcomes. (See, e.g., State CEQA Guidelines, §§ 15083, 15086 [consultation with affected agencies and the public is required to assist in the determination of impacts].) Where – as here – an EIR fails to provide a "meaningful assessment of the true scope of numerous potentially serious adverse environmental effects," courts have struck down the RLO033-36

Response to comment RLO033-35

Please see Master Response 2.

Response to comment RLO033-36

Please see Master Response 2.

CEQA document as inadequate. (*Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1220-21.) The EIR has failed to provide a good faith, public disclosure of the proposed project's impacts, and the EIR thus fails under CEQA and must be revised. RLO033-36

4. The Deficient Water Resources Analysis Ignores Known Factors and Constraints Affecting Water Supply Availability and Ignores Foreseeable Impacts of Water Resources Mitigation Measures.

The analysis regarding Water Resources is seriously deficient. For example, the DEIR states that there are three DWR Surface Water Storage programs that could help achieve the goal of greater water supply reliability. (DEIR pp. 2A-12, 3-77.) The RDEIR's analysis is based on the DEIR's assumptions. However, two of the three storage projects mentioned are north of the Delta. This means that the stored water will need to be sent through the Delta, and it is reasonably foreseeable based on existing and past conditions, that conveyance of that water would be limited by restrictions under SWRCB water right and water quality decisions, measures under the federal Endangered Species Act, and possibly measures under the California Endangered Species Act, among others. Similar regulatory prescriptions will exist for the foreseeable future. Further, the RDEIR fails to disclose what the water management related restrictions could be, much less analyze them and how they will affect the ability to convey water from these new storage projects through the Delta. Fundamentally, however, regulating water supply and water quality is within the jurisdiction of the SWRCB, not the Council, and it is not appropriate for the Council to merely assume what will be done by another agency without supporting evidence.

In its very short discussion of the supply of water conveyed through the Delta on pages 3-14 to 3-15 of the DEIR and occasional mention elsewhere, the RDEIR fails to analyze that water supply and the factors that impact it. While the DEIR states the raw quantities of water conveyed through the Delta in 2007 through 2009, it does not disclose how these quantities of water have varied over time and how they vary depending on the water year type, or how those numbers have been impacted by the relevant biological opinions and other restrictions. These failures violate CEQA, and these same failures exist in the RDEIR. Significantly more disclosure, discussion, and analysis needs to be added. RLO033-37

The DEIR notes that, in many areas, existing water supplies are fully used, further groundwater development is limited due to declining and poor quality groundwater, and existing reductions are already challenging the areas' ability to meet its water needs. (E.g., DEIR p. 3-69 to 3-70.) Despite this, both the DEIR and the RDEIR simply assume that the quantity of water that can be conveyed through the Delta can be decreased under the Delta Plan and unidentified new wells, desalination plants, water storage, recycled water, and transfers can easily make up this loss of water, without any disclosure or analysis of how this would be possible, and with the ultimate conclusion that finding and using these other sources will have a less-than-significant impact on groundwater. (RDEIR p. 3-2.) Assertions in the EIR without support do not constitute substantial evidence. In addition, Mitigation Measure 3-2, which is in both the DEIR and the RDEIR, for impacts on groundwater, merely requires surveys made of new wells to see if their operation affects water levels in other wells, installation of sheet piles, or, if not feasible, trucking in water supplies to satisfy the well user's water supply needs. (RDEIR p. 3-18.) This does not address how the project will reduce impacts to groundwater, disclose how much water

Response to comment RLO033-37

As the commenter notes, restrictions on through-Delta conveyance are not within the scope of the Delta Plan. Please see master Response 5 for a discussion of potential SWRCB flow objectives.

CEQA does not require the EIR to provide an exhaustive analysis of existing or historical conditions. The EIR's description of the Delta Plan's environmental setting is sufficient for the program-level evaluation of its impacts.

Regarding the ability of local and regional supply projects to meet demand, please see Master Response 5. Master Response 5 also discusses the Delta Plan's policies encouraging sustainable groundwater use. The policies, in combination with existing law and the mitigation measures identified in the EIR, will likely ensure that impacts to groundwater resources will be less than significant. The EIR, however, concludes that these impacts could be significant and unavoidable due to the uncertainty regarding the precise nature of the projects that the Delta Plan will encourage. Regarding the environmental impacts of mitigation measures, please see Master Response 4. Truck trips required for water hauling would be similar to those required for construction of projects encouraged under the Delta Plan, and thus would not cause any impacts different from the potentially significant and unavoidable impacts that the EIR discusses related to air quality and traffic.

The EIR clearly concludes that operation of the local and regional water supply projects encouraged under the Delta Plan would have a beneficial impact related to water supply reliability (DPEIR at 3-82; RDPEIR at 3-5).

might have to be trucked in, where water is available to be trucked in from, or the fact that trucking in water supplies on a wide-spread basis would have significant air quality, traffic, and other impacts. The significant impacts of mitigation measures require disclosure and analysis in the EIR. (State CEQA Guidelines, § 15126.4(a)(1)(D).)

The DEIR contains a significance conclusion for construction-related impacts to "Reliable Water Supply," but not from proposed project operations. (See DEIR pp. 3-80 to 3-81.) Similarly, neither the DEIR nor the RDEIR has any conclusion of significance for Reliable Water Supply, Impact 3-3a; the assertion, notwithstanding the Council's lack of authority to carry out, that the proposed project will "Substantially Change Water Supply Availability to Water Users That Use Delta Water." The two-sentence discussion of this statement (DEIR p. 3-82) is clearly inadequate in any case, as it, like the rest of the EIR, merely assumes the feasibility of replacement water, despite the fact that the EIR elsewhere notes the lack of groundwater, the near-impossibility of constructing new dams or desalination plants, and other problems that will prevent the development of new water sources. The same defect exists in the RDEIR. (RDEIR p. 3-5.) The DEIR and RDEIR assume some unknown level of significant decrease in the availability of water conveyed through the Delta. Such losses would result in a significant impact on water supply for water users, particularly because most have already had their water supplies cut back. The environmental impacts of this must be disclosed, evaluated, and mitigated. RLO033-37

5. The Deficient Discussion of Colorado River Water Supplies Fails to Disclose Known Uncertainties.

The DEIR's discussion of the availability of Colorado River water supplies and the QSA (DEIR p. 3-69) is deficient, as it does not describe where or how such supplies are used or acknowledge that the QSA and related agreements are currently in litigation. The EIR should recognize this, and disclose how the uncertainty in the outcome of the litigation could potentially adversely affect Colorado River water deliveries to Southern California. RLO033-38

6. The Deficient Biological Resources Discussion Fails to Disclose Special Status Species and Potential Impacts.

The Biological Resources analysis is inadequate under CEQA, as it fails to disclose the special status species in the areas outside the Delta that will be impacted by reductions in the quantity of water conveyed through the Delta, much less analyze the potential impacts to them (notwithstanding the Council's lack of authority to regulate exports). Furthermore, and as set forth above, the biological "analysis" does not actually describe potential impacts, instead stating that impacts may or may not be significant – the EIR does not provide sufficient information to make a determination, in violation of CEQA. (E.g., EIR p. 4-3.) RLO033-39

7. Deficient Land Use Analysis Fails to Analyze Significant Impacts on Land Uses Outside the Delta.

The Land Use analysis is inadequate under CEQA, as it does not analyze the impacts of the proposed project on land uses in areas outside the Delta (see DEIR p. 6-26). The level of impacts on the areas outside the Delta that would potentially be impacted by the proposed project requires the same level of consideration as areas in the Delta. Also, while there is a single figure showing the land uses in California, the impact of the proposed project on these land uses is not RLO033-40

Response to comment RLO033-38

Please see Master Response 1. 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), are compared to the projected conditions under the proposed Delta Plan and the alternatives.

Response to comment RLO033-39

Regarding impacts to biological resources related to the flow objectives encouraged under the Delta Plan, please see Master Response 5; regarding the EIR's approach to the analysis of impacts, please refer to Master Response 2.

Response to comment RLO033-40

Section 6 of the EIR considers whether the Delta Plan would either physically divide an established community or conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect. Its analysis includes all such potential projects under the Delta Plan, including those outside the Delta. For example, on page 6-47, the Draft PEIR considers whether surface storage facilities in the "Delta watershed and in areas outside of the Delta that use Delta water" would physically divide an established community. A covered action will be consistent with Delta Plan Policy DP P1 as long as any urban development proposed by the action is within an area designated for such development under existing city and county general plans. It therefore by definition creates no conflict with those plans.

disclosed, much less analyzed, despite the fact the proposed project will have a host of significant impacts on an area that, as stated in the DEIR, "represents 74 percent of the incorporated population in the state and 60 percent of the total state population." (DEIR p. 6-43.) Furthermore, neither the DEIR nor the RDEIR address the impacts of displaced population as a result of the Delta Plan's intended moratorium on all land use development beyond that already identified on existing general plans. (See revised Delta Plan Policy DP P1 [forbidding development on any Delta lands that are not already designated for development in existing city and county general plans].) Indeed, the land use analysis does not even mention Policy DP P1, even though that policy seeks to shut down future growth and expansion of all cities/counties within the Delta and to displace that growth and development to other areas of the state. RLO033-40

8. The EIR's Deficient Discussion of Multiple Resources Fails to Analyze or Disclose the Plan's Impacts Throughout California.

The Visual Resources analysis is inadequate under CEQA, as it does not analyze or disclose the visual impacts of reducing water deliveries to 24 million acres – 23% of the entire land mass of California, or any other visual impacts to areas outside the Delta. (DEIR p. 8-15.) RLO033-41 Instead, it focuses solely on the areas in the Delta. The Geology and Soils section also fails to analyze impacts on areas outside the Delta, despite the significant potential for subsidence due to increased groundwater pumping that could result if the proposed project were to be implemented as proposed. These errors, which are evident in the DEIR, are equally present in the RDEIR. RLO033-42

9. The EIR's Deficient Air Quality Analysis Fails to Even Qualitatively Analyze Impacts, Which Are Likely to Include Increased Particulate Emissions, Increased Emissions Due to Use of Desalination Plants, and Impacts to Sensitive Receptors.

The Air Quality analysis is inadequate, insufficiently detailed, and fails to provide even a basic public disclosure of the proposed project's impacts as required by CEQA. These comments apply equally to the DEIR, which is defective, and to the RDEIR which uses the same methodologies and approaches for "determining" impacts as did the DEIR. (RDEIR § 9.4.1 ["The impact analysis methods and significance criteria are the same as the methods presented in the Draft PEIR."]; see also §§ 3.4.1, 4.4.1, 5.4.1, etc.)

Although the EIR states that any quantification of air quality impacts would be too speculative to provide in the EIR (EIR p. 9-18), the Council has failed even to provide an adequate qualitative discussion of impacts. The EIR fails to provide the thresholds of significance that are used in various air basins and fails to give a potential magnitude of impacts as a result of the proposed project. This makes it impossible to determine whether the proposed project will result in impacts that are twice the applicable thresholds of significance or 200 times the applicable thresholds. RLO033-43

Further, the EIR provides no analysis of the types of impacts that might occur within each air basin, instead providing just a couple of paragraphs of general discussion to describe significant impacts the might occur state-wide. This general disclosure provides little more than a flat conclusion that the Council has no idea what the impacts of the proposed project actually are and flies in the face of CEQA's requirement that a good faith analysis be done before reaching a significance conclusion. For example, potential risks from particulate emissions in the Central Air Basin due to the proposed project's assumed reductions in the quantity of water

Response to comment RLO033-41

Please see Master Response 2 regarding the study areas for the EIR's impact analyses.

Response to comment RLO033-42

Please see Master Response 2 regarding the study areas for the EIR's impact analyses.

Response to comment RLO033-43

Please see Master Response 2 regarding the EIR's programmatic approach to the analysis of environmental impacts. The EIR is not required to discuss or provide other agencies' thresholds of significance. The EIR considers the air quality impacts of fallowing agricultural land. See DPEIR at 9-17.

conveyed through the Delta are neither identified nor analyzed. The potential for certain air basins (i.e., coastal basins) to disproportionately bear the impacts of desalination plants is not discussed. The Council must significantly expand its discussion to actually analyze on a basin-by-basin level what impacts are likely to result from implementation of the proposed project.

The EIR also provides no real discussion of sensitive receptors or what specific pollutants those receptors may be exposed to. Although the EIR states that impacts to sensitive receptors may be significant (or insignificant), the EIR does not clarify what those actual impacts are. It is not enough to merely state that significant impacts may result – the Council must describe the connection between the potentially significant emissions and the actual health risks that may occur. (See *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1219 [EIR struck down where it "failed to correlate the identified adverse air quality impacts to resultant adverse health effects"].) Further, the EIR must identify whether certain communities or schools are more at risk than others for being exposed to such pollutants based on those communities' proportionate need for replacement water facilities. RLO033-43

10. The EIR's Deficient Greenhouse Gas Analysis Ignores the Vast Array of Water and Energy Projects Proposed by the Delta Plan, Despite the Massive Amounts of Electricity They Will Require.

The Greenhouse Gas ("GHG") analysis is inadequate, insufficiently detailed, and fails to provide even a basic public disclosure of the proposed project's impacts as required by CEQA. These comments apply equally to the DEIR, which is defective, and to the RDEIR which uses the same methodologies and approaches for "determining" impacts as the DEIR. (RDEIR § 21.4.1 ["The impact analysis methods and significance criteria are the same as the methods presented in the Draft PEIR."]; see also §§ 3.4.1, 4.4.1, 5.4.1, etc.)

The entire "analysis" of construction and operational GHG emissions are contained on pages 21-3 and 21-4 of the RREIR. Given the vast array of water transport, water treatment, water conservation, and energy projects contemplated by the proposed project, and given that water transport and treatment impose significant energy demands – this two page "analysis" is inadequate. Moreover, and as with other impact areas, the RDEIR concludes that it would be "speculative" to try and provide any kind of more-detailed analysis. (RDEIR p. 21-4.) This in no way meets CEQA's requirements for a good faith disclosure of potential impacts. RLO033-44

As limited examples of items that need to be addressed in both the DEIR and the RDEIR, the Council must discuss and attempt to analyze how the potential fallowing of thousands of acres of agricultural lands (lands which previously grew crops or trees which remove CO2 from the air) would contribute to climate change. Similarly, "[t]he Revised Project would encourage projects such as new or expanded reservoirs, groundwater production facilities (wells and pipelines), ocean desalination facilities, and recycled water facilities" as potential sources of replacement drinking water (RDEIR p. ES-2), yet the RDEIR fails to discuss the fact that all of these options require massive amounts of electricity to process and treat water. Since electricity generation is one of the largest producers of GHGs, the failure to discuss this impact is inadequate under CEQA. Another issue is that the proposed project could generate GHGs through the construction and operation of replacement water supply facilities. No mention is made of this fact. Both the DEIR and RDEIR must be revised to provide a detailed discussion of climate changes, including discussing what impacts certain communities may see (i.e., the

Response to comment RLO033-44

Please see Master Response 2 regarding the EIR's programmatic approach. Section 21 of the EIR considers the greenhouse gas-related impacts of the operation of recycled water facilities, along with other types of projects that the Delta Plan would encourage to further water supply reliability and water quality, and of the fallowing of agricultural land (DEIR at 21-11, 21-16, 21-20; RDEIR at 21-4, 21-9, 21-16). Because climate change is a global phenomenon, the EIR is not required to document the particular impacts of the Delta Plan's contribution.

RLO033-44

impacts of climate change are different depending on whether one lives in a coastal community, the Delta area, the central valley, or the mountains).

11. The EIR's Analysis Regarding Delta Flood Risk is Deficient

The RDEIR's discussion regarding Delta flood risk is deficient. First, the statement in lines 6-8 on page 5-13 should be expanded to state that most, if not all, ecosystem restoration projects will reduce the flood risk impacts by expanding flood conveyance and removing infrastructure, and by providing increased protection for people and property.

Second, the RDEIR incorrectly concludes that the Revised Project does not encourage projects promoting placement of additional housing within the Delta because current efforts on Bethel Island to improve the levees to an equivalent 100-year FEMA urban standard could ultimately facilitate additional urbanization, false sense of security, and increased potential loss of life and property.

RLO033-45

Third, Mitigation Measure 5-4 should be expanded. Even with the proposed project, preventing floods is impossible[2], especially floods from seismically induced levee failures. Therefore, the portfolio of economically and ecologically based risk-reduction strategies for the Delta must prioritize investments in the levee system. Risks can be reduced through an emergency preparedness, response, and recovery system; appropriate land uses; land acquisition and conversion to ecosystem functions; subsidence reversal strategies; and strategic levee improvements. The mitigation measures in the Draft EIR should recognize and evaluate the following: (1) Investment in alternative risk reduction strategies which include comparing levee upgrades to flood-proofing, land acquisition and conversion to habitat; subsidence reversal; relocation of infrastructure, and flood insurance, (2) Long-term drivers of change and economic sustainability before establishing funding priorities, and (3) Integrated risk reduction investments with the coequal goals through the coordinated transition of some islands to habitat.

12. The EIR Fails to Consider Potentially Significant Impacts

CEQA requires analysis of the potentially significant impacts of the Council's proposed project. (State CEQA Guidelines, §§ 15064, subd. (d), 15126.2, subd. (a), 15130, 15355; *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564; *Napa Citizens for Honest Government v. Napa County Board of Supervisors* (2001) 91 Cal.App.4th 342, 361.) The EIR does not satisfy CEQA because it fails to adequately describe and disclose the potentially significant effects of the proposed project, some of which has been previously identified, such as effects associated with reductions in the quantity of water conveyed through the Delta, impacts of the use of substitute water sources such as groundwater, resulting overdraft and/or ground subsidence, impacts of likely increased water quality from alternative supplies, adverse impacts to air quality from increased dust and particulate matter or from actions to obtain alternative

RLO033-46

[2] DWR August 2012 press release – "According to the 2009 Delta Risk Management Strategy prepared by the Department of Water Resources, a ground motion equivalent to less than 20 percent of the acceleration of gravity would be capable of collapsing, or liquefying, the loose, sandy soils in many Delta levees. An earthquake capable of generating such motion has a 45 percent chance of being exceeded in the western Delta in the next 30 years, according to experts. The hazard decreases farther from the Bay; experts put the probability at 26 percent in the eastern Delta. **However, the hazard increases each year that passes without an earthquake."** (Emphasis added.)

Response to comment RLO033-45

The comment regarding the flood protection benefits of ecosystem restoration is noted. The Delta Plan does not induce substantial population growth in an area, either directly or indirectly, because of the Delta Plan policies DP P1 that restricts new urban development, RR P2 that requires flood protection for residential development in rural areas, ER P3 that protects opportunities to restore habitat, and WR P1 that requires reduced reliance on the Delta and improve regional self reliance. The suggested additions to mitigation measures are already contained within mitigation measure 5-4, as well as Delta Plan policies RR P1, RR P2, ER P3, ER P4, and recommendations RR R1, RR R2, RR R3, ER R1, and DP R7.

Response to comment RLO033-46

Please see the responses to the preceding comments.

RLO033-46

supplies (new facilities, increased use of wells), and social and economic impacts of reduced water supplies on local communities.

RLO033-47

Further, the Council has not adequately considered economic and social factors in determining the feasibility of proposed mitigation measures to reduce or avoid the Delta Plan's significant environmental effects. (State CEQA Guidelines, § 15131m subd. (c).) Severe impacts on agricultural communities, including job and income losses, increased food and housing costs, and lost economic output, are the reasonably foreseeable result of the proposed project. (See, e.g., Michael, et al., A Retrospective Estimate of the Economic Impacts of Reduced Water Supplies to the San Joaquin Valley in 2009 (2010).) The EIR ignores these effects and their relationship to the feasibility of the Proposed Regulations and to mitigation measures.

RLO033-48

Similarly, the EIR fails to analyze the impacts of the Proposed Regulations from the loss of productive agricultural lands due to fallowing, levee setbacks, habitat restoration, or limitations on use based on potential for restoration. The EIR ignores the relationship of these impacts to the feasibility of proposed regulations and mitigation measures. In short, and as previously presented, the EIR continues to ignore the impacts of its proposed regulatory policies.

E. Alternatives.

RLO033-49

The Comparison of Alternatives (RDEIR p. 25-1) fails to identify and quantify the environmental impacts of the Revised Project as compared to each alternative. It also fails to identify how each iteration of the project meets the project objectives. As a result, it is impossible for the reader to meaningfully compare the alternatives, nor is a reader able to determine if any alternatives are capable of avoiding or lessening the significant impacts of the project. (See State CEQA Guidelines, § 15126.6(b).)

The RDEIR compares the Revised Project to the original Proposed Project, the No Project alternative, and four additional alternatives. However, not a single comparison is based on any quantitative evaluation of an alternative's impacts. Instead, the alternatives are described as having a potentially lesser or greater impact on a specific resource. No details are provided regarding how much less or how much greater the impacts would be for any particular alternative. No details are provided regarding where the differences in impacts would occur geographically, nor is it clear if the greater or lesser relative impacts involve significant effects versus less than significant effects. In many cases, no details are given as to why the differences in a certain impact's magnitude occur. Without these salient details, the comparison of alternatives is rendered meaningless and certainly does not meet CEQA's mandate that the EIR include "sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison." (State CEQA Guidelines, § 15126.6(d).) These missing details include, but are not limited to the following:

- The proposed project (Revised Project, the Proposed Project), and Alternative 3 have "less water-supply impact than Alternative 2" but the RDEIR fails to quantify to what degree. (RDEIR p. 25-6.)

Response to comment RLO033-47

The economic impacts described in the comment do not appear to relate to the feasibility of any mitigation measure identified in the EIR.

Response to comment RLO033-48

Please see Master Response 5. Section 7 of the EIR determines that the reduced availability of Delta water could lead to the conversion of agricultural land to other uses, a significant environmental impact (DPEIR at 7-21).

Response to comment RLO033-49

Please see Master Response 3.

- Alternative 2 is described as "contribut[ing] more to improving conditions for biological resources" yet the RDEIR does not identify in what quantity, for which particular resources, or where this would occur. (RDEIR p. 25-7.)

- The No Project Alternative and Alternatives 1A, 1B and 3 are described as having "a lower potential than the Revised Project to convert agricultural lands or timberland/forest resources to other uses" but again, the comparison provides no information in the difference of converted acreage, or the location of the land most likely to be converted. (RDEIR p. 25-9.)

- Air quality impacts from operation of large or complex facilities such as reservoirs, desalination or water treatment facilities or major conveyance systems are briefly referred to, but no even rough estimate of the difference in potential air quality impacts between the alternatives is identified. (RDEIR p. 25-9, 10.)

- Impacts on recreational facilities and activities under the No Project Alternative, the proposed project Alternative and Alternatives 1A, 1B, 2 and 3 are described as being "less than under the Revised Project" but again, there are no quantities or even orders of magnitude identified to provide any meaningful comparison. (RDEIR p. 25-14.) RLO033-49

Because the alternatives analysis is based solely on general qualitative comparisons, it is wholly unclear from the text whether the alternatives reduce any significant impacts posed by the Revised Project or the original Proposed Project, defeating the very purpose of the alternatives analysis. (State CEQA Guidelines, § 15126.6(b).)

There is no meaningful comparison of each alternative to the project objectives. It is unclear from the short descriptions of each alternative whether each meets the project objectives in total, in part, or not at all. The very purpose of identifying the objectives sought by a project is to evaluate a reasonable range of alternatives. (State CEQA Guidelines, § 15124(b).) Each alternative must be compared against the project objectives in order for decision makers to determine the acceptability of each alternative, and meaningfully compare them against one another.

The alternatives comparison of the RDEIR does not include a sufficient degree of analysis to provide decision makers with the information needed to make an intelligent judgment on the project. (*Napa Citizens for Honest Govt. v. Napa Cnty Bd. of Supervisors* (2001) 91 Cal.App.4th 342, 356.) As written, the RDEIR does not include an adequate comparison of alternatives. No quantitative analysis of each alternative's impacts is provided, and no comparison of each alternative's ability to meet the project objectives is given. Without this essential information, there can be no meaningful alternatives analysis, as required by CEQA.

F. Cumulative Impacts.

1. The Cumulative Impacts Discussion Is Deficiently Vague.

The cumulative impacts analysis of the RDEIR identifies the "past projects, other current projects, and probable future projects" that may contribute to cumulative impacts along with the Revised Project in only the vaguest of terms. (RDEIR p. 22-1.) RLO033-50

Response to comment RLO033-50

The past, present, and reasonably foreseeable future projects considered in the cumulative impacts analysis are listed in Table 22-1. Concerning the EIR's programmatic approach to the analysis of environmental impacts, please see Mater Response 2.

For example, under Water Resources, other projects identified as possibly leading to cumulative impacts to water resources include specific projects such as the San Diego County Water Authority Emergency Storage Project and El Monte Valley Mining, Reclamation, and Groundwater Recharge Project as well as general and undefined projects such as "fish screen projects." (RDEIR p. 22-2.) No locations or project descriptions are provided, and there is no discussion of how cumulative impacts from these other projects were calculated and added to those of the Revised Project. Additionally, as discussed above, the impacts of the Revised Project are so vague and uncertain, there is no meaningful way to assess their contribution to cumulative impacts in the region. RLO033-50

2. No Quantitative Comparison of Cumulative Impacts Between the Original Proposed Project and the Revised Project.

The RDEIR's cumulative impacts analysis provides only vague, qualitative comparisons between the cumulative impacts of the Revised Project and the original Proposed Project. For each analysis area, the impacts of the Revised Project are only identified as being "greater than," "less than," or "the same" as those of the original Proposed Project. No quantitative information, not even to identify vague orders of magnitude, are provided in the cumulative impacts analysis. Examples of deficient cumulative impacts analysis include, but are not limited to, the following:

- In each of the analysis areas, from water resources to climate change and greenhouse gas emissions, the Revised Project's cumulative impacts related to reliable water supply actions are described as being "greater than" the Proposed Project. Absolutely no additional information regarding the quantity of the additional cumulative impacts is provided. (See RDEIR pp. 22-3 to 22-24.) RLO033-51

- Similarly, in each of the analysis areas, from water resources to climate change and greenhouse gas emissions, the Revised Project's cumulative impacts related to Delta ecosystem restoration actions are also described as being "the same" as the Proposed Project, however no calculations to support this assertion are provided. (See RDEIR pp. 22-3 to 22-24.)

- Similarly, in each of the analysis areas, from water resources to climate change and greenhouse gas emissions, the Revised Project's cumulative impacts related to Delta enhancement actions are described as being "greater than" the Proposed Project, however no calculations to support this assertion are provided. (See RDEIR pp. 22-3 to 22-24.)

Response to comment RLO033-51

The Recirculated Draft PEIR's approach to analysis is discussed the response to comment RLO033-5, and the programmatic approach of the EIR as a whole is discussed in Master Response 2.

G. The Council's Proposed Regulations Raise Additional Concerns About CEQA Compliance[3]

1. The Proposed Regulations Directly and Substantially Conflict with Controlling Law

Under the APA, proposed regulations purporting to implement or interpret a statute must be consistent and not in conflict with statutory authority, and must be reasonably necessary to effectuate the statutory purpose. (Gov. Code, § 11342.2.) Regulations are invalid if they impair of conflict with the statute they purport to implement. (*California Association of Psychology Providers v. Rank* (1990) 51 Cal.3d 1, 11; *Esberg v. Union Oil Co.* (2002) 28 Cal.4th 262, 269.) No deference is accorded to the agency proposing the regulations as to whether it has exceeded its statutory authority. (*Rank, supra,* 51 Cal.3d at pp. 11-12; *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98, 108-109.)

Section 5001(e)(1)

The proposed regulatory definition of "achieving the coequal goal of providing a more reliable water supply for California" conflicts with the authorizing statute. (Wat. Code, § 85302, subd. (d)(1).) Specifically, the statute mandates that "[t]he Delta Plan shall include measures to promote a more reliable water supply that address all of the following," including "[m]eeting the needs for reasonable and beneficial uses of water." (*Ibid.*) The Council's proposed regulation conflicts with this key criterion identified in the Delta Reform Act to achieve the goal of water supply reliability.

Section 5001(s) RLO033-52

The proposed regulatory definition of "significant impact" impermissibly attempts to alter and amend established CEQA principles regarding baseline conditions and assessment of impacts (direct, indirect, and cumulative), and is in direct conflict with controlling law. (Pub. Resources Code, §§ 21065, 21068; Cal. Code Regs., tit. 14, § 15125; *In re Bay-Delta Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1167-1168; *Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal.4th 310, 315, 320-322; *Citizens for East Shore Parks v. State Lands Commission* (2011) 202 Cal.App.4th 549, 557-566.) The Council has no authority to alter the fundamental framework of environmental review, which is concerned with whether approval of a proposed action may result in an *adverse physical change* in the existing environment. (Pub. Resources Code, §§ 21065, 21068; Cal. Code Regs., tit. 14, §§ 15060, subd. (c)(2), 15061, 15064, 15125, 15358, 15360, 15378, subd. (a); 15382.)

Section 5003(b)(2)(D)

The proposed definition of "covered actions" impermissibly attempts to alter and amend established CEQA principles regarding the definition of a "project," as well as the application of

[3] As established in footnote 1, the Public Water Agencies submitted comments on the drafts of the Delta Plan and on the regulations the Council has proposed for adoption, all of which were attached and incorporated herein by reference. Those comments provide additional information on legal deficiency with the actions proposed by the Council.

Response to comment RLO033-52

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

statutory and categorical exemptions, and is in direct conflict with controlling law. (Pub. Resources Code, § 21065; Cal. Code Regs., tit. 14, §§ 15300.2, subd. (c), 15378; 15382.) Statutory exemptions under CEQA are absolute; they reflect legislative policy determinations and are not subject to any exceptions for "unusual circumstances." (Cal. Code Regs., tit. 14, § 15061, subd. (b)(2); *Sunset Sky Ranch Pilots Association v. County of Sacramento* (2009) 47 Cal.4th 902, 907; *Great Oaks Water Co. v. Santa Clara Water Dist.* (2009) 170 Cal.App.4th 9576, 966, fn. 8; *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98, 128-129.) The Council's proposed regulation directly conflicts with these established principles. Furthermore, "unusual circumstances" as they pertain to categorical CEQA exemptions have been defined and interpreted under CEQA. (Cal. Code Regs., tit. 14, §§ 15300.2, subd. (c); see, e.g., *Banker's Hill v. City of San Diego* (2006) 139 Cal.App.4th 249, 261; *Turlock Irrigation District v. Zanker* (2006) 140 Cal.App.4th 1047; *Santa Monica Chamber of Commerce v. City of Santa Monica* (2002) 101 Cal.App.4th 786, 800; *Fairbank v. City of Mill Valley* (1999) 75 Cal.App.4th 1243, 1260-1261.) The Council has no authority to fundamentally alter controlling law.

Section 5004(b)(3)

The proposed regulation states that "[a]s relevant to the purpose and nature of the project, all covered actions must document use of best available science (as described in Appendix 1A)." While the use of best available science certainly should be encouraged, this regulation appears to exceed the Council's authority to the extent that it imposes higher standards of proof for local agency actions than can be found in the controlling law. (See, e.g., Code Civ. Proc., §§ 1085, 1094.5.) The Council lacks authority to limit or alter the scope of local agency discretion. RLO033-52

Section 5006

The Council's proposed regulation of "improved transparency in water contracting" is redundant of existing policies, as shown in the Council's appendices. Furthermore, any attempt by the Council to alter or amend those policies is inconsistent with supremacy principles under federal law, which governs the contracting process for water supplied by the CVP.

Section 5009

The Council's proposed regulation states that "[s]ignificant impacts to the opportunity to restore habitat at the elevations shown in Appendix 4 must be avoided or mitigated." It is unclear what constitutes an "opportunity to restore habitat," and how such an "opportunity" might be the subject of a potentially significant impact (which much be an adverse *physical* impact under controlling law). (Pub. Resources Code, §§ 21065, 21068; Cal. Code Regs., tit. 14, §§15358, 15382.)

2. The Initial Statement of Reasons Fails to Establish Necessity for Most of the Proposed Regulations

Government Code section 11349.1, subdivision (a)(1), requires OAL to review all proposed regulations for compliance with the "necessity" standard. Government Code section 11349, subdivision (a), defines necessity to mean that "the record of the rulemaking proceeding demonstrates by substantial evidence the need for a regulation to effectuate the purpose of the

No comments

- n/a -

statute, court decision, or other provision of law that the regulation implements, interprets, or makes specific, taking into account the totality of the record." (See also Cal.Code Regs., tit. 1, § 10, subd. (b).) For the reasons set forth below, the proposed regulations fail to comply with this standard.

Section 5001(k)

The proposed regulatory definition of "feasible" merely repeats the language of Public Resources Code section 21061.1. (See also Cal. Code Regs., tit. 14, § 15364.) As such, the regulation is unnecessary and duplicative.

Section 5001(s) RLO033-52

The proposed regulatory definition of "significant impact" conflicts with existing statutory and regulatory definitions of the same term used in the same context. (Pub. Resources Code, § 21068; Cal. Code Regs., tit. 14, § 15382.) The Council's proposed regulation is confusing and unnecessary as well as inconsistent with controlling law. (Pub. Resources Code, § 21068; Cal. Code Regs., tit. 14, § 15382; see also *In re Bay-Delta Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1167-1168; *Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal.4th 310, 315, 320-322; *Citizens for East Shore Parks v. State Lands Commission* (2011) 202 Cal.App.4th 549, 557-566.)

Section 5006

The Council's proposed regulation of "improved transparency in water contracting" is redundant of existing policies, as shown in the Council's appendices. Furthermore, any attempt by the Council to alter or amend those policies is inconsistent with supremacy principles under federal law, which governs the contracting process for water supplied by the federal CVP.

3. The Proposed Regulations are Ambiguous and Confusing

OAL must review each proposed regulation to determine whether it complies with the clarity standard set forth in Government Code section 11349.1, subdivision (a)(3). "Clarity" means "written or displayed so that the meaning of regulations will be easily understood by those persons directly affected by them." (See also Cal.Code Regs., tit. 1, § 16, subd. (a).)

The Council's proposed regulations will be implemented through a series of vaguely described processes, with many of the critical details unknown. The proposed regulations do not comport with the applicable standard of clarity, requiring that the regulations be "written or displayed so that the meaning . . . will be easily understood by the persons directly affected by them." (Gov. Code, § 11349, subd. (c).) Because the regulations contain so many vagaries, the RLO033-53 regulated community cannot know how they may be required to comply. The Council has an obligation to provide clear and complete regulations for public review and comment such that their requirements are readily apparent.

Response to comment RLO033-53

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

Section 5009

The Council's proposed regulation states that "[s]ignificant impacts to the opportunity to restore habitat at the elevations shown in Appendix 4 must be avoided or mitigated." It is unclear what constitutes an "opportunity to restore habitat," and how such an "opportunity" might be the subject of a potentially significant impact (which much be a *physical* impact under controlling law). (Pub. Resources Code, §§ 21065, 21068; Cal. Code Regs., tit. 14, §§15358, 15382.) Further, it is unclear how the proposed mandatory language requiring that "opportunity" impacts "must be avoided or mitigated" is to be satisfied. RLO033-53

4. The Proposed Regulations Duplicate and Conflict with Areas Already Regulated

Nothing in the Council's authorizing statute permits it to supersede the regulatory authority of any other California department or agency, or to duplicate or adopt conflicting regulations in areas already regulated. A number of significant conflicts with existing statutes, regulations, and established case law are created by and embedded in the Council's proposed regulations. For example, the California Resources Agency is responsible for adopting guidelines implementing CEQA, and the courts have extensively interpreted that statute's definitions and requirements pertaining to environmental impact assessment, mitigation requirements, and environmental disclosure standards in relation to project approval, among others. The Council has no authority to adopt regulations that attempt to supersede, and create substantial conflicts with, those established requirements.

Section 5001(k)

The proposed regulatory definition of "feasible" merely repeats the language of Public Resources Code section 21061.1. (See also Cal. Code Regs., tit. 14, § 15364.) As such, the regulation is unnecessary and duplicative.

Section 5001(s) RLO033-54

The proposed regulatory definition of "significant impact" conflicts with existing statutory and regulatory definitions of the same term used in the same context. (Pub. Resources Code, § 21068; Cal. Code Regs., tit. 14, § 15382.) The Council's proposed regulation is confusing and unnecessary as well as inconsistent with controlling law. (Pub. Resources Code, § 21068; Cal. Code Regs., tit. 14, § 15382; see also *In re Bay-Delta Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1167-1168; *Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal.4th 310, 315, 320-322; *Citizens for East Shore Parks v. State Lands Commission* (2011) 202 Cal.App.4th 549, 557-566.)

Section 5003(b)(2)(D)

The proposed definition of "covered actions" impermissibly attempts to alter and amend established CEQA principles regarding the definition of a "project," as well as the application of statutory and categorical exemptions, and is in direct conflict with controlling law. (Pub. Resources Code, § 21065; Cal. Code Regs., tit. 14, §§ 15300.2, subd. (c), 15378; 15382.) Furthermore, "unusual circumstances" as they pertain to categorical CEQA exemptions have

Response to comment RLO033-54

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

been defined and interpreted under CEQA. (Cal. Code Regs., tit. 14, §§ 15300.2, subd. (c); see, e.g., *Banker's Hill v. City of San Diego* (2006) 139 Cal.App.4th 249, 261; *Turlock Irrigation District v. Zanker* (2006) 140 Cal.App.4th 1047; *Santa Monica Chamber of Commerce v. City of Santa Monica* (2002) 101 Cal.App.4th 786, 800; *Fairbank v. City of Mill Valley* (1999) 75 Cal.App.4th 1243, 1260-1261.) The Council has no authority to duplicate, supersede, or adopt conflicting regulations in areas already regulated. RLO033-54

Section 5006

The Council's proposed regulation of "improved transparency in water contracting" is redundant of existing policies, as shown in the Council's appendices. Furthermore, any attempt by the Council to alter or amend those policies is inconsistent with supremacy principles under federal law, which governs the contracting process for water supplied by the federal CVP.

H. Conclusion.

For the reasons set forth above, the proposed regulations exceed and transgress the Council's statutory authority. As such they are invalid under the Delta Reform Act of 2009 (Wat. Code, § 85001 et seq.), the California Environmental Quality Act ("CEQA") (Pub. Resources Code, § 21000 et seq.), and the APA (Gov. Code, § 11342.2). Additionally, this EIR does not provide a legal basis for the Council to adopt the Delta Plan. Accordingly, the Council should not certify the EIR. However, if it does, the Council must first revise the EIR to make it legally compliant with CEQA. Such revisions would constitute new information of substantial importance under CEQA and thus require recirculation before the Council considers certification of a subsequent, legally sufficient EIR. (State CEQA Guidelines, § 15088.5.) RLO033-55

Response to comment RLO033-55

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

APPENDIX

Comments on Recirculated Draft Delta Plan Environmental Impact Report, November 2012

1. February 15, 2012 Comments from the State and Federal Contractors Water Agency regarding the Delta Protection Commission's "Proposal to Protect, Enhance, and Sustain the Unique Cultural, Historical, Recreational, Agricultural and Economic Values of the Sacramento-San Joaquin Delta as an Evolving Place" (Proposal).

2. June 27, 2012 Comments from the San Luis & Delta-Mendota Water Authority, Westlands Water District, Del Puerto Water District, San Luis Water District, San Benito County Water District, San Joaquin River Exchange Contractors Water Authority regarding WR P1.

3. September 26, 2012 Comments from the State and Federal Contractors Water Agency regarding the final draft strike-out/underline addition Delta Plan discussed by the Delta Stewardship Council at its September 13, 2012 meeting.

4. *Consol. Salmonid Cases* (E.D. Cal. 2010) 713 F.Supp.2d 1116.

5. *Consol. Salmonid Cases* (E.D. Cal. 2011) 791 F.Supp.2d 802.

6. *San Luis & Delta-Mendota Water Authority, et al. v. Salazar, et al. (Delta Smelt Consol. Cases)* (E.D. Cal. 2009) 2009 WL 1575169.

7. *Delta Smelt Consol. Cases* (E.D. Cal. 2010) 717 F.Supp.2d 1021.

8. *Delta Smelt Consol. Cases* (E.D. Cal. 2010) 760 F.Supp.2d 855.

9. Department of Water Resources, News for Immediate Release: Researchers Shake Delta Soil to Better Understand Earthquake Risk (Aug. 15, 2012), available online at: http://www.water.ca.gov/news/newsreleases/2012/081512shaketest.pdf.

10. Kimmerer, WJ. 2008, Losses of Sacramento River Chinook salmon and delta smelt to entrainment in water diversions in the Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science 6. http://repositories.cdlib.org/jmie/sfews/vol6/iss1/art4.

11. Kimmerer, WJ, Nobriga, ML 2008, Investigating particle transport and fate in the Sacramento-San Joaquin Delta using a particle tracking model. San Francisco Estuary and Watershed Science 6. http://repositories.cdlib.org/jmie/sfews/vol6/iss1/art4.

12. Michael, J., et al. 2009, A Retrospective Estimate of the Economic Impacts of Reduced Water Supplies to the San Joaquin Valley in 2009 (Sept. 28, 2010).

13. January 14, 2013 Comments from the San Luis & Delta-Mendota Water Authority and State Water Contractors regarding Delta Stewardship Council Proposed Rulemaking.

No comments

- n/a -

No comments

- n/a -

APPENDIX DOC. 1

SFCWA
State & Federal Contractors Water Agency
1121 L Street, Suite 806, Sacramento, CA 95814

February 15, 2012

Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Dear Chairman Isenberg and Council Members:

I am writing to provide the perspective of the State and Federal Water Contractors Water Agency (SFCWA) regarding the Delta Protection Commission's (Commission) "Proposal to Protect, Enhance, and Sustain the Unique Cultural, Historical, Recreational, Agricultural and Economic Values of the Sacramento-San Joaquin Delta as an Evolving Place" (Proposal) dated January 26, 2012, that was the subject of the Council's deliberations on February 9 and 10 this past week. As with the Economic Sustainability Plan (ESP) prepared for the Commission, which provides the foundation for the Proposal, there is much to be supported but also much that reflects an unfortunate agenda that continues unproductive opposition to effective implementation of the Delta Plan and the Bay Delta Conservation Plan (BDCP), as well as a "fortress Delta" mentality that is unproductive and inconsistent with the Legislative intent of the Delta Reform Act (Act). Once again, as with the ESP itself, in many areas the Proposal represents a missed opportunity to move beyond obstruction and toward an active, positive relationship with the Council and other stakeholders to constructively address issues of mutual concern by developing strategies for reducing impacts while meeting the State's interest in achieving the co-equal goals and providing for an economically sustainable Delta.

Generally, we concur with your staff's review, analysis and conclusions related to the Proposal as conveyed to you in the staff report prepared for your early February meeting. Still, there are some areas where we have some disagreement so here provide further detail and elevate specific concerns for your consideration. Of overarching concern is that we do not believe that the Proposal is consistent with furthering the achievement of the coequal goals in many respects. Critiques of habitat restoration and water supply reliability infrastructure activities particularly are couched in terms that contradict the effective pursuit of the coequal goals, and are notably more appropriately raised within the BDCP EIR/EIS public process.

Another significant problem is that much of what is actually "proposed" is dependent upon a levee maintenance philosophy that perpetuates the failures of the past with regard to an absence of any prioritization or notion of a "strategic levee investment" program as called for by the Act. Simply stating that certain levees should be maintained to a higher standard than other levees misses the fundamental problem that there are insufficient resources to undertake such a universal program and that there must be a ranking of which levees are "more important" to invest in than others – not just what levee stability standard should ultimately be achieved in any given location.

No comments

- n/a -

Below we provide specific feedback regarding the Proposal, working from the Council staff's memo.

LEVEES AND PUBLIC SAFETY RECOMMENDATIONS

1. **Improve and maintain all non-project levees to at least the Delta-specific PL 84-99 standard.** We concur with the Council staff's notes regarding the lack of prioritization and add that the question of who would pay for such a sweeping and universal approach is conspicuously absent as the cost of achieving this proposal would be very high, generally beyond the capabilities of the Delta's local landowners and Reclamation Districts.

2. **Improve most "lowland" levees and selected other levees and other levees to a higher Delta-specific standard….** We concur with the Council staff's notes regarding a lack of prioritization and uncertain costs. We also suggest it would be useful to incorporate the Council's previously developed notion that prioritization and categorization of levees should seek to match a particular level of protection with the value of what is being protected by any particular levee.

3. **The Delta Levee Subventions and Special Projects Program should continue to be supported.** We agree with this recommendation with a caveat. Instead of simply continuing the Subventions program, we encourage the Council to facilitate and/or undertake its own review of the program in the context of the Delta Plan and the coequal goals to ensure that it is carried out consistent with these new mandates and in a manner that most effectively furthers them.

4. **Transfer to a regional agency with fee assessment authority on levee beneficiaries' responsibility for allocating funds ….** We concur with the Council staff's conclusion that "discussion needed". Much discussion will be needed, as we are generally skeptical of the value of adding *another* agency layer in the Delta. While emergency preparedness and response could certainly be appropriately within the purview of such a regional agency, issues regarding levee maintenance and investments of limited financial resources reach well beyond the Delta and the State and those other interests paying the fees would need to be involved in any prioritization and decision-making processes.

5. **In addition to providing funding for longer-term levee improvements, provide ongoing funding for regular levee maintenance and expanded emergency preparedness, response and recovery.** We concur with the Council staff's notes and would also inquire where the funding is to come from and who is supposed to receive it? Is this separate from the "regional entity" proposed in recommendation # 4? In addition, this recommendation seems to be seeking financial support for what is and should be primarily a local responsibility.

We concur with Council staff's perspective regarding recommendations # 6, 7, and 8.

GENERAL RECOMMENDATIONS FOR ECONOMIC SUSTAINABILITY

1. **Designate a regional agency to implement and facilitate economic development efforts.** We concur with Council staff's perspective, although we again remain somewhat skeptical that adding another agency layer in the Delta is truly consistent with the intent of the Act, particularly when this sort of activity is within the Conservancy's mission description. Still, there is much that could be done to address the economic development needs of the Delta.

No comments

- n/a -

For example, consideration should be given to creating "visitor development zones" associated with the legacy communities to try to reduce investment risk and thus encourage increased investments in visitor serving facilities. In such areas there could be standard variances to otherwise applicable regulatory requirements etc. to facilitate appropriate and necessary business development.

2. **Economic impacts of habitat creation and development of facilities for export water supply should be fully mitigated.** We concur with Council staff's perspective. Use of "fully mitigated" is well beyond the requirements of California law. The Act already requires in-lieu property tax be paid for lands impacted by the construction of and mitigation for new conveyance facilities. As written, this recommendation is inappropriate with respect to habitat restoration as restoring the Delta is part of the coequal goal. However, there is no doubt that there will be economic impacts, particularly within the Primary Zone, from implementation of the Delta Plan over the decades to come and facilitating near-term discussions amongst appropriate stakeholders as to how to ameliorate them and reduce them when practicable should be part of the Council's implementation plan. As the Proposal concludes its description of this recommendation: "Measuring and effectively compensating communities for dispersed and indirect net economic impacts should be further explored."

3. **Land use planning and regulation must be clear and consistent across agencies.** We concur with Council staff's perspective. It is critical to emphasize, however, that it is the Delta Plan and the coequal goals against which local land use and planning occurring in the Delta must be compared for consistency, not the other way around. With the significant exception of the Council's "covered action" review, the Commission's recently updated Land Use and Resource Management Plan (LURMP) already is supposed to ensure a high level of consistency in land use planning and regulation in the Delta.

RECOMMENDATIONS FOR ECONOMIC SUSTAINABILITY OF AGRICULTURE

1. **Maintain and enhance the value of Delta agriculture.** We agree with Council staff's assessment. While this recommendation may be aspirational, it isn't terribly realistic or helpful. The fact that the Proposal seeks to justify it by asserting consistency with a draft "performance measure" in the 5th iteration of the Delta Plan which had been previously described as "a mistake" (and repeated as such on 2/9) is more troubling. It should be noted that the LURMP would not satisfy this recommendation. In fact, according to the ESP itself, it would be difficult to achieve this recommendation if the status quo were continued in the Delta as the trends today are downward with respect to economic activity, particularly in the Primary Zone.

2. **Limit the loss of productive farmland…to the greatest extent practicable.** We disagree with the Council staff's determination that this recommendation is "consistent" with Delta Plan objectives. The staff notes are on point, but we believe the wording of the recommendation is "inconsistent" with the Delta Plan objectives since "greatest practical extent" begs the question of what's "practical". We agree that where it can be done consistent with implementation of the Delta Plan and furthering the coequal goals, including BDCP if it is incorporated consistent with the requirements of the Act, preservation of agricultural lands should be a priority, and starting habitat restoration projects on publicly owned lands is logical. The BDCP's adaptive management approach incorporates the Proposal's recommendation that habitat acreage goals be reassessed over time.

No comments

- n/a -

3. **Protect Delta water quality and water supplies for agriculture.** Based upon the ESP, we assume this recommendation is intended to apply only to "in-Delta" agriculture. Consequently, we disagree with Council staff's assessment that this recommendation is "consistent" with the Delta Plan objectives. As with other aspects of the Proposal and the ESP, this recommendation reflects expectations of the Commission and the authors that are ultimately inconsistent and in conflict with the effective implementation of the Delta Plan and the furthering of the coequal goals. Council staff correctly points out in the notes that this issue is within the purview of the State Water Resources Control Board (SWRCB), which has the responsibility to balance all beneficial uses of water as it reviews and potentially updates its Water Quality Control Plan (WQCP) for the Delta.

We concur with Council staff's perspective regarding recommendations # 4 and 5.

RECOMMENDATIONS FOR ECONOMIC SUSTAINABILITY OF RECREATION AND TOURISM

1. We concur with Council staff's position.

2. We concur with Council staff's position.

3. **Implement Economic Sustainability Plan through specific strategies.** We concur with Council staff's notes on this recommendation but would simply add that only those portions of the Proposal and ESP that are consistent with the Delta Plan and furthering the achievement of the coequal goals are appropriate for implementation.

RECOMMENDATIONS FOR INFRASTRUCTURE

1. **Planning of levee investments must fully consider the economic value of infrastructure services along with all other benefits.** We concur with Council staff's evaluation, and would specifically add the need for prioritization remains.

2. **All owners and operators of infrastructure that depend on Delta levees must contribute to levee system investment and maintenance.** We concur with the Council staff's notes on this recommendation. Of course, the "devil will be in the details".

3. **Protect and improve Delta water quality and supply for agricultural, municipal and industrial uses.** As with recommendation # 3 regarding sustaining Delta agriculture, we assume this recommendation is intended to apply only to "in-Delta" uses. Consequently, we disagree with Council staff's assessment that this recommendation is "consistent" with the Delta Plan objectives. As with other aspects of the Proposal and the ESP, this recommendation reflects expectations of the Commission and the authors that are ultimately inconsistent and in conflict with the effective implementation of the Delta Plan and the furthering of the coequal goals. In addition, water quality is an important issue for ecosystem restoration, which should be identified as well. Council staff correctly points out in the notes that this issue is within the purview of the SWRCB, which has the responsibility to balance all beneficial uses of water as it reviews and potentially updates its WQCP for the Delta.

4. **Ensure that future development of infrastructure in the Delta is aligned with economic sustainability strategies.** We disagree with Council staff's assessment of this recommendation

No comments

- n/a -

in that we would categorize it as "potentially consistent". Again, we believe that the recommendation and language used imply expectations of the Commission and the authors that cannot be fulfilled consistent with the Delta Plan and furthering the achievement of the coequal goals. There is an implicit "trumping" of infrastructure development by the ESP incorporated in this recommendation. We would add "to the extent practicable" at the end of the recommendation, and even then it would remain "potentially consistent".

5. **Support expansion and development of the ports.** As with # 4 above, we disagree somewhat with the Council staff's determination and would instead designate it "potentially consistent". In addition, while the staff notes call out potential environmental impacts associated with increased activity at the ports, there are also potential water supply, water quality and water supply reliability impacts due to potential channel modifications that could arise and thus both prongs of the coequal goals are implicated by this recommendation.

RECOMMENDATIONS FOR HABITAT AND ECOSYSTEM IMPROVEMENTS

1. **Emphasize strategies with little or no conflict with the Delta economy.** We disagree with the Council staff's designation of "premature" and instead think it is important to be honest and upfront and designate this recommendation as "inconsistent" with the Delta Plan and furthering the coequal goals. As the Public Policy Institute of California pointed out as when it issued its first Delta Vision report a few years ago, the notion of "win-win" is a mirage, due to inevitable large scale changes driven by seismic vulnerability and sea level rise. This recommendation simply ignores the realities of the status quo as well as the Legislative direction to move forward with the Delta Plan (and BDCP subject to the requirements of the Act). Certainly it will be critical to try to minimize and ameliorate impacts resulting from habitat conversion, but the expectations implicit in this recommendation are simply unrealistic. We note, as well, that in the Proposal's description of this recommendation the authors call out "increased fresh water flows" as an "example" of how to achieve it. All questions related to water quality regulation in the Delta will be appropriately before the SWRCB and are not a subject for the Delta Plan or the ESP to seek to address.

We concur with Council staff's determinations for recommendations # 2 – 6.

RECOMMENDATIONS FOR WATER SUPPLY RELIABILITY

We concur with Council staff's determinations for recommendations # 1 – 3, although we reiterate our view that the Council is not the proper forum to receive the Proposal's concerns regarding the BDCP, but rather the BDCP's EIR/EIS public process is the appropriate venue.

RECOMMENDATIONS FOR RESEARCH AND MONITORING

1. **Conduct a comprehensive and credible cost-benefit analysis to analyze Delta alternatives.** We disagree with Council staff's determination regarding this recommendation. This is not "potentially consistent" but rather it is "inconsistent" with the Delta Plan objectives because it is not appropriately an issue for the Delta Plan to address. Council staff seems to have interpreted this as applicable to discrete projects that may become part of the Delta Plan. The reality is this is targeted at the HCP/NCCP alternatives analysis being conducted as part of the BDCP EIR/EIS

No comments

- n/a -

process and as such is again inappropriate to be included as a recommendation to the Council. This comment should be addressed within the BDCP EIR/EIS public process.

We concur with Council staff's determinations with regard to recommendations # 2 – 5

Thank you for the opportunity to provide these comments. There is much to promote within the Proposal but, as highlighted and called out above, there is much that is not appropriate to the legislative intent of having the ESP developed to inform the Council's deliberations. Finally, we remind the Council that it maintains complete discretion as to the incorporation of any or none of the ESP's and Proposal's recommendations as it determines consistency with the Delta Plan and furtherance of the coequal goals.

Sincerely,

Byron M. Buck
Executive Director

No comments

- n/a -

No comments

- n/a -

APPENDIX DOC. 2

June 27, 2012

Delta Stewardship Council
Mr. Phil Isenberg – Chair
Ms. Gloria Gray
Ms. Felicia Marcus
Mr. Don Nottoli
Mr. Randy Fiorini
Mr. Patrick Johnston
Mr. Hank Nordhoff

RE: Support for ACWA Ag-Urban WR P1 Alternative Language

Dear Council Members:

We appreciate the enormity of your undertaking to develop the Delta Plan. Over the last year and half, the Plan has benefitted greatly from your dedication to participate in the vast number of meetings held to hear from the array of stakeholder groups that have helped shape the current draft version. We understand that it is your intention during the next Council meeting to make decisions regarding the content of the final draft of the Plan that will then be subject to another round of public review and comment under the California Environmental Quality Act process prior to final adoption.

To that end, we are writing to strongly encourage your consideration of the attached language addressing "WR P1: Reduce Reliance on the Delta and Improve Regional Self-Reliance". We recognize the importance of this issue to all regions of the State and have worked closely with our colleagues in the Delta and upstream through the ACWA Ag-Urban Coalition to help them develop this optional language. We share your desire to further promote improved water management throughout the State and believe that the most effective way to ensure advancement of this important State policy is to maintain a single standard of compliance, appropriately applicable to the entity seeking the covered action, and verifiable through routine review by the Council.

We appreciate and look forward to the ongoing opportunity to review and comment on the next iteration of the draft Plan and continued cooperation with you and your staff toward ensuring a Plan that is effective, enhancing, and durable. Thank you for your consideration.

Sincerely,

Daniel G. Nelson
Executive Director
San Luis & Delta-Mendota Water Authority

Thomas W. Birmingham
General Manager
Westlands Water District

William Harrison
General Manager
Del Puerto Water District

Martin McIntyre
General Manger
San Luis Water District

Jeff Cattaneo
District Manger & Engineer
San Benito County Water District

Steve Chedester
Executive Director
San Joaquin River Exchange Contractors WA

No comments

- n/a -

ACWA Ag-Urban Coalition Proposed WR P1

WR P1: Reduce Reliance on the Delta and Improve Regional Self-Reliance

A covered action is inconsistent with the Delta Plan if (1) the service area of the entity seeking the covered action has failed to reduce its reliance on the Delta or adequately contribute to improved regional self-reliance; (2) that failure has significantly caused the need for the covered action; and (3) the covered action would have a significant adverse environmental impact in the Delta.

This policy addresses a covered action to export water from, transfer water through, or use water in the Delta.

For the purposes of this policy, "reducing reliance on the Delta or adequately contributing to improved regional self-reliance" means (1) a reduction in net per capita water use; (2) a reduction in the percentage of Delta water used as a part of total regional water supply; or (3) compliance with state laws regarding water conservation, water efficiency and urban and agricultural water management planning. For an entity that is required to have a plan and does not, its covered action is deemed inconsistent with the Delta Plan. (1), (2), and (3) identified in this paragraph may be achieved through investment 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.

For the purpose of determining if a covered action is consistent with the Delta Plan, the Council's review shall be limited to the entity taking the covered action.

To ensure advances are being made to reduce reliance on the Delta and improve regional self-reliance, the Delta Stewardship Council will request that the Department of Water Resources and Bureau of Reclamation provide to the Council a periodic (annual) update of reports that describe the manner in which water agencies are implementing State and federal water use efficiency standards.

No comments

- n/a -

No comments

- n/a -

APPENDIX DOC. 3

SFCWA
State & Federal Contractors Water Agency
1121 L Street, Suite 806, Sacramento, CA 95814

September 26, 2012

Chairman Isenberg and Council Members
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Dear Chairman Isenberg and Council Members:

The State and Federal Contractors Water Agency is pleased to provide the attached specific comments regarding the final draft strike-out/underline addition Delta Plan discussed by the Council at its September 13th, 2012 meeting. Please note that the page and line citations are referenced to the redline versions of the documents.

While we realize the Council did not provide additional direction regarding various criticisms of more policy related issues we have raised in these and prior comments, we are hopeful that our other comments, which make up the bulk of our submittal, can be incorporated into the final draft as they are editorial suggestions to improve clarity and tone and correct factual errors that do not alter the substantive content of the draft.

We look forward to the publication of the supplemental volume of the Draft PEIR and subsequently the response to comments received on both the original PEIR and the supplemental volume. We also look forward to the review and further discussion this fall regarding your previously adopted administrative procedures, including those which we continue to object to related to a potential appeal of the Department of Fish and Game's certification of the Bay Delta Conservation Plan's satisfaction of the criteria set forth in the Delta Reform Act for its incorporation into the Delta Plan.

We request that when the final draft Delta Plan is released that you provide an index of language deletions and additions as compared to the September 5th draft to help expedite review.

We appreciate all the effort you and your staff have put into this process and the responsiveness to our constructive engagement and that of other stakeholders. We will continue our participation to help develop a successful Delta Plan that furthers the coequal goals.

Sincerely,

Byron M. Buck
Executive Director

Enclosure (1)

No comments

- n/a -

SFCWA comments regarding the final draft strike-out/underline addition of the Delta Plan
September 26, 2012

P xxvi, last bullet WQ R8: delete duplicate language, "and determine control measures for implementation starting in 2020."

P 3, L 18: New language though somewhat improved still gives impression of population equally spread over region when that is far from the case. Suggest the following as a substitute for the last sentence: "The Delta is comprised of both a Primary Zone formed by the unique patchwork of mostly agricultural islands and an increasingly urban landscape of the Secondary Zone that includes the cities of West Sacramento, Stockton, Tracy and other communities. Of the Delta's half million residents, about 98% live in the Secondary Zone."

P 4, L 23-24: This sentence referencing the state policy to reduce reliance on the Delta should accurately reflect the statute and thus "in meeting future water supply needs" should be added after "Delta".

P 5, L 30: Use of "from past abuses" is inappropriate and inaccurate as most of the actions were taken consistent with law etc. We suggest "from past actions" as a substitute.

P 9, L 22: Use of "threaten" is inappropriate as it can be read to imply incompatibility. We suggest "impact" as a substitute.

P 13, L 39: To improve accuracy, we suggest an addition; "run backward, and some fish, lacking...."

P 15, Sidebar, 3rd bullet: Suggest adding language that 98% of residents live in the Secondary Zone.

P 16, L 17-18: This sentence regarding the salmon fishery is out of place and, if included at all, should not be part of a "Water Exports Cut" paragraph. Moreover, it is important to reference the fact that the PFMC determined that ocean conditions were most determinative of salmon population levels and not other factors that are often cited.

P 19, L 11-14: This sentence falsely equates the State's new "reduce reliance" policy with an absolute reduction in exports from the Delta and a "give back" to the system. In fact, new paradigm is to better integrate activities, construct new infrastructure to enhance operational flexibility, and to seek to shift exports from drier times to wetter ones. Consequently, the first sentence of this paragraph and the word "Thus" from the second should be deleted.

P 39, Table 2-1: Description of Delta Watermaster > suggest adding "under authority delegated by the SWRCB" at end of sentence. Description of Bureau of Reclamation > suggest addition "which, among other activities, pumps water through...." to reflect the fact the CVP includes units other than the San Luis Unit.

P 40, L 9: The word "transparent" should not have been deleted as that is included in the statutory direction to the Council. It needs to remain.

P 43, L 19: The word "transparent" should not have been deleted as that is included in the statutory direction to the Council. It needs to remain.

P 54, L 23-26: The use of "baseline" and the "cumulative impact" approach to assessing whether a "proposed action" will have a "significant impact" only adds confusion and uncertainty. The cumulative

No comments

- n/a -

effect concept essentially moots the Legislature's intention and definition of a "covered action" as itself having to have a significant impact as it is hard to imagine any action in the Delta, combined with the "probable future" actions of the BDCP, not having a significant "cumulative" effect. That can not have been the intent of the statute.

P 56, L 16-17: Leaving in the expiration date is problematic as it removes certainty from the transfer market leading up to that date. Instead, we suggest substituting language stating that "This exemption will be reviewed by the Council for possible amendment by ~~on~~ January 1, 2015. ~~unless the Council acts to extend the exemption prior to that date.~~ The Council contemplates that any amendments ~~extension~~ would be...."

P 56, L 38-39: Staff and Council previously indicated this language would be updated pending the outcome of Lois Wolk's bill (1495). The Wolk bill includes a much more narrow definition of what is considered a "routine" activity for the purposes of exemption from covered action applicability. The Governor has signed 1495 and thus we suggest deleting the current language and replacing it with specific reference to the bill language in the administrative exemption. The bill reads: "(i) Dredging to maintain the Stockton Deep Water Ship Channel at a depth of 40 feet in the sediment trap at the confluence of the San Joaquin River, between river mile 39.3 to river mile 40.2, and to maintain the remaining Stockton Deep Water Ship Channel at a depth of 35 feet plus two feet overdredge from river mile 35 to river mile 43."

P 57, L 36-41: We reiterate out position that if the BDCP is incorporated into the Delta Plan then by definition all of the activities undertaken pursuant to it will be consistent with the Delta Plan and thus there is no need for a certification process. A consistency determination requirement by the Council, no matter how pro forma, is redundant, unnecessary, and provides an avenue for delay in furthering the achievement of the coequal goals.

P 60, L 11: In addition to "organizes and integrates" the Council's science plan should be one that prioritizes ongoing research and monitoring as well.

P 72, Sidebar, last bullet: Delete "when the limited amount of available water must remain in the Delta". This language implies that NO water may be diverted and deleting it does not change the point of the sentence.

P 73, L 10: Insert the following to be more accurate, "...one corner of the state can have ripple effects" since not all actions have these sorts of connections.

P 73, L 19: Term "geographic situation" is confusing. This sentence is awkward and should be revised.

P 73, L 23: Insert the following to be more accurate, "...fear the impacts of reduced water supply reliability...."

P 73, L 32: Insert the following to be accurate, "...meet the projected additional water demands...."

P 74, L 12: Problem with this sentence in that "exports" don't "support" flow patterns nor do they reduce vulnerability to disruption. New conveyance facilities will provide the capability to achieve these identified outcomes. The sentence should be revised accordingly.

No comments

- n/a -

P 81, L 27-30: Suggest addition for clarity, "Maintaining freshwater conditions to meet regulatory requirements in the Delta...." Also, it is unclear how it follows that it will "increase risk from catastrophic levee failure and floods." This last part should be explained or deleted.

P 82, L 8-9: The Public Trust is NOT a "longstanding constitutional" doctrine. It is a common law doctrine. Suggest deleting "constitutional" as easiest way to handle.

P 82, L 23-27: It is not enough to quote the full text of Article X, Section II in the Glossary. The portion of the Constitution directing that the State's waters be put to beneficial use to the "fullest extent" should be included here are well, as it is that fullest use that is subject to the reasonable use requirement.

P 83, L 2-5: This discussion of the Public Trust doctrine leaves the reader with a false impression that serving "public trust" resources trumps all other considerations. Even if "feasible" the touchstone of the Public Trust is serving the *public interest*, which may require not dedicating resources to the public trust values. To provide the full picture, the following quotation from the decision would be beneficial, "as a matter of practical necessity the state may have to approve appropriations despite foreseeable harm to public trust uses."

P 95, L 40-41: It is important to note that DWR's reliability assessment is based upon the capability of existing infrastructure so as not to give the impression this is necessarily a continuing trend.

P 97, L 24: Water transfers are an important tool for improving water supply reliability, as the original language stated. The concept of "predictability of exports" is not related to transfers and, in fact, the following sentences point out the uncertainty related to the capability to move transfer water. We suggest keeping the original language with the addition of "improving", i.e. "...important tool for improving water supply reliability."

P 97, L 40: The term "past expectation" should be deleted as it never existed and doesn't exist today. If anyone is aware of the variability of water supplies and the impact of hydrology it is the exporters. This and the following clause in the sentence are without basis. The entire first paragraph (L 39-42) of the section should be deleted.

P 110, L 14-15: Famigletti did not measure lost groundwater storage capability as this statement implies, he measured how much groundwater was extracted and not replaced, i.e. the space created by that use. Not all of that resulted in subsidence and the loss of groundwater storage capacity.

P 110, L 16: Replace "many" with "some". As written, implies unmanaged overdraft is widespread and it is not.

P 115, L 31: Why was footnote 19 deleted and relegated to a mention in the appendix? This is an important definition to include in the text as it originally appeared to help alleviate potential uncertainty. In addition, it is critical that the definition of "water supplier" be forwarded to OAL as part of the policy and severing it from it raises concerns about that being done.

No comments

- n/a -

P 118, L 32-37: We reiterate our 6th draft comment regarding this language as overstating the "problem" and ignoring the vast majority of California's groundwater that is actively and well managed. There are some areas that are not utilizing best practices and information related to groundwater management should be more transparent. However, the sky is not falling as this "problem statement" suggests.

P 124, L 39-42: This sentence should be rewritten. Again, the Council appears to inappropriately equate the reduce reliance policy with reducing exports in absolute terms. This is a position without support. To make the point that seems to underlie this language we suggest the following, "....that will ~~benefit the amount of water,~~ improve the quality of water and the timing of flows in and through...."

P 139, L 7-8: This sentence implies that the projects are the only cause of harm to the ecosystem. The proscriptions on project operations may have "fully" mitigated the harm caused but other stressors in the system may have blocked those benefits from being realized since they cause harmful impacts too. We suggest a period after "reduce damage" and deletion of the rest of the sentence.

P 139, L 18-19: There are a number of "other stressors" that should be referenced along with invasives, e.g. pollution, unscreened diversions, etc.

P 145, L 40: We do not think the use of the term "master variable" is constructive or informative, but it does perpetuate misunderstanding. We suggest substituting "important" for "master".

P 150, Figure 4-4: The graphic describing "unimpaired" flows should state that while the water facilities are removed, flood control facilities and the channelization of the rivers and Delta still exist. Historically, "unimpaired" flows would have flooded the Sacramento Valley and created what was known as a great inland sea, which would reduce the volume of outflow and attenuate that flow dramatically as compared to current conditions.

P 150, L 12-13: There seems to be some verbiage missing here.

P 152, Sidebar, last line of 2nd to last paragraph: This statement is inaccurate. The appeal the Council may hear is regarding the DFG certification of the BDCP meeting the statutory criteria for its inclusion in the Delta Plan, not whether the BDCP will be included or not. This is stated correctly in the sidebar on page 103.

P 153, L 2-3: There seems to be some verbiage missing here.

P 153, L 37: This statement begs the question of what "significant numbers" are. Even if this were true, which we are skeptical of since the issue is not just entrainment through the pumps but also providing a feeding haven for predators such that entrainment is relatively low because the fish have been "entrained" into predators' stomachs. Moreover, under the ESA, ANY take is "significant". This sentence should be revised or deleted.

P 158, L 22-23: Why was the sentence regarding other stressors deleted? We request it be returned to the text.

P 161, L 14-21: There is no discussion of the current exemption to this policy that exists for California, which I think is in place? Also, the issue is not just forcing removal of vegetation, but also a prohibition

No comments

- n/a -

on new planting which is critical to ecosystem restoration along channels, especially where setback levees are not feasible.

P 164, L 30: Need to keep the word "century" in the sentence and not delete it.

P 166, L 25-44: Any discussion of the critical role of ocean conditions in the health of salmon populations is conspicuously absent considering the conclusions of the PFMC as to being a key factor.

P 167, L 12: If there are "unmitigable stressors" it seems worth mentioning the possibility of having to adapt expectations of restoration or of the tools used to try to achieve it as well.

P 167, L 24: It is inappropriate to state that flows are insufficient to "protect" the Delta based on the SWRCB's 2010 flow report as that report was non-regulatory in nature and, as the SWRCB itself caveated heavily, did not take into account any balancing of other beneficial uses as required by law when establishing water quality objectives. This sentence should be deleted and doing so will not change the paragraph's purpose or message.

P 176, L 28: The proper term is "mark select", not "marking selective".

P 201, L 11-23: It is important to note that the DPC's LURMP and ESP must be consistent with the Delta Plan and that it is the Council that makes those determinations.

P 210, L 37: There are some islands in the central Delta that have subsided as much as 30 feet. This should be noted.

P 227, L 6: At the end of the sentence add the following, "...guided by the DPC's ESP, consistent with the Delta Plan."

P 245, L 27-36: The entire discussion of X2 should be deleted as it does "continue to be studied and debated". Instead, keep the first 2 sentences of the paragraph and the last. Most of the verbiage in-between repeats hypotheses that have been rejected by the courts and are in dispute; it should be deleted.

P 245, L 43-45: This sentence should be deleted as it is referring to a hypothetical future scenario and it is out of place with the rest of the paragraph: [~~The combined effects of sea-level rise and changes in other aspects of estuarine habitat caused by climate change and increased water diversions are likely to pose a significant threat to the future survival of Delta smelt (Feyrer et al. 2011).~~]

P 250, L 6-12: The last sentence in the "Ammonium" bullet should be deleted and replaced with a sentence reflecting current scientific information. [~~It is not known, however, how much this inhibition extends to freshwater algae in the Delta.~~] "Ammonium impacts on phytoplankton have also been observed in the Sacramento River below the Sacramento Regional WWTP. Parker et al. (2012a; 2012b) observed not just an inhibition of nitrate uptake, but also an inhibition of nitrogen uptake and a decline in primary productivity when ammonium concentrations are greater than about 4 µmol/L."

P 259, L 14-20: The target date of January 2018 to adopt and implement nutrient objectives for the Delta and Suisun Marsh is unnecessarily and inappropriately distant. The San Francisco Bay Regional

No comments

- n/a -

Water Quality Control Board and the SWRCB both have policy development programs underway to develop nutrient objectives, and the analysis of nutrient impacts in the Delta and Suisun Bay is an active area of current research. The Water Boards should be able to adopt nutrient objectives for the Delta and Suisun Marsh well before 2018. The Council should seek to prioritize an earlier and more reasonable date for development of nutrient objectives that reflects all the progress to date.

P 276, L 5: after "development," add "ecosystem restoration,".

P 277, Sidebar, last paragraph: It would be informative, and remove a false impression of how much levee restoration costs today, to include an estimate of what the cost to make the identified repairs would be today.

P 278, L 13-14. This is an incomplete statement. Levee failures can, in some places, cause damage to the ecosystem. But in other areas, levee failures can and have created new habitat (e.g., Liberty, Little Holland, Mildred Islands).

P 282, L 9: "12 to 15 feet" should be replaced with "5 to 29 feet" or "up to 29 feet". (per Joel Dudas, DWR Lidar specialist and "Contemporaneous Subsidence and Levee Overtopping Potential, Sacramento-San Joaquin Delta, California", San Francisco Estuary and Watershed Science, 10(1), Brooks et al).

P 282, L 16-18. Undo deletion.

P 289, L 41-42. This statement is untrue. USGS has found ecosystem benefits (phytoplankton growth) on the flooded Mildred Island.

P 312, L 5-15: Add new bullets: "Establish Acreage goals for new ecosystem enhancements, including set-back levees and breached levees." And, "Agencies avoid spending public money on levees that will eventually be breached for ecosystem enhancement."

P 322, Glossary, "coequal goals": Why was "shall" replaced with "must" when "shall" is what is in the statutory definition? The statutory language should be used.

P 340, Glossary, "low salinity zone": Everything after the first sentence should be deleted as superfluous and irrelevant to the definition of the LSZ. "X2" is defined later so it should not be mentioned here. Moreover, including the "hypothesized" conclusion has no place in a Glossary.

P 342, Glossary, "Public Trust Doctrine": This definition completely ignores the central tenet of the doctrine that it is the *public interest* that is key and that there may be times when it is either infeasible or a reasonable policy choice is made to take the most "protective" action. This presents only one side of the coin.

P 345, Glossary, "unimpaired flow": This does not state that the measurements are made with the current flood management facilities in place and the current geometry of the system which is not what that "natural" system would be. "Unimpaired flows" in a "natural" condition would be significantly different from those under the DWR contrived "unimpaired flow" model.

No comments

- n/a -

SFCWA comments regarding the final draft strike-out/underline addition of the Delta Plan
September 26, 2012

P C-1, Appendix C, WR P1: This new language doesn't make much sense and is unclear. The "covered actions" aren't going to be completing current UWMP/AWMPs?

P C-12, Appendix C, FR R1: This is a bit confusing. Shouldn't it include actions that "contribute to" or "further" the coequal goals, not just "do or may achieve"?

P N-1, Appendix N, Table N-1: We reiterate our objection to including a $20M placeholder for Studies/Grants for 2013-2014 forward, in addition to the almost $10M of "other studies", prior to undertaking an inventory and prioritization of the science already being undertaken and the development of a new, integrated Science Plan.

P P-3, Appendix P, L 10: there are two "that"s and one needs to be deleted.

No comments

- n/a -

No comments

- n/a -

APPENDIX DOC. 4

United States District Court,
E.D. California.
The CONSOLIDATED SALMONID CASES.

No. 1:09–cv–1053 OWW DLB.
May 18, 2010.
Supplemental Opinion June 1, 2010.

Background: State water contractors, water districts, water authorities, and irrigation districts filed actions against Bureau of Reclamation and National Marine Fisheries Service (NMFS) under National Environmental Policy Act (NEPA), Endangered Species Act (ESA), and Administrative Procedure Act (APA) regarding water restrictions associated with salmonid biological opinion (BiOp). Actions were consolidated. California Department of Water Resources (DWR) intervened as plaintiff. Various parties sought temporary restraining order and preliminary injunction against implementation of various provisions of BiOp.

Holdings: The District Court, Oliver W. Wanger, J., held that:
(1) comparisons of juvenile salvage to negative flows in particular rivers, by utilizing raw salvage numbers, rather than scaling salvage to population size, was arbitrary and capricious;
(2) defendants violated NEPA by not making reasonable evaluation, analysis, taking "hard look at," or disclosure of harms and damage to human health and safety, human environment, and other environments not inhabited by listed species;
(3) Court could consider extra administrative record expert testimony for explanation of technical terms and complex subject matter beyond court's knowledge, to understand agency's explanations, or lack thereof, underlying reasonable and prudent alternative (RPA) actions, and to determine if any bad faith existed;
(4) Court could take judicial notice of Fish and Wildlife Service and National Marine Fisheries Service, Endangered Species Consultation Handbook;
(5) alleged deficiencies in analysis of impacts to orcas in BiOp did not justify preliminary injunction to enjoin implementation of RPA water supply reductions;
(6) NMFS applied viable salmonid population (VSP) concept in sufficiently rigorous manner by using that VSP methodology in BiOp in qualitative manner, as conceptual framework;
(7) imposition of limit on water exports, without any reasoned and scientifically justified biological explanation for selecting specific remedial measures chosen, was arbitrary and capricious; and
(8) public interest of enhancing water supply to reduce adverse harms had to be addressed without jeopardizing species and their critical habitat.

Ordered accordingly.

West Headnotes

[1] Injunction 212 ⚷1598

212 Injunction
212V Actions and Proceedings
212V(G) Determination
212k1598 k. Operation and effect. Most Cited Cases
(Formerly 212k158)

The denial of a motion for a temporary restraining order (TRO) is not dispositive of the merits of a related motion for preliminary injunction.

[2] Injunction 212 ⚷1007

212 Injunction
212I Injunctions in General; Permanent Injunctions in General
212I(A) Nature, Form, and Scope of Remedy
212k1007 k. Extraordinary or unusual nature of remedy. Most Cited Cases
(Formerly 212k1)

Injunction 212 ⚷1075

212 Injunction
212II Preliminary, Temporary, and Interlocutory Injunctions in General

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No comments

- n/a -

212II(A) Nature, Form, and Scope of Remedy
212k1075 k. Extraordinary or unusual nature of remedy. Most Cited Cases
(Formerly 212k132)

Injunctive relief, whether temporary or permanent, is an extraordinary remedy, never awarded as of right.

[3] Injunction 212 ⚷1092

212 Injunction
212II Preliminary, Temporary, and Interlocutory Injunctions in General
212II(B) Factors Considered in General
212k1092 k. Grounds in general; multiple factors. Most Cited Cases
(Formerly 212k138.1)

Injunction 212 ⚷1571

212 Injunction
212V Actions and Proceedings
212V(E) Evidence
212k1567 Weight and Sufficiency
212k1571 k. Preponderance of evidence. Most Cited Cases
(Formerly 212k138.1)

Four factors must be established by a preponderance of the evidence to qualify for a temporary injunction: (1) likelihood of success on the merits; (2) likelihood the moving party will suffer irreparable harm absent injunctive relief; (3) the balance of equities tips in the moving parties' favor; and (4) an injunction is in the public interest.

[4] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Comparisons of juvenile salvage to negative flows in particular rivers, relied upon by National Marine Fisheries Service (NMFS) in salmonid biological opinion (BiOp) for reasonable and prudent alternative (RPA) water supply reductions, by utilizing raw salvage numbers, rather than scaling salvage to population size, was arbitrary and capricious under ESA, since scaling salvage to population size was standard fisheries science practice and could have been accomplished for several of listed species based on existing population data. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[5] Environmental Law 149E ⚷577

149E Environmental Law
149EXII Assessments and Impact Statements
149Ek577 k. Duty of government bodies to consider environment in general. Most Cited Cases

Bureau of Reclamation, that had co-equal objective of providing water service, and National Marine Fisheries Service (NMFS) violated NEPA by not making reasonable evaluation, analysis, taking "hard look at," or disclosure of harms and damage to human health and safety, human environment, and other environments not inhabited by listed species in implementation of reasonable and prudent alternative (RPA) water supply reductions as referenced in salmonid biological opinion (BiOp) such as destruction of permanent crops, fallowed lands, increased groundwater consumption, land subsidence, reduction of air quality, destruction of family and entity farming businesses, and social disruption and dislocation. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

[6] Environmental Law 149E ⚷577

149E Environmental Law
149EXII Assessments and Impact Statements
149Ek577 k. Duty of government bodies to consider environment in general. Most Cited Cases

NEPA insures that federal agencies make informed decisions and contemplate the environmental impacts of their actions. National Environmental Policy Act of 1969, § 2, 42 U.S.C.A. § 4321.

[7] Environmental Law 149E ⚷577

149E Environmental Law
149EXII Assessments and Impact Statements
149Ek577 k. Duty of government bodies to

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No comments

- n/a -

consider environment in general. Most Cited Cases

NEPA emphasizes the importance of coherent and comprehensive up-front environmental analysis to insure informed decision-making to the end that the agency will not act on incomplete information, only to regret its decision after it is too late to correct. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

[8] Environmental Law 149E ⚷608

149E Environmental Law
149EXII Assessments and Impact Statements
149Ek607 Effect of Deficiency
149Ek608 k. In general. Most Cited Cases

Environmental Law 149E ⚷695

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek694 Determination, Judgment, and Relief
149Ek695 k. In general. Most Cited Cases

Where a federal agency takes action in violation of NEPA, that action will be set aside. National Environmental Policy Act of 1969, § 2, 42 U.S.C.A. § 4321.

[9] Environmental Law 149E ⚷700

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek700 k. In general. Most Cited Cases

A court may not issue an injunction under NEPA that would cause a violation of other statutory requirements, such as interagency cooperation mandates of ESA. Endangered Species Act of 1973, § 7, 16 U.S.C.A. § 1536; National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

[10] Environmental Law 149E ⚷700

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek700 k. In general. Most Cited Cases

An injunction should not issue under NEPA when enjoining government action would result in more harm to the environment than denying injunctive relief. National Environmental Policy Act of 1969, § 2, 42 U.S.C.A. § 4321.

[11] Administrative Law and Procedure 15A ⚷676

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(A) In General
15Ak676 k. Record. Most Cited Cases

Administrative Law and Procedure 15A ⚷753

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak753 k. Theory and grounds of administrative decision. Most Cited Cases

Judicial review under the Administrative Procedure Act (APA) must focus on the administrative record already in existence, not some new record made initially in a reviewing court; parties may not use post-decision information as a new rationalization either for sustaining or attacking the agency's decision. 5 U.S.C.A. § 706(2)(A).

[12] Environmental Law 149E ⚷688

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek677 Scope of Inquiry on Review of Administrative Decision
149Ek688 k. Plants and wildlife; endangered species. Most Cited Cases

Judicial review of a biological opinion under the Administrative Procedure Act (APA) is based upon the evidence contained in the administrative record. 5 U.S.C.A. § 706(2)(A).

[13] Administrative Law and Procedure 15A ⚷676

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No comments

- n/a -

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(A) In General
15Ak676 k. Record. Most Cited Cases

Exceptions to administrative record review for technical information or expert explanation make such evidence admissible only for limited purposes, and those exceptions are narrowly construed and applied. 5 U.S.C.A. § 706(2)(A).

[14] Environmental Law 149E ⚷688

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek677 Scope of Inquiry on Review of Administrative Decision
149Ek688 k. Plants and wildlife; endangered species. Most Cited Cases

District court could consider extra administrative record expert testimony for explanation of technical terms and complex subject matter beyond court's knowledge, to understand agency's explanations, or lack thereof, underlying reasonable and prudent alternative (RPA) actions, and to determine if any bad faith existed, on judicial review under Administrative Procedure Act (APA) of salmonid biological opinion (BiOp) issued by National Marine Fisheries Service (NMFS). 5 U.S.C.A. § 706(2)(A).

[15] Administrative Law and Procedure 15A ⚷760

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak754 Discretion of Administrative Agency
15Ak760 k. Wisdom, judgment or opinion. Most Cited Cases

Administrative Law and Procedure 15A ⚷763

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak763 k. Arbitrary, unreasonable or capricious action; illegality. Most Cited Cases

On judicial review of agency action under the Administrative Procedure Act (APA), a district court must defer to the agency on matters within the agency's expertise, unless the agency completely failed to address some factor, consideration of which was essential to making an informed decision; the court may not substitute its judgment for that of the agency concerning the wisdom or prudence of the agency's action. 5 U.S.C.A. § 706(2)(A).

[16] Administrative Law and Procedure 15A ⚷763

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak763 k. Arbitrary, unreasonable or capricious action; illegality. Most Cited Cases

Administrative Law and Procedure 15A ⚷785

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak784 Fact Questions
15Ak785 k. Clear error. Most Cited Cases

When conducting an Administrative Procedure Act (APA) review, a court must determine whether the agency's decision is founded on a rational connection between the facts found and the choices made and whether the agency has committed a clear error of judgment; the agency's action need be only a reasonable, not the best or most reasonable, decision. 5 U.S.C.A. § 706(2)(A).

[17] Administrative Law and Procedure 15A ⚷763

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General

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No comments

- n/a -

15Ak763 k. Arbitrary, unreasonable or capricious action; illegality. Most Cited Cases

Administrative Law and Procedure 15A 785

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak784 Fact Questions
15Ak785 k. Clear error. Most Cited Cases

Although deferential, judicial review under the Administrative Procedure Act (APA) is designed to ensure that the agency considered all of the relevant factors and that its decision contained no clear error of judgment. 5 U.S.C.A. § 706(2)(A).

[18] Administrative Law and Procedure 15A 759

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak754 Discretion of Administrative Agency
15Ak759 k. Technical questions. Most Cited Cases

Administrative Law and Procedure 15A 763

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak763 k. Arbitrary, unreasonable or capricious action; illegality. Most Cited Cases

The deference accorded an agency's scientific or technical expertise is not unlimited, on judicial review of agency action under the Administrative Procedure Act (APA); deference is not owed when the agency has completely failed to address some factor consideration of which was essential to making an informed decision. 5 U.S.C.A. § 706(2)(A).

[19] Administrative Law and Procedure 15A 763

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak763 k. Arbitrary, unreasonable or capricious action; illegality. Most Cited Cases

On judicial review of agency action under the Administrative Procedure Act (APA), an agency's decision is arbitrary and capricious if it has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise. 5 U.S.C.A. § 706(2)(A).

[20] Environmental Law 149E 537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under the ESA, an agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction; likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[21] Environmental Law 149E 537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under the ESA, a failure by the agency to utilize the best available science is arbitrary and capricious. 5 U.S.C.A. § 706(2)(A); Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R.

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No comments

- n/a -

§ 402.14(g)(8).

[22] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under the ESA, a decision about jeopardy must be made based on the best science available at the time of the decision; the agency cannot wait for or promise future studies. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[23] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Environmental Law 149E ⚷688

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek677 Scope of Inquiry on Review of Administrative Decision
149Ek688 k. Plants and wildlife; endangered species. Most Cited Cases

Under the ESA, what constitutes the "best" available science implicates core agency judgment and expertise to which Congress requires the courts to defer; a court should be especially wary of overturning such a determination on review. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[24] Environmental Law 149E ⚷688

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek677 Scope of Inquiry on Review of Administrative Decision
149Ek688 k. Plants and wildlife; endangered species. Most Cited Cases

Under the ESA, an agency's scientific methodology is owed substantial deference and extends to the use and interpretation of statistical methodologies. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[25] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Environmental Law 149E ⚷551

149E Environmental Law
149EXI Plants and Wildlife
149Ek548 Evidence
149Ek551 k. Weight and sufficiency. Most Cited Cases

Mere uncertainty, or the fact that evidence may be weak, is not fatal to an agency decision under the ESA. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[26] Environmental Law 149E ⚷550

149E Environmental Law
149EXI Plants and Wildlife
149Ek548 Evidence
149Ek550 k. Presumptions, inferences, and burden of proof. Most Cited Cases

Under the ESA, the presumption of agency expertise may be rebutted if the agency's decisions, although based on scientific expertise, are not reasoned; agencies cannot disregard available scientific evidence better than the evidence on which it relies. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[27] Environmental Law 149E ⚷688

149E Environmental Law

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No comments

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149EXIII Judicial Review or Intervention
149Ek677 Scope of Inquiry on Review of Administrative Decision
149Ek688 k. Plants and wildlife; endangered species. Most Cited Cases

A district court is not required by the ESA to defer to an agency conclusion that runs counter to that of other agencies or individuals with specialized expertise in a particular technical area. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[28] Environmental Law 149E ⚷551

149E Environmental Law
149EXI Plants and Wildlife
149Ek548 Evidence
149Ek551 k. Weight and sufficiency. Most Cited Cases

Under the ESA, a court should reject conclusory assertions of agency expertise where the agency spurns unrebutted expert opinions without itself offering a credible alternative explanation. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[29] Evidence 157 ⚷48

157 Evidence
157I Judicial Notice
157k48 k. Official proceedings and acts. Most Cited Cases

District court could take judicial notice of United States Fish and Wildlife Service and National Marine Fisheries Service, Endangered Species Consultation Handbook, in action against Bureau of Reclamation and National Marine Fisheries Service (NMFS) under ESA regarding implementation of reasonable and prudent alternative (RPA) water supply reductions as referenced in salmonid biological opinion (BiOp). Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(f).

[30] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under the ESA, when an agency considers the effects of its actions within the context of other existing human activities that impact the listed species, it is not required to quantify and/or parcel out the "proportional share" of harms among the baseline and the proposed action; however, the record must reasonably demonstrate that the agency's proposed actions, when viewed in the present and future human and natural contexts, will cause jeopardy or adverse modification. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. §§ 402.02, 402.14(f).

[31] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Where an agency is required by law to perform an action, it lacks the power under the ESA to insure that the action will not jeopardize the species. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[32] Environmental Law 149E ⚷701

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek701 k. Preliminary injunction. Most Cited Cases

Alleged deficiencies in analysis of impacts to orcas in salmonid biological opinion (BiOp) issued by National Marine Fisheries Service (NMFS) did not justify preliminary injunction to enjoin implementation of reasonable and prudent alternative (RPA) water supply reductions, in action under ESA, since NMFS adopted RPA primarily for benefit of salmon, steelhead, and green sturgeon that migrated through delta and were harmed by export pumping

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that interfered with their migrations, not orcas which resided in ocean and indirect effect of alleged reductions of orca prey was not mentioned as direct justification for challenged RPA. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[33] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Environmental Law 149E ⚷688

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek677 Scope of Inquiry on Review of Administrative Decision
149Ek688 k. Plants and wildlife; endangered species. Most Cited Cases

National Marine Fisheries Service (NMFS) applied viable salmonid population (VSP) concept in sufficiently rigorous manner under ESA by using that VSP methodology in salmonid biological opinion (BiOp) in qualitative manner, as conceptual framework, even if analysis in BiOp may have benefited from application of quantitative VSP methodologies and it was disputed whether failure to do so represented breach of accepted scientific practice, since court had to defer to agency in such scientific disputes; requiring NMFS to adapt VSP methodology to operate as quantitative model would have been equivalent of requiring NMFS to generate data and agency was not required to generate new studies. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[34] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

National Marine Fisheries Service (NMFS) was not required by ESA to engage in population modeling and/or life cycle analysis before issuing reasonable and prudent alternative (RPA) water supply reductions in salmonid biological opinion (BiOp), despite scientific preference for such modeling, where NMFS had not been presented with then-existing best available science representing appropriate population or life cycle models for species of concern prior to issuance of BiOp and primary purpose of RPA was to protect outmigrating juvenile members of steelhead for which no population indices, whether absolute or relative, were available. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[35] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Imposition of limit on water exports by National Marine Fisheries Service (NMFS) in salmonid biological opinion (BiOp), as reasonable and prudent alternative (RPA) water supply reduction, without any reasoned and scientifically justified biological explanation for selecting specific remedial measures chosen, was arbitrary and capricious, in action under ESA particularly in light of enormous human impacts caused by even small changes in flow regime reducing exports, where there was no way to know whether those levels were sufficiently protective, not protective enough, or far more protective than necessary. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[36] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Margin of error, i.e. taking precautionary approach, built into reasonable and prudent alternative

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(RPA) actions, had to be properly justified and disclosed by record, even if it was scientifically justifiable under ESA to do so. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[37] Environmental Law 149E 537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

National Marine Fisheries Service (NMFS), when issuing reasonable and prudent alternative (RPA) water supply reductions in salmonid biological opinion (BiOp), did not act rationally, and was not scientifically justified under ESA, in relying on studies for findings that authors themselves refused to make. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[38] Environmental Law 149E 688

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek677 Scope of Inquiry on Review of Administrative Decision
149Ek688 k. Plants and wildlife; endangered species. Most Cited Cases

Deference was owed to National Marine Fisheries Service (NMFS) unless NMFS was unreasonably wrong, despite undeniable problems with basis in salmonid biological opinion (BiOp) for reasonable and prudent alternative (RPA) water supply reductions in San Joaquin basin, where studies supported proposition that, for those populations spawning entirely within San Joaquin basin, increasing exports negatively impact salmonid smolt survival. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[39] Environmental Law 149E 537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

A federal action agency must not blindly adopt the conclusions of a consulting agency to conclusively establish its compliance with its substantive obligations the under ESA to ensure that its actions will not jeopardize a listed species. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[40] Environmental Law 149E 701

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek701 k. Preliminary injunction. Most Cited Cases

On motion for preliminary injunction, public interest of enhancing water supply to reduce adverse harms of destruction of permanent crops, fallowed lands, increased groundwater consumption, land subsidence, reduction of air quality, destruction of family and entity farming businesses, and social disruption and dislocation, such as increased property crimes and intra-family crimes of violence, adverse effects on schools, and increased unemployment leading to hunger and homelessness had to be addressed under ESA without jeopardizing species and their critical habitat. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2).

[41] Environmental Law 149E 700

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek700 k. In general. Most Cited Cases

All harms may be considered in evaluating a claim for injunctive relief under NEPA. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

[42] Environmental Law 149E 701

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek701 k. Preliminary injunction. Most

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Cited Cases

In light of up-to-date evidence of status of affected fish species, preliminary injunction against water pumping restrictions, found to have violated NEPA and to have likely violated ESA, until date of their planned termination, would not deepen jeopardy to affected species. Endangered Species Act of 1973, § 2 et seq., 16 U.S.C.A. § 1531 et seq.; National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

***1121** Daniel Joseph O'Hanlon, Hanspeter Walter, K. Eric Adair, Hanspeter Walter, ***1122** Kronick, Moskovitz, Tiedemann & Girard, David A. Diepenbrock, Jon David Rubin, Jonathan R. Marz, Eileen M. Diepenbrock, Diepenbrock Harrison, Linus Serafeim Masouredis, Metropolitan Water District of Southern California, Sacramento, CA, Charles Wesley Strickland, Brownstein Hyatt Farber and Schrek LLP, Santa Barbara, CA, Geoffrey M. Williamson, PHV, Mark J. Mathews, PHV, Martha F. Bauer, PHV, Michelle C. Kales, PHV, Brownstein Hyatt Farber Schreck LLP, Denver, CO, Steve O. Sims, PHV, Brownstein Hyatt Farber Schreck LLP, Albuquerque, NM, Harold Craig Manson, Thomas William Birmingham, Westlands Water District, Fresno, CA, Alexis Keane Galbraith, Jeanne M. Zolezzi, Karna E. Harrigfeld, Jennifer L. Spaletta, Herum Crabtree, Stockton, CA, Tim P. O'Laughlin, O'Laughlin & Paris, LLP, Chico, CA, Audrey M. Huang, Paul S. Weiland, Nossaman LLP, Irvine, CA, Christopher J. Carr, William M. Sloan, Edgar B. Washburn, Morrison & Foerster, LLP, San Francisco, CA, Amelia Minaberrigarai, Bakersfield, CA, for Plaintiffs.

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FINDINGS OF FACT AND CONCLUSIONS OF LAW RE: PLAINTIFFS' REQUEST FOR PRELIMINARY INJUNCTION (Docs. 161 & 230)
OLIVER W. WANGER, District Judge.

I. *INTRODUCTION*

[1] Plaintiffs San Luis & Delta Mendota Water Authority (the "Authority") and Westlands Water District ("Westlands") (collectively "San Luis Plaintiffs") seek a Temporary Restraining Order ("TRO") [FN1] and a Preliminary Injunction ("PI") against the implementation of Reasonable and Prudent Alternative ("RPA") Action IV.2.1 set forth in the National Marine Fisheries Service's ("NMFS") June 4, 2009 Biological Opinion ("2009 Salmonid BiOp"), which addresses the impacts of the coordinated operations of the federal Central Valley Project ("CVP") and State Water Project ("SWP") on the Central Valley winter-run and spring-run Chinook salmon, Central Valley steelhead, Southern Distinct Population Segment of Green ***1123** Sturgeon, and Southern Resident Killer Whales ("Listed Species"). Both motions were filed February 22, 2010. Docs. 230, 233.

FN1. Plaintiffs' request for a TRO against the imminent implementation of Action IV.2.1, which took effect as of April 1, Doc. 233, was denied for the reasons stated in open court on the record on March 31, 2010. Doc. 306. The denial of a TRO motion is not dispositive of the merits of a related motion for preliminary injunction. *See Office of Personnel Management v. Am. Fed'n of Gov't Employees,* 473 U.S. 1301, 1305, 105 S.Ct. 3467, 87 L.Ed.2d 603 (1985).

Plaintiffs State Water Contractors, Stockton East Water District, Oakdale Irrigation District, and South San Joaquin Irrigation District, and Plaintiff–Intervenor California Department of Water Resources ("DWR") filed statements of non-opposition. Docs. 247, 248 & 251. Federal Defendants and Defendant–

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Intervenors opposed. Docs. 273 & 274.

Additionally, San Luis Plaintiffs seek a PI against the implementation of Action IV.2.3 in the 2009 Salmonid BiOp. Doc. 164 (filed Jan. 27, 2010). Plaintiffs Kern County Water Agency and Coalition for a Sustainable Delta joined. Doc. 181. DWR filed a partial joinder in and statement of non-opposition to the motion. Doc. 249. Federal Defendants and Defendant–Intervenors opposed. Docs. 273 & 274.

The PI motions came on for evidentiary hearing and argument, in Courtroom 3 of the above-captioned Court from March 30 through April 2, 2010. The parties were represented by counsel, as noted on the record in open court.

After consideration of the testimony of the witnesses, the exhibits received in evidence, the written briefs of the parties, oral arguments, and the parties' proposed findings of fact and conclusions of law, Docs. 316 & 314, and disapprovals thereto, Docs. 320, 321 & 336, the following findings of fact and conclusions of law concerning the motion for interim relief/preliminary injunction are entered.

To the extent any finding of fact may be interpreted as a conclusion of law or any conclusion of law may be interpreted as a finding of fact, it is so intended.

II. *BACKGROUND*

The 2009 Salmonid BiOp found that planned coordinated Project operations would jeopardize the continued existence of and/or adversely modify the critical habitat of several of the Listed Species.[FN2] BiOp at 1–2. As required by law, NMFS proposed a Reasonable and Prudent Alternative ("RPA") that imposes a number of operating restrictions and other measures on the Projects. The RPA included numerous elements for each of the various project divisions and associated stressors, which NMFS concluded "must be implemented *in its entirety* to avoid jeopardy and adverse modification." *Id.* at ¶ 578 (emphasis added). The description of the RPA comprises approximately 90 pages of the 2009 Salmonid BiOp. *See id.* at 581–671.

FN2. Jeopardy was found as to all of the covered species; adverse habitat modification was found as to the designated critical habitat of winter-run, spring-run, steelhead, and green sturgeon. BiOp at 1–2.

The RPA includes five principle components, with numerous sub-parts, but Plaintiffs currently seek to restrain only:

• Action IV.2.1, which will limit pumping based on San Joaquin River inflow, measured at Vernalis, from April 1 through May 31; and

• Action IV.2.3, which imposes restrictions on negative flows in Old and Middle Rivers ("OMR") between January 1 and June 15, or until average daily water temps at Mossdale (a location on the San Joaquin River west of Manteca, California) are greater than 72°F, whichever is earlier.

III. *SUMMARY OF MOTION*

Plaintiffs seek preliminary injunctive relief against implementation of Actions IV.2.1 and IV.2.3 on the grounds that:

1) the district court already found that the United States Bureau of Reclamation***1124** ("Reclamation") failed to comply with the National Environmental Policy Act ("NEPA") in implementing the 2009 Salmonid BiOp; and

2) the 2009 Salmonid BiOp is arbitrary, capricious, and contrary to law because:

a) NMFS allegedly conducted an effects analysis that improperly overstates impacts attributable to the coordinated operations of the CVP and SWP;

b) NMFS failed to clearly define or consistently apply a relevant environmental baseline;

c) NMFS failed to distinguish between discretionary and non-discretionary CVP and SWP activities, which overstated the effects of coordinated operations of the Projects; and

d) RPA Actions IV.2.1 and IV.2.3 are arbitrary and capricious, because they are without factual or scientific justification and/or not supported by the best available science.

Plaintiffs further claim that the implementation

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of Actions IV.2.1 and IV.2.3 will cause them continuing irreparable harm and that the public interest and balance of hardships favor injunctive relief.

IV. *STANDARD OF DECISION*

[2][3] Injunctive relief, whether temporary or permanent, is an "extraordinary remedy, never awarded as of right." *Winter v. Natural Resources Defense Council,* 555 U.S. 7, 129 S.Ct. 365, 376, 172 L.Ed.2d 249 (2008); *Weinberger v. Romero–Barcelo,* 456 U.S. 305, 312, 102 S.Ct. 1798, 72 L.Ed.2d 91 (1982). Four factors must be established by a preponderance of the evidence to qualify for temporary injunctive relief:

1. Likelihood of success on the merits;

2. Likelihood the moving party will suffer irreparable harm absent injunctive relief;

3. The balance of equities tips in the moving parties' favor; and

4. An injunction is in the public interest.

Winter, 129 S.Ct. at 374; *Am. Trucking Ass'n v. City of Los Angeles,* 559 F.3d 1046, 1052 (9th Cir.2009).

V. *FINDINGS OF FACT*

A. *The Agency Action.*

1. The agency action is the coordinated operation of the CVP and SWP, pursuant to an Agreement for the Coordinated Operation of the two projects ("COA").

2. According to the Rivers and Harbors Act of 1937, the dams and reservoirs of the CVP "shall be used, first, for river regulation, improvement of navigation and flood control; second, for irrigation and domestic uses; and, third, for power." 50 Stat. 844, 850.

3. The CVP was reauthorized in 1992 through the Central Valley Improvement Act ("CVPIA"), which modified the 1937 Act and added mitigation, protection, and restoration of fish and wildlife as project purposes. Pub.L. 102–575 § 3402, 106 Stat. 4600, 4706 (1992). One of the stated purposes of the CVPIA is to address impacts of the CVP on fish and wildlife. 3406(a). The CVPIA made environmental protection and water deliveries co-purposes.

4. This case presents a critical conflict between these dual legislative purposes, providing water service for agricultural, domestic, and industrial use versus enhancing environmental protection for fish species whose habitat is maintained in rivers, estuaries, canals, and other waterways that comprise the Sacramento–San Joaquin Delta.

5. It is of manifest significance to the public interest that DWR, a co-operator and the State contractual partner of Reclamation,***1125** disagrees with at least some portions of the RPA and seeks limited injunctive relief against RPA Action IV.2.3.

B. *Facts Relevant to NEPA Claims.*

6. It is undisputed that neither NMFS nor Reclamation engaged in any NEPA analysis in connection with preparation or implementation of the 2009 Salmonid BiOp.

7. It is undisputed that a March 17, granted San Luis Plaintiffs' motion for summary judgment on their claim that Federal Defendants violated NEPA when they adopted and implemented the 2009 NMFS BiOp RPA without conducting the required NEPA analysis. Doc. 288.

8. NMFS asserts that it did consider a range of alternative RPA actions, including those proposed by Reclamation and DWR, and "carefully avoided prescribing measures that are not necessary to meet section 7 requirements." BiOp at ¶ 578, 580 & 720 (NMFS endeavored "through the iterative consultation process to avoid developing RPA actions that would result in high water costs, while still providing for the survival and recovery of listed species."). However, this process did not fully or sufficiently evaluate, explain or analyze the extent and gravity of the harms to humans and the environment visited upon Plaintiffs by Project water service reductions and pumping restrictions.

9. The 2009 Salmonid BiOp phases in some elements of the RPA over time, provides a health and safety exception to ensure a minimum level of water exports, uses monitoring programs and adaptive management to initiate RPA actions when species are present and protections are most needed, and includes

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specific scientific studies and engineering programs to refine RPA elements. *Id.* at ¶ 579–80, 719–23. In addition, the challenged RPA Actions were modified between the draft and final RPA to lessen water supply impacts, including shortening the duration of Action IV.2.1 from 90 to 60 days. *Id.* at 723; NMFS AR 104419.

10. A legally sufficient NEPA analysis should identify and analyze alternatives that minimize harm to humans and the human environment. Federal Defendants do not claim that they engaged in a systematic consideration of impacts to humans and the human environment and/or the alternatives that would have minimized harm to human and the human environment while still protecting the species.

11. Federal Defendants did not take the hard look required to achieve, to the maximum extent possible, the co-equal Reclamation Law objective of providing water service.

C. *Facts Relevant to ESA Challenges.*

(1) *Current Status of the Species.*

a. *Sacramento River Winter–Run Chinook Salmon.*

12. Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) ("winter-run") are listed as "endangered" under the ESA. 70 Fed. Reg. 37,160 (June 28, 2005). Winter-run critical habitat includes portions of the Sacramento River and other waters. Historical winter-run population estimates were as high as approximately 100,000 fish in the 1960s, but declined to under 200 fish in the 1990s. Gov't Salmon Ex. 4 (Second Stuart Decl., Doc. 273–3), 45. In recent years, population surveys of winter-run estimated a high of 17,344 fish in 2006, followed by a decline in 2007 (2,542 fish) that persisted into 2008 (2,830 fish). *Id.* In 2009, there was a modest increase in adult escapement (4,658 fish). *Id.* Winter-run are "currently not viable." BiOp at 88; *see also* 4/1/10 Tr. 175: 11–12.

13. Winter-run juvenile rearing and migration typically occurs between July ***1126** and February in the upper Sacramento River, with juvenile emigration downstream through the Delta taking place between November through May or June. BiOp at 81, 94; *Pac. Coast Fed'n of Fishermans' Ass'ns. v. Gutierrez* ("*Gutierrez II* "), 606 F.Supp.2d 1195, 1216–17 (E.D.Cal.2008); 4/1/10 Tr. 167:5–19; Gov't Salmon Ex. 1 (First Stuart Decl., Doc. 190–4) at (internal) Exhibit 1a. Historically, the peak emigration period for winter-run occurs during March. Gov't Salmon Ex. 4, 47.

14. During the current emigration year (2009–2010), juvenile winter-run began entering the Delta in October 2009. *Id.* at 46. On April 1, 2010, Mr. Stuart, an NMFS biologist, testified that "about 1,600 winter-run" juveniles have been salvaged at the pumping facilities for the season. 4/1/10 Tr. 174:11.

15. The estimate of juvenile winter-run production (known as the Juvenile Production Estimate ("JPE")) for 2009 is 1,144,860. Gov't Salmon Ex. 1, at 3. The BiOp sets an incidental take limit of two percent of the JPE of winter-run salmon, or 22,897. BiOp at 775; 3/31/10 Tr. 112:16–25–113:1.

16. In addition, although winter-run are currently at the "tail end" of their emigration through the Delta (90% moved through the Delta by the end of March), 3/31/10 Tr. 172:3–6, Mr. Stuart opined that the "tail end" of the winter-run migration period is "significant" because it "represents fish that would probably show a different life history than fish that occur during the other parts" and, "protecting the tail end would be important to maintain the diversity of that winter-run population," 4/1/10 Tr. 174:19–175:8.

17. The emigration period for winter-run is all but concluded for this water year.

18. Designated critical habitat for winter-run includes the Sacramento River, the Delta, and downstream bays to the Golden Gate Bridge. *Gutierrez II,* 606 F.Supp.2d at 1217. Currently, the value of winter-run critical habitat is "degraded." BiOp at 93.

b. *Central Valley Spring–Run Chinook Salmon.*

19. Central Valley spring-run Chinook salmon (*O. tshawytscha*) ("spring-run") are listed as "threatened" under the ESA. 71 Fed. Reg. 834 (June 5, 2005); 70 Fed. Reg. 37160 (June 28, 2005) (critical habitat designated). Spring-run are not currently viable. 4/1/10 Tr. 179:12–15. Spring-run Chinook have been declining over recent years; this past year was one of the lowest adult escapements ever seen. 3/31/10 Tr. 137:22–138:2.

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20. It is estimated that the entire Evolutionarily Significant Unit ("ESU") consists of 3,800 adults. 4/1/10 Tr. 180:9–11; Gov't Salmon Ex. 4 at (internal) Ex. 7 (March 2010 population estimates).

21. The emigration period for spring-run extends from November to May, *see* Gov't Salmon Ex. 4, ¶ 50, although spring-run may occur in the Delta in low abundance in June, *see* Gov't Salmon Ex. 1 at (internal) Exhibit 1a. Historically, April is the peak period for spring-run salvage at the CVP and SWP. 3/31/10 Tr. 125:14; *see also* Gov't Salmon Ex. 4, 52.

22. Emigration for spring-run for 2009–2010 is substantially complete.

23. During the current emigration year (2009–2010), spring-run began entering the Delta in October 2009. Gov't Salmon Ex. 4, ¶ 52. Under the 2009 Salmonid BiOp, NMFS uses the release of specially-marked late fall-run Chinook as a surrogate for determining take of spring-run Chinook at the export pumps. BiOp at 776, 782; Gov't Salmon Ex. 4, ¶ 52; *id.* at (internal) Exhibit 10 (graph showing peak of spring-run salvage in April). For ***1127** spring-run, the incidental take limit is one percent of the marked fall-run surrogates. 3/31/10 Tr. 113:1–2; *see also* BiOp at 776. Take of the tagged late-fall surrogate releases exceeded the caution level of 0.5% this year, which would have triggered a reduction in negative OMR flows under RPA Action IV.2.3. *See* 3/31/10 Tr. 113:1–4; Gov't Salmon Ex. 4, ¶ 52; BiOp at 649. However, because Action IV.2.3 was enjoined, NMFS could not implement Action IV.2.3 for several days. *See* Gov't Salmon Ex. 4, ¶ 52.

24. Designated critical habitat for spring-run includes the Sacramento River, tributaries supporting spring-run, the Delta, and downstream bays to the Golden Gate Bridge. *Gutierrez II,* 606 F.Supp.2d at 1217. The value of spring-run critical habitat currently is "degraded." BiOp at 101, 104.

c. *Central Valley Steelhead.*

25. Central Valley steelhead (*O. mykiss*) ("CV steelhead") are listed as "threatened" under the ESA. 71 Fed. Reg. 834 (Jan. 5, 2006). Wild CV steelhead are confined mostly to the upper Sacramento River and its tributaries. BiOp at 107. Recent surveys also have detected small, self-sustaining populations on the Stanislaus, Mokelumne, and Calaveras rivers, as well as observations of juvenile steelhead on the Tuolumne and Merced rivers. *Id.* These small populations make up the remaining representatives of the Southern Sierra Nevada Diversity Group ("SSNDG") of CV Steelhead. *Id.* at 198.

26. Approximately 90% of historical CV Steelhead range is blocked by dams. 3/31/10 Tr. 99:25–100:2. Mortality rates for CV steelhead, estimated by using fall-run Chinook as surrogates, are approximately 70 to 90%. *Id.* at 102:21–23.

27. While there is limited information on population size, one population estimate in 2005 calculated that there were approximately 3,600 female CV steelhead spawning in the entire Central Valley, compared with 40,000 spawners in the 1960s. BiOp at 106.

28. All available data indicate that the CV steelhead population continues to decline. *Id.* at 108–09; *see also id.* at 100:8.

29. The SSNDG is one of the population groups of the CV steelhead. 3/31/10 Tr. 98:2–3. Under the Viable Salmonid Population ("VSP") concept and the Lindley (2007) paper applying the VSP concept to Central Valley salmonids, NMFS must maintain all extant populations within the Central Valley, in order to maintain the viability of the Distinct Population Segment ("DPS") as a whole. *Id.* at 98:3–7.

30. The SSNDG is a very small population, represented by very few adult fish moving back into the system and potentially only a few hundred to a few thousand juveniles moving out each year. *Id.* at 98:9–12; 100:12–23. These numbers are an "assumption" because of the limited monitoring data available. *Id.* at 98:12–15.

31. The risk of extirpating the SSNDG is very high because 100% of this very small population must travel through the Delta, where it is exposed to numerous risks. *Id.* at 103:2–11. Mr. Stuart opined that this diversity group has a "very tenuous hold on survival" and that "[i]t wouldn't take much to extirpate it." *Id.* at Tr. 104:11–13. Extirpation of this diversity group would further decrease the viability of the CV steelhead DPS as a whole. *Id.* at 103:24–104:3.

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32. The CV steelhead DPS as a whole is not currently viable. *Id.* at 99:8–11.

33. Juvenile CV steelhead typically emigrate through the Delta from late September through June. Gov't Salmon Ex. 1, at (internal) Exhibit 1a. "Peak entrainment typically occurs between mid-February and mid-March with a prolonged tail into June." Gov't Salmon Ex. 4, ¶ 57. CV ***1128** steelhead are currently migrating through the Delta, including the Sacramento and San Joaquin Rivers and their associated tributaries. *See* 3/31/10 Tr. 118:8–10. As of March 15, 2010, approximately 420 wild CV steelhead had been taken at the CVP since October 2009, and 204 wild steelhead had been taken at the SWP. Gov't Salmon Ex. 4, ¶ 57. The "highest rates of fish collection did overlap with the period in which the TRO [issued in this case against the implementation of Action IV.2.3] allowed increased exports (February 5 through February 10, 2010)." *Id.*

34. The 2009 incidental take for CV steelhead is 3,000 fish based on "fairly old data." 3/31/10 Tr. 135:19–20.

35. CV steelhead critical habitat is severely degraded. 3/31/10 Tr. 67:21–68:8.

36. Despite over five (5) years of active controversy over relevant ESU designation and preservation of CV steelhead, Federal Defendants have no credible population figures, nor a reliable life cycle model for this species.

d. *Southern DPS of North American Green Sturgeon.*

37. The southern distinct population segment of the North American green sturgeon ("green sturgeon") (*Acipenser medirostris*) is listed as "threatened" under the ESA. 71 Fed. Reg. 177¶ 57 (Apr. 7, 2006); 73 Fed. Reg. 52,084 (critical habitat designated).

38. Green sturgeon are anadromous fish that spawn and rear in freshwater rivers and estuaries but spend most of their lives in the ocean. Gov't Salmon Ex. 4, ¶ 58. Juvenile green sturgeon are present in the Delta year round. *Id.* at ¶ 59. The green sturgeon "is at substantial risk of future population declines" due to, among other things, "loss of juvenile green sturgeon due to entrainment at the project fish collection facilities in the South Delta ...." BiOp at 126.

39. There are no population counts or figures for the Southern DPS green sturgeon. 3/31/10 Tr. 73:1. Mr. Stuart was unable to provide an estimate of the actual population of green sturgeon because relevant data is sparse. 4/1/10 Tr. 177:7–8, 183:17–18. The BiOp estimates salvage of green sturgeon to be highly variable, with a 10–year historical average of 74 adults and 106 juveniles per year. BiOp at 777. However, Mr. Stuart noted that green sturgeon have not been detected in salvage this year. 4/1/10 Tr. 177:10–11.

40. Green sturgeon are another species for which no reliable population estimates and/or life cycle models have been developed, preventing the formulation of more precise protective measures.

e. *Southern Resident Killer Whale.*

41. The Southern Resident killer whale DPS ("Southern Residents") of *Orcinus orca* was listed as an "endangered" species under the ESA on November 18, 2005. 70 Fed. Reg. 69,903 (Nov. 18, 2005).

42. Southern Residents are found throughout the coastal waters off Washington, Oregon, and Vancouver Island and are known to travel as far south as central California and as far north as the Queen Charlotte Islands, British Columbia. BiOp at 159. The Southern Residents were formerly thought to range southward along the coast to about Grays Harbor or the mouth of the Columbia River. However, recent sightings of members of K and L pods in Oregon (in 1999 and 2000) and California (in 2000, 2003, 2005, 2006 and 2008) have extended the southern limit of the Southern Resident range. *Id.* at 160.

43. The Southern Residents have fewer than 90 members and loss of even a single individual, or the decrease in reproductive capacity of a single individual, is likely to reduce the likelihood of survival and recovery of the DPS. BiOp at 573. NMFS concluded that Southern Residents prefer ***1129** Chinook salmon as prey. *Id.* at 163 (salmon constitute up to 96% of Southern Resident prey, with Chinook salmon constituting 72% of that prey); *id.* at 573. In addition, genetic and chemical evidence indicate that Southern Residents consume Chinook salmon from the Central Valley. *Id.* at 164. Orca sightings off the

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Coast of California coincide with large runs of Central Valley salmon. *Id.* at 159–62, 573.

44. NMFS concluded that extinction of winter-run and spring-run Chinook salmon, as well as reductions in fall-run Chinook salmon populations [FN3], "would reduce prey availability and increase the likelihood for local depletions of prey in particular locations and times," which would, in turn increase the risk of extinction of the Southern Residents. *Id.* at ¶ 573–74.

FN3. Fall-run Chinook salmon are not listed as threatened or endangered under the ESA. 3/31/10 Tr. 126:19–21

E. There is no direct evidence of orca mortality attributable to the Projects.

(2) *Effects of Ocean Conditions on Salmon Declines.*

46. Mr. Cramer testified that poor fall-run Chinook adult returns during 2007 and 2008 could be attributed to a change in ocean conditions and very poor survival in the ocean. 3/30/10 Tr. 111:10–112:2; 117:17–118:2.

47. The BiOp cites the Lindley (2009) analysis of this fishery collapse for the proposition that "the rapid and likely temporary deterioration in ocean conditions acted on top of a long-term steady degradation of the freshwater and estuarine environment." BiOp at 149. The BiOp also concludes:

> Because the potential for poor ocean conditions exists in any given year, and there is no way for salmon managers to control these factors, any deleterious effects endured by salmonids in the freshwater environment can only exacerbate the problem of an inhospitable marine environment. Therefore, in order to ensure viable populations, it is important that any impacts that can be avoided prior to the period when salmonids enter the ocean must be carefully considered and reduced to the greatest extent possible.

Id. at 152–53

48. Mr. Cramer clarified that the fish of concern were already at low abundance and that, over the course of decades, there were other factors operating on their population trajectories besides ocean conditions. 3/31/10 Tr. 2:18–3:2. Mr. Stuart testified that the collapse of fall-run Chinook was not exclusively caused by ocean conditions, but also was brought about by freshwater environmental conditions, including reduced flows, water temperatures, predators, and non-native species. 3/31/10 Tr. 127:22–25; *id.* at 128:1–11.

49. Other causes of freshwater degradation, including, but not limited to, toxics, increased salinity, alien and invasive species, predators, riparian pumping and in-Delta diversions are unaddressed by any alternatives. These other causes have not been systematically addressed by Federal Defendants or any other potentially interested agency or entity.

(3) *Action IV.2.1.*

a. *Operation and Purpose(s) of Action IV.2.1.*

50. The stated objectives of Action IV.2.1 are to: (a) reduce vulnerability of emigrating CV Steelhead in the San Joaquin River (i.e., the SSNDG) to conditions in the South Delta and at the pumps; and ***1130** (b) enhance likelihood of salmonids successfully exiting the Delta by creating more suitable hydraulic conditions in the mainstem of the San Joaquin. BiOp at 641; 3/31/10 Tr. 65:10–18.

51. NMFS's analysis of the scientific basis for Action IV.2.1 is found in Appendix 5 to the BiOP. Gov't Salmon Ex. 20 ("BiOp App. 5").

52. While spring flow increases and export reductions have been provided as part of the Vernalis Adaptive Management Plan ("VAMP") since 2000, the proposed operation did not carry VAMP forward, as funding for such flows was set to expire in 2009, and the San Joaquin River Agreement, a key to implementing VAMP, expires in 2012. *Id.* at 2. Based on uncertainty that VAMP would continue, NMFS determined it necessary to develop an RPA which ensured the flows necessary for successful juvenile outmigration and maintenance of critical habitat. *Id.* at 3.

53. Action IV.2.1 is in effect from April 1 through May 31 and has two requirements. First, the Action requires a minimum flow, as measured at Vernalis, based on an index of storage at New Melones ("New Melondes Index"). BiOp at 642. Based on this Index, the minimum flow required at Vernalis

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from April 1, 2010 to May 31, 2010 under Action IV.2.1 is the greater of 3,000 cubic feet per second ("cfs") or the flow needed to meet the requirements of State Water Resources Control Board Decision 1641 ("D–1641"). Gov't Salmon Ex. 5 (Third Milligan Decl.), ¶ 5. The Vernalis flow requirement is not challenged here.

54. The second requirement of Action IV.2.1 restricts combined CVP and SWP export pumping based on the flows at Vernalis, with the permissible exports rising in relation to increased flows at Vernalis. BiOp at 642. The baseline export rate is set at 1,500 cfs, as this has been deemed an operational minimum required to address health and human safety needs. 3/31/10 Tr. 64:9–11. As of a March 15, 2010 estimate provided by the day-to-day manager of the CVP, Ronald Milligan, Vernalis flows are likely to be less than 6,000 cfs, meaning that Action IV.2.1 likely will limit export pumping to 1,500 cfs. BiOp at 642; Gov't Salmon Ex. 5, ¶ 5.

55. Action IV.2.1 will not control exports for the entire 60–day period, as VAMP will limit combined exports to 1,500 cfs for 30 days in April and May. Gov't Salmon Ex. 5, ¶ 23. This year, VAMP likely will be initiated April 22, 2010. *Id.*

56. Action IV.2.1 is designed primarily to benefit the SSNDG (i.e. steelhead that originate in the San Joaquin basin from the Stanislaus, Tuolumne, and Merced Rivers). 3/31/10 Tr. 65:10–13. Action IV.2.1 will also benefit those salmonids that emigrate out of the Calaveras and Mokelumne Rivers and those salmonids that come from the Sacramento River basin but enter into the central and southern Delta through Georgiana Slough or the Delta Cross Channel ("DCC") and the Mokelumne River system when the DCC gates are open. *Id.* at 65:13–18.

57. Increased flows from Action IV.2.1 will also benefit designated critical habitat for the CV steelhead within this region by enhancing riparian habitat, flow, and decreasing ambient temperature, as well as increasing turbidity and juvenile migration time, both of which lessen the risk of predation. 3/31/10 Tr. 67:2–17. However, habitat protection is not one of the rationales for Action IV.2.1 articulated in the BiOp or Appendix 5.

b. *Viable Salmonid Population Methodology.*

58. There is considerable dispute about whether NMFS went far enough in its use of the Viable Salmonid Population ("VSP") concept to evaluate the effects of Project operations on the Listed Species.

***1131** 59. It is undisputed that VSP can serve as a "conceptual framework" around which the analysis of a project can be structured. BiOp at 51–53. The BiOp describes VSP as follows:

> The VSP concept provides specific guidance for estimating the viability of populations and larger-scale groups of Pacific salmonids such as ESU or DPS. Four VSP parameters form the key to evaluating population and ESU/DPS viability: (1) abundance; (2) productivity (i.e., population growth rate); (3) population spatial structure; and (4) diversity.

Id.

60. Under the VSP concept, abundance is just one of several criteria that must be met for a population to be considered viable. BiOp at 84. ESU viability also depends on the number of populations and subunits within the ESU, their individual status, their spatial arrangement with respect to each other and sources of catastrophic disturbance, and diversity of the populations and their habitat. *Id.; see also* NMFS AR 00123481 (Lindley (2007)).

61. The BiOp explains that under the VSP framework, viability requires more than attaining a particular level of population abundance. "Rather, for an ESU to persist, populations within the ESU must be able to spread risk and maximize future potential for adaptation." BiOp at 84. Lindley (2007) further found that an important risk facing salmonid ESUs is "that much of the diversity historically present in these ESUs has been lost." NMFS AR 00123489. Lindley (2007) thus recommends that "every extant population" of the listed salmonids "be viewed as necessary for the recovery of the ESU," because all three ESUs "are far short of being viable, and extant populations, even if not presently viable, may be needed for recovery." NMFS AR 00123494. Based on this recommendation, the BiOp "assumed that if appreciable reductions in any population's viability are expected to result from implementation of the proposed action, then this would be expected to appreciably reduce the likelihood of both the survival

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and recovery of the diversity group the population belongs to as well as the listed ESU/DPS." BiOp at 50.

62. The BiOp used the VSP concept, extensively discussed it, and addressed the various VSP factors in considering the current status of and the impacts of proposed Project operations on the Listed Species. *See BiOp* at 105 at 43; *see also, id.* at 50–53, 68, 84–88, 93–101, 108–111, 124, 173, 309, 443, 451, 472. However, NMFS used VSP as a *qualitative* framework.

63. There is a dispute over whether NMFS should have used the VSP as a starting point for a *quantitative* analysis. Mr. Cramer opines that the VSP concept described in Lindley (2006) ("NMFS Science Center Evaluation of the Peer Reviews of the Long–Term Central Valley Project and State Water Project Operations Section 7 Consultation"), identifies attributes of a population that are useful in determining a population's ability to persist, but is not a quantitative framework. 3/30/10 Tr. 105:5–13.

64. Lindley 2006 states that the VSP framework was designed to be a conceptual framework. SLDMWA Ex. 379 at 5. However, Lindley 2006 also stated: "while VSP would provide a conceptual framework, an analytical framework will still need to be assembled to assess the impacts of specific projects on VSP parameters." *Id.*

65. Mr. Cramer opines that there was data cited in the 2009 Salmonid BiOp that would have permitted quantitative analyses within the VSP framework. 3/30/10 Tr. 123:1–12.

***1132** 66. However, the NMFS Science Center's 2006 peer evaluation of the previous salmonid biological opinion, for which Lindley was the lead author, disagrees: "While new information or models," beyond the VSP criteria, "may help make the analysis more transparent and rigorous, it is not required and many times is not realistic given the limitations on time and resources." SLDMWA Ex. 379 at 5.

67. Although the analysis in the BiOp could have benefited from the application of quantitative methodologies within the VSP framework, there is a scientific dispute whether the failure to do so represents a breach of accepted scientific practice.

c. *Population Modeling/Life Cycle Analysis.*

68. Mr. Cramer opines that the BiOp should have performed population modeling and/or life cycle modeling. *See* 3/30/10 Tr. 94:8–96:1. In the context of anadromous salmonids, the application of such a methodology involves evaluation of the life history of the population, from adults spawning in fresh water, to fry emergence from gravel, to downstream migration as smolts rear, and then to the species' salt-water life history. At each stage, population modeling would be used to evaluate the factors that affect survival. *Id.* at 94:8–96:1. Mr. Cramer opined that proper use of a life cycle model involves testing of a hypothesis against available data to determine whether predicted outcomes match up with observed values. *Id.* at 97:13–98:8.

69. NMFS did not explicitly evaluate the impact of project operations in a life cycle model. This failure has been criticized as not complying with accepted scientific principles for population analysis. Plaintiffs presented no evidence regarding the existence or availability of such a life cycle model for the species in question. Plaintiffs did not present evidence that they, or anyone else developed or made available to NMFS an appropriate life cycle model or the results of an appropriate life cycle analysis prior to the issuance of the BiOp.

70. The primary purpose of Action IV.2.1 is to protect outmigrating juvenile members of the SSNDG of CV steelhead, for which no population indices (whether absolute or relative) exist.

71. Despite years of controversy and litigation over CV steelhead, the absence of reliable population data complicates the analysis.

d. *Lack of Statistically Significant Correlation Between Exports and Effects on Salmonid Survival.*

72. The crux of Plaintiffs' critique of Action IV.2.1 is that it is unsupported by the various studies and analyses actually relied upon in the BiOp. The rationale for Action IV.2.1, provided in Appendix 5 to the BiOp, relies on a number of sources.

(1) *Treatment of VAMP Data in the BiOp.*

73. VAMP is a multi-agency collaborative effort designed to test the hypothesis that exports and flow in the San Joaquin River influence survival of smolts

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emigrating down the San Joaquin River. 3/30/10 Tr. 126:21–127:4. Annual reports presenting the results of the VAMP experiment have been produced since 2000. *Id.* at 127:5–7.

74. Analyses of the evidence gathered during VAMP have been equivocal regarding the impact of exports on survival. The BiOp recognized that "recent papers examining the effects of exports on salmon survival have been unable to prove a statistically significant reduction in survival related to exports (Newman 2008)." BiOp at 426.

75. Newman's 2008 statistical analyses of the VAMP data concludes that environmental***1133** variables could obscure any relationship between exports and survival. 3/31/10 Tr. 88:11–14. This caveat was recognized in the BiOp. BiOp at 426.

76. The VAMP experimental design has not been implemented in full, in that not all of the planned relationships have been tested. 3/31/10 Tr. 83:11–15. Over the ten years VAMP data was collected, there have been six replications of conditions at 3,200 cfs Vernalis flow and 1,500 cfs exports. *Id.* at 84:2–4. Newman noted that the small number of variables tested in the existing VAMP data did not provide the ability to discriminate between survival effects. *Id.* at 88:19–22. Plaintiffs' expert, Mr. Cramer, and DWR's expert, Mr. Cavallo, recognize these limitations in the VAMP data. *Id.* at 191:6–12; 4/1/10 Tr. 100:4–11.

77. The BiOp also recognizes these limitations. BiOp at 426. To build a more robust data set, NMFS is implementing a six-year acoustic tag study prescribed by RPA Action IV.2.2. 3/31/10 Tr. 87:11–15.

78. The BiOp considered the VAMP evidence and its limitations and did not disregard any important conclusions generated from the VAMP data.

(a) *Figure 10.*

79. Notwithstanding the lack of statistical significance, evidence contained in the VAMP reports demonstrates that, during times when the Head of Old River Barrier ("HORB") [FN4] was in place, as the ratio between Vernalis flow and exports increased, survival increased. 3/31/10 Tr. 86:6–9; BiOp App. 5 at 20. [FN5] Figure 10 in Appendix 5 of the BiOp demonstrates a positive relationship between the Vernalis flow/export ratio and survival. BiOp App. 5 at 20. The relationship was not statistically significant, but the BiOp states that this may have been due to the narrow range of export rates tested. *Id.*

FN4. HORB is a removable rock barrier that "when installed, directs flows on the San Joaquin River away from the Old River into the Central Delta." Finding of Fact # 47 Re: Interim Remedies Re: Delta Smelt ESA Remand and Reconsultation, *NRDC v. Kempthorne,* 2007 WL 4462395 (Dec. 14, 2007).

FN5. It is undisputed that when HORB is in place, there is a statistically significant relationship between Vernalis *flows* and survival. *See* BiOp App. 5 at 20; Tr. 3/30/10–128:3–130:11 (Cramer); SLDMWA Ex. 128. This is not equivalent to a statistically significant effect of *exports or the Vernalis flow/export ratio* on survival.

80. RPA Action IV.2.1 assumes a physical or nonphysical barrier will be installed at the head of Old River in order to prevent the fish from following the flow split at the juncture of the mainstem San Joaquin and Old Rivers. 3/31/10 Tr. 92:4–8. However, because the HORB negatively impacts the Delta smelt, NMFS worked with Reclamation, DWR, and other parties to develop alternative engineering solutions, which resulted in an additional RPA Action to study ways to separate fish from the flow. *Id.* at 95:22–96:3.

81. A non-physical barrier, or "bubble barrier," which uses bubbles, LED strobe lights, and acoustic noise to deter the fish from entering Old River is planned to be installed this year. *Id.* at 96:10–14. Based on a 2009 study, the bubble barrier was 83% successful in blocking fish from moving through the barrier. *Id.* at 96:19–21. NMFS has determined that the bubble barrier will serve as an effective substitute for the physical barrier at the head of Old River required by RPA Action IV.2.1. *Id.* at 96:22–25. As of March 31, the installation of the bubble barrier was scheduled to commence on April 6, 2010. *Id.* at 180:19.

82. Mr. Cramer opined that without HORB in place, studies of survival with HORB in place should not be used. *See id.* at 132:13–24; SLDMWA Ex.

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129. Mr. ***1134** Cramer did not address whether the alternative bubble barrier will produce conditions similar enough to those present with HORB in place to permit the reliance on survival data from when HORB was in place.

83. The record suggests that an effective barrier will be in place at the head of Old River. It was not unreasonable for NMFS to consider data with HORB in place.

(2) *Escapement Data.*

84. In Figure 11 of Appendix 5, the BiOp relied on an analysis presented in the 2006 VAMP annual report that showed a positive relationship between the spring Vernalis flow/export ratio and adult escapement (i.e. return from the ocean to freshwater) two and a half years later, based on data from 1951 through 2003. 3/31/10 Tr. 70:12–14, 74:7–20; BiOp App. 5 at 21.

85. The analysis in Figure 11 did not attempt to account for variable ocean conditions or commercial harvest of salmonids. *See* generally 3/31/10 Tr. 142–43 (Cramer). Elsewhere in the BiOp, NMFS acknowledges that escapement survival may be significantly impacted by ocean conditions. *See, e.g.,* BiOp 96, 144–45, 148–53, 166–68, 218. There is a conceptual model in the administrative record that suggests even though ocean conditions and harvest may vary from year to year, the species' long-term declines may be attributed to other factors affecting survival during the freshwater life stages of the species in question. DI 1002 (Lawson conceptual model).

86. Although Figure 11 did not account for variable ocean conditions and/or commercial harvest, Plaintiffs' expert, Mr. Cramer, testified that a reasonable biologist would use this data. 3/30/10 Tr. 192:21–193:3. This suggests that it was not unreasonable for NMFS to consider the analysis depicted in Figure 11.

e. *Delta Action 8 Studies.*

87. The BiOp also considered data from the so-called "Delta Action 8 studies," which compared the relative survival rates of coded-wire tagged salmon released at (a) Ryde on the Sacramento River and (b) Georgiana Slough, a channel that splits off of the Sacramento River at Walnut Grove and leads to the interior Delta, joining the South Fork of the Mokelumne River just before it meets the San Joaquin River.

88. Evaluating the data from the Delta Action 8 studies, Newman (2008) first explained that there was a high level of environmental variation in the data. *Id.* at 78:18–23. Dr. Newman performed further analysis to reduce the amount of environmental variation and subsequently found a 98% probability that a negative relationship between exports and survival is present. *Id.* at 79:5–7. Mr. Stuart stated the significance of Newman's finding is that as exports increased, survival decreases for those salmonid smolts that are moving down into the San Joaquin River, where they would be exposed to the influences of the export pumps. 4/2/10 Tr. 32:8–34:12. For those fish released into Georgiana Slough, survival was better when exports were lower.

89. This study is relevant to assessing the impacts of export pumping on fish migrating through the San Joaquin River, because fish released into Georgiana Slough must exit into the San Joaquin River, where they are subject to the influence of the pumps. 3/31/10 Tr. 76:20–23. The Georgiana Slough fish share a common migratory pathway with fish that exit the San Joaquin River basin. *Id.* at 76:24–77:6. Regardless of their origin, once the fish are in this common migratory pathway, they are subject to the same hydraulic conditions. *Id.* at 78:1–17.

90. Mr. Cavallo stated that his interpretation of the Newman (2008) study is ***1135** that there is a weak relationship between exports and survival in the interior Delta, but conceded that there was some relationship. 4/1/10 Tr. 98:24–99:4. Mr. Stuart testified that Newman's studies are the best available and the fact that Newman could find a relationship given the considerable amount of "environmental noise" and the very low signal to noise ratio "shows that the relationship is probably very real." *Id.* at 159:6–10. Whether this opinion is entitled to weight is disputed by Plaintiffs.

91. A September 26, 2008 paper prepared by Dr. Newman with Patricia L. Brandes entitled "Hierarchical Modeling of Juvenile Chinook Salmon Survival as A Function of Sacramento–San Joaquin Delta Water Exports" ("Newman and Brandes 2008") examined the Delta Action 8 data concerning the relative survival rates for Ryde and Georgiana Slough

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releases and declared: what "*we cannot conclude is that exports are the cause of this lower relative survival.*" 4/1/10 Tr. 67:20–23 (emphasis added); DWR Ex. 507 at 22. Newman and Brandes 2008 reached this conclusion because "the evidence for an association between exports and survival is somewhat weak" and because of the study's inability to randomize export levels within a given outmigration season. 4/1/10 Tr. 68:1–12; DWR Ex. 507 at 22–23. A later version of this study, dated 2009, omitted this language from the conclusion. 4/2/10 Tr. 28:2–13.[FN6]

FN6. Mr. Stuart explained that although the BiOp cited the 2008 version of the Newman and Brandes study, he actually used the 2009 version to prepare the BiOp and the 2009 paper was in his reference list. He does not know why the BiOp used the 2008 citation. 4/2/10 Tr. 28:2–13.

92. The Delta Action 8 studies seek to relate to exports survival of juvenile salmonids and steelhead passing through the interior Delta from the San Joaquin River basin. These studies show a negative relationship, although admittedly weak, between export levels and survival for fish passing through this area of the Delta.

f. *Limited Amount of Water Available in Storage to Increase Flows at Vernalis.*

93. Figure 11 and other studies cited in Appendix 5 suggest that maximizing the difference between Vernalis flows and export levels (or maximizing the Vernalis flow/export ratio) improves survival. BiOp App. 5 at 8, 20–21.

94. NMFS determined that, because there was a limited amount of water available to increase flows at Vernalis, capping export levels would provide the greatest differential between flows at Vernalis and export levels. 3/31/10 Tr. 71:12–17; 97:14–21.

95. This reason for controlling exports is unrelated to any direct scientific evidence connecting export levels to fish survival, making the reason arbitrary, capricious, unsupported by reasonable explanation, and not based on best available science.

g. *Justification for Ratios Used in Action IV.2.1.*

96. Although not the subject of extensive testimony during the evidentiary hearing, there is little to no justification in the record for the exact flow ratios chosen for RPA Action IV.2.1.

97. NMFS looked at the VAMP data to develop the ratio.

> *Current VAMP studies have ratios of flow to exports clustered around 2:1, which have provided low survival indices for upstream releases compared to downstream releases, particularly in recent years.* Studies which would have had higher flows (i.e., 7,000 cfs) ***1136** to export (1,500 cfs) ratios were not conducted, since the necessary environmental conditions to implement this part of the study protocol never occurred. Recent conditions in which high flows did occur in the San Joaquin River basin and which would have given flow to export ratios greater than 3:1 in 2005 and 10:1 in 2006 were confounded by poor ocean conditions during the smolts entry into the marine environment, and returning adult fall-run Chinook salmon escapement numbers from these brood years were very low (brood years 2004, 2005 which returned in 2007 and 2008). *From the available data, including the information contained in figures 10* [FN7] *and 11* [FN8]*, flow to export ratios should be at least 2:1 and preferably higher to increase survival and abundance. In light of these factors, NMFS initially developed flow to export ratios of 4:1 for wet, above normal, below normal, and dry years,* based on the minimum export level of 1,500 cfs and a targeted minimum Vernalis flow of 6,000 cfs. *Flows in critically dry years were targeted to be a minimum 3,000 cfs, which gives a flow to export ratio of 2:1* when exports are targeted to be 1,500 cfs.
>
> FN7. Figure 10 suggests there is a positive relationship between the ratio of Vernalis flow to exports and survival of salmonids in the interior Delta.
>
> FN8. Figure 11 relied on an analysis presented in the 2006 VAMP annual report that showed a positive relationship between the spring Vernalis flow/export ratio and adult escapement.

BiOp App. 5 at 22–23 (emphasis added). The feasibility and water supply implications of imple-

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menting such flow versus export ratios were then examined through computer modeling. *Id.* at 24–68. The BiOp reasoned that a 2:1 ratio was insufficient because the VAMP studies demonstrated low survival rates at that ratio, and that higher ratios would be "prefera[ble]" to increase survival and abundance. Yet, without any *biological* explanation, the BiOp chose to impose a 1,500 cfs limit when flows at Vernalis are lower than 6,000 cfs,[FN9] and a ratio of *4:1* (as opposed to 2.5:1, or 3:1, or even 5:1 or higher) when Vernalis flows are between 6,000 cfs and 21,750 cfs. *Id.* at 71–72.

FN9. This 1,500 cfs limit is the minimum export level that would maintain health and safety criteria. BiOp App. 5 at 22. At flows of 5,000 cfs, for example, the ratio would therefore be 5,000/1,500 or approximately 3.33:1.

98. The absence of explanation and analysis for adoption of these limits uses no science, let alone the best available and is simply indefensible.

h. *Will Enjoining Action IV.2.1 Appreciably Diminish The Likelihood Of Survival Or Recovery Of The Listed Species Or Adversely Modify Their Critical Habitat?*

99. The evidence supports NMFS's general finding that some form of restriction on the Vernalis flow/export ratio is needed to prevent jeopardy to the SSNDG of CV Steelhead. Enjoining any flow/export ratio restriction will appreciably diminish the likelihood of the SSNDG's survival or recovery and/or adversely modify its critical habitat.

a. Mr. Stuart testified that enjoining Action IV.2.1 would "jeopardize" the SSNDG of CV steelhead, 3/31/10 Tr. 122:9, 121:3–5, which in turn would "further decrease the viability of the Central Valley" steelhead DPS, *id.* at 104:2–3. Plaintiffs' expert, Mr. Cramer, did not provide an opinion on the impact of enjoining Action IV.2.1 on the SSNDG of CV steelhead. *Id.* at 24:23–25:1.

***1137** b. For critical habitat, Mr. Stuart opined that Action IV.2.1 provides benefits by enhancing migratory corridors, increasing riparian zones and rearing areas which can be used by migrating juveniles, and shortening migration time and increasing turbidity, both of which can decrease vulnerability to predation. *Id.* at 110:24–111:14. Mr. Stuart testified that enjoining Action IV.2.1 would remove these beneficial effects. *Id.* at 111:1–2, 121:13–19; *see also* Gov't Salmon Ex., 4 (enjoining Action IV.2.1 would "negate" the benefits provided by Action IV.2.1). Mr. Cramer did not opine what effect enjoining Action IV.2.1 would have on CV steelhead critical habitat. 3/31/10 Tr. 25:7–11, 110:24–25, 111:1–2 (Stuart testimony that Mr. Cramer "didn't look at the effects of the flow on enhancing critical habitat in migratory corridors in the Delta").

100. The low levels of incidental take of steelhead in this water year do not undermine this conclusion.

a. Mr. Cramer opined that the current estimated take of salmon and steelhead is below the incidental take limits in the BiOp. *See* SLMWA Ex. 122, Doc. 244, Cramer Decl., ¶¶ 41–43.[FN10]

FN10. Mr. Cramer also suggests in his declaration that "once fish have entered the south Delta, their best chance for survival is to be salvaged at the fish facilities." SLDMWA Ex. 122, ¶ 26. However, Mr. Stuart disagreed with this position and pointed out that, in addition to the mortality at the salvage facility, there is a high chance of predation for the fish released back into the western Delta after salvage. 3/31/10 Tr. 132:16–24. The best option is to keep the fish out of Old River. *Id.* at 132:24–133:1. This is a matter of scientific dispute among experts.

b. The purpose of the incidental take limit is to identify a point at which reinitiation of consultation should occur. 3/31/10 Tr. 113:20–22. It is not the default level at which the facilities should be operated. If the RPA works as designed, the incidental take limit should never be reached. *Id.* at 113:25–114:7, 133:15–24. Mr. Stuart opines that the take limits alone are not sufficiently protective without implementation of the RPA Actions. *See, e.g., id.* at 148:20–149:1; BiOp 105 at 729 ("If less take occurs from the proposed action than is anticipated, this does not indicate that the actions compromising the RPA are not necessary to avoid jeopardizing listed species.").

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b. Take of salmon and steelhead at the pumps is only a "small fraction" of their overall mortality, 3/31/10 Tr. 126:5–7, and does not account for indirect impacts of export pumping. 3/31/10 Tr. 114:10–15. Mr. Cramer, expressed no opinion whether enjoining Action IV.2.1 would increase indirect mortality. 3/31/10 Tr. 36:22–37:25.

101. Action IV.2.1 also helps spring-run Chinook salmon, because "the reduced export rates [caused by Action IV.2.1] create a more positive OMR flow within the southern central Delta," resulting in less fish entrained when entering the San Joaquin River at Mokelumne. 3/31/10 Tr. 124:9–15.

102. However, the record does not support a finding that the specific Vernalis flow to export ratios imposed by Action IV.2.1 (as opposed to lesser or greater ratios) are necessary to avoid jeopardy and/or adverse modification to any of the Listed Species. The total absence of explanation for the exact flow limits chosen makes Action IV.2.1 arbitrary and capricious.

(4) *Action IV.2.3.*

103. Action IV. 2.3 operates from January 1 through June 15 or until the average daily water temperature at Mossdale is ***1138** greater than 72° F, and limits OMR flows to no more negative than -2,500 to -5,000 cfs, depending on juvenile entrainment levels. BiOp at 648–52. At the first level of increased juvenile loss, exports must be reduced to achieve an average net flow of -3,500 cfs for a minimum of five days, and at the second level, a more positive OMR average of -2,500 cfs must be achieved for at least five days. *Id.* For each trigger, OMR averages can return to -5,000 cfs only after three consecutive days of not meeting the higher-density juvenile loss trigger. *Id.*

103. Action IV. 2.3 is meant to:

> [r]educe the vulnerability of emigrating juvenile winter-run, yearling spring-run, and CV steelhead within the lower Sacramento and San Joaquin rivers to entrainment into the channels of the South Delta and at the pumps due to the diversion of water by the export facilities in the South Delta. Enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the mainstem of the San Joaquin River for emigrating fish, including greater net downstream flows.

BiOp at 648. RPA Action IV.2.3 is intended to benefit fish coming from both the Sacramento and San Joaquin River basins. 4/1/10 Tr. 101:18–102:2.

105. NMFS utilized several sources of data to determine that export flow limitations would achieve the objectives of RPA Action IV.2.3, including the relationship between OMR flows and salvage, particle tracking model simulations, and other studies evaluating survival of fish within the central and southern Delta. 4/1/10 Tr. 134:5–17.

a. *Reliance on Particle Tracking Model Simulations.*

106. Plaintiffs' seminal challenge to Action IV.2.3 is that NMFS improperly based its rationale for the Action on outputs from computer model runs utilizing the so-called Particle Tracking Model ("PTM"), which models the flow of inert particles as they move within a flowing body of water.

107. PTM is a hydrodynamic simulation used to assess the fate of particles, as a function of flow, tides, exports, and other factors. 4/1/10 Tr. 18:12–15; *see also id.* at 143:9–25. NMFS used PTM to assess the effects of different OMR flows on the movement of neutrally buoyant particles injected at nine different locations in the Delta. Gov't Salmon Ex. 23 at 2; BiOp at 364–66. The 2009 Salmonid BiOp states that "NMFS uses the findings of PTM simulations to look at the eventual fate of objects in the river over a defined period of time from a given point of origin in the system." BiOp at 366. According to the BiOp, "PTM data can be useful to indicate the magnitude of the net movement of water through the channel after the junction split (and the route selected by the fish), and thus can be used to infer the probable fate of salmonids that are advected into these channels during their migration." *Id.* at 367.

108. Mr. Cavallo opined that PTM data are not useful to infer the probable fate of salmonids because, in contrast to PTM particles, which have no behavior characteristics, fish have behavior, swim quickly, and have a destination in mind. 4/1/10 Tr. 20:14–21:5. Mr. Cramer explained that "[j]uvenile salmonids are strong swimmers whose movements

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are determined by a wide variety of factors varying with species, size, developmental state, season, time of day, and water temperature, as well as relative hydraulic conditions in a channel. Unlike passive particles, juveniles can and do swim against significant currents." SLDMWA Ex. 120 at ¶ 6. To illustrate the problems with PTM, Mr. Stuart compared PTM simulations to actual***1139** data from mark-recapture studies of Chinook salmon. This comparison demonstrated that salmon move approximately 3.5 times faster though the water than neutrally buoyant particles and would arrive at Chipps Island in a considerably shorter time frame. 4/1/10 Tr. 37:13–38:4.

109. This was a concern expressed in other studies by other experts. For example, the BiOp relied upon Wim J. Kimmerer and Matthew Nobriga's report entitled "Investigating Particle Transport and Fate in the Sacramento–San Joaquin Delta Using a Particle Tracking Model" ("Kimmerer and Nobriga 2008"). BiOp 105 at 380–381; Gov't Salmon Ex. 1 at 4; Gov't Salmon Ex. 4 at 8. Kimmerer and Nobriga 2008 disclaims: "[w]e do not claim that the specific results presented here represent actual movements of salmon; rather, these results indicate what factors may or may not be important in determining how salmon smolts may move through the Delta." DWR Ex. 501 at 18.

110. DWR expressed similar concerns in an email to NMFS dated April 20, 2009 regarding the draft 2009 Salmonid BiOp, asserting that NMFS improperly applied the PTM results in determining the eventual fate of salmonids. Attachment 1 to DWR's comments is a comparison of the results of an experimental release of coded wire tagged salmon in the San Joaquin River under known hydrodynamic conditions with a PTM simulation under identical conditions. 4/1/10 Tr. 32:19–33:8. These results indicate that under low flow conditions, the coded wire tag salmon reached the end location of Chipps Island long before the arrival of most of the PTM particles. The PTM results only partially corresponded with the coded wire tag results under high flow conditions. *Id.* at 34:3–35:18; DWR Ex. 502 at AR 00086765, AR 00086767.

111. NMFS recognized the limitations of applying the PTM model simulation to salmonids. 4/1/10 Tr. 144:2–8. There were discussions with DWR concerning this issue during the consultation process. *Id.* at 144:9–11. In discussions between DWR and NMFS, NMFS indicated it was using the PTM to evaluate water movement and the potential vulnerability to particle entrainment from various locations in the Delta. *Id.* at 144:13–19. NMFS was explicit that it was not using PTM to predict exactly how fish were moving within these same channels, but that the information gleaned from PTM about water movement through the Delta could provide information on vulnerability to entrainment. *Id.* at 144:19–25.

112. DWR's expert, Mr. Cavallo, agrees with the BiOp that PTM data can be useful to indicate the magnitude of the net movement of water through a channel after a junction split. *Id.* at 20:21–23; BiOp at 367.

113. Mr. Cavallo also agrees that PTM results may be informative with regard to salmon movement. 4/1/10 Tr. 28:21–25. Mr. Cavallo stated that under the appropriate conditions, PTM simulations would be an appropriate tool to describe fish movement in discharge-driven portions of the Delta watershed. *Id.* at 86:8–10. Mr. Cavallo stated that the Kimmerer and Nobriga PTM study shows that "flow has a big effect on the path that water takes through the Delta," and that fish in a riverine system will tend to go with the flow. *Id.* at 30:11–15.

114. Mr. Cavallo's time-step critique of the PTM simulations used in the BiOp is unsupported.

a. Mr. Cavallo opines that the correct approach to PTM simulations is be to ensure that the time horizon used in the model was consistent with the time horizon of the fish being studied. *Id.* at 25:6–11. Mr. Cavallo interpreted particular graphs in the biological opinion to ***1140** indicate that NMFS used a 31–day time horizon in its PTM simulations, *id.* at 26:6–16, and opined that this time horizon was too long and would skew the results of the simulation, *id.* at 27:7–11.

b. The PTM simulations NMFS used were run by DWR. *Id.* at 86:14–15; 146:9–10. These simulations included four model runs for the months of February through June, using both wet year, a dry year, and varied whether HORB was installed during the April/May period. *Id.* at 146:14–24, 147:4–6. Three different OMR flows were examined: –

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3,000 cfs, -2,500 cfs, and -1,250 cfs. *Id.* at 147:15–18. During that simulation, the particles actually were tracked every five days for the first 30 days. *Id.* at 147:1–4; Gov't Salmon Ex. 23 at 2. Mr. Cavallo was unsure that the particles were tracked every five days, nor did he review Mr. Stuart's memorandum explaining the PTM simulation results. 4/1/10 Tr. 87:11–13.

115. Mr. Cavallo's critique of the choice of injection sites is weakened by his agreement that at least two of the particle injection sites modeled by DWR, at NMFS' request, were useful in evaluating the movement of water particles at channel junctions. *Id.* at 90:17–91:16. NMFS selected the particular injection sites in order to model the vulnerability of particles within the waterways of the south Delta. *Id.* at 147:22–149:13.

116. NMFS' PTM simulation also showed that, as export levels increase, OMR levels became more negative. 4/1/10 Tr. 150:21–21. Mr. Cavallo stated that exports are highly correlated with OMR flows. 4/1/10 Tr. 40:25–41:2.

117. NMFS' PTM simulation showed that, as exports increased, the percentage of particles entrained at the export facilities increased, particularly from the Mossdale and Union Island sites and stations 912, 815, 902, and 915. 4/1/10 Tr. 150:22–25; *see* Gov't Salmon Ex. 18 (map of injection sites). The proximity of the injection point to the export facilities led to a much higher level of particle entrainment. 4/1/10 Tr. 151:1–3. As exports increased, the rate at which the particles arrived at the export facilities increased. *Id.* at 151:3–5; *see also* BiOp at 365–66; 4/1/10 Tr. 151:21–153:9 (explaining graphs in biological opinion).

118. Despite the statement in the Kimmerer and Nobriga study that they could not establish a "zone of influence" of exports, Mr. Stuart testified that the shorter time horizon used in NMFS' PTM simulations distinguished it from the Kimmerer and Nobriga simulations, which utilized a 90–day period. 4/2/10 Tr. 23:21–24:2.

119. Mr. Stuart testified that there is no precisely defined boundary for the influence of the exports, and that the boundary of influence depends on river flow, tides, and the magnitude of the exports. *Id.* at 29:4–9. If there are extremely low-flow conditions and high exports, the extent of the exports could travel considerably farther downstream, even towards the junction of the Sacramento and San Joaquin Rivers. *Id.* at 29:9–13. Typically, according to Mr. Stuart, the boundary would be close to station 815 at the confluence of Georgiana Slough and the Mokelumne River or slightly farther downstream. *Id.* at 29:13–15. As the BiOp explains:

> The data output for the PTM simulation of particles injected at the confluence of the Mokelumne River and the San Joaquin River (Station 815) indicate that as net OMR flow increases southwards from -2,500 to -3,500 cfs, the risk of particle entrainment nearly doubles from 10 percent to 20 percent, and quadruples to 40 percent at -5,000 cfs. At flows more negative than -5,000 cfs, the risk of entrainment increases at an even greater ***1141** rate, reaching approximately 90 percent at -7,000 cfs. Even if salmonids do not behave exactly as neutrally buoyant particles, the risk of entrainment escalates considerably with increasing exports, as represented by the net OMR flows. The logical conclusion is that as OMR reverse flows increase, risk of entrainment into the channels of the South Delta is increased. Conversely, the risk of entrainment into the channels of the South delta is reduced when exports are lower and the net flow in the OMR channels is more positive—that is, in the direction of the natural flow toward the ocean.

BiOp at 652.

120. This is a dispute among scientists. While DWR criticizes PTM modeling, Stuart and NMFS recognized its limitations and found PTM studies helpful to support its conclusions that: (a) as exports increase, negative OMR flows also increase; and (b) that at Station 815 (the confluence of the Mokelumne River and the San Joaquin River), *particle entrainment* increases from 10% at -2,500 cfs, to 20% at -3,500 cfs, to 40% at -5,000 cfs, and 90% at -7,000 cfs. NMFS, through Mr. Stuart, took into account inherent differences in the movement of neutrally buoyant particles and their speed and direction of travel. Administrative law requires deference to the Agency. Additional record analysis is necessary to determine the extent of support for NMFS's additional opinion that exports affect salmonid survival.

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b. *Additional Data Relied Upon by NMFS.*

(1) *Salvage Data.*

[4] 121. NMFS also relied on salvage data provided by Plaintiff–Intervenor DWR. 4/1/10 Tr. 134:21; *see* Gov't Salmon Ex. 1 at (internal) Exhibit 3. This data collected monthly average OMR flows for the months of December to April 1995–2007 and the monthly older juvenile loss numbers for both the state and the federal facilities. *Id.* at 135:18–136:8.

122. This data was presented in Figures 6–65 and 6–66 of the BiOp:

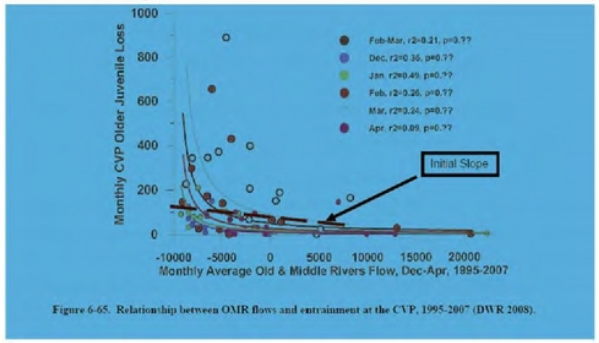

Figure 6-65. Relationship between OMR flows and entrainment at the CVP, 1995-2007 (DWR 2008).

***1142**

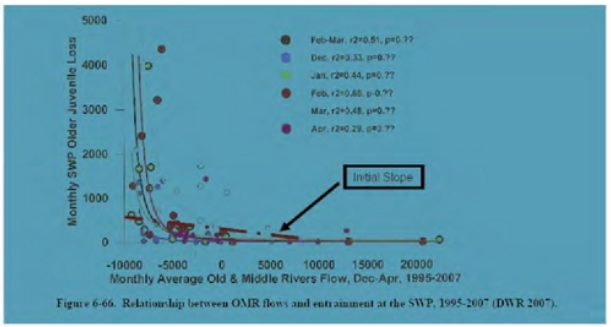

Figure 6-66. Relationship between OMR flows and entrainment at the SWP, 1995-2007 (DWR 2007).

BiOp at 361–62.

123. Based on this data, NMFS determined that there was a threshold level of pumping, as reflected by OMR flows, below which entrainment was low, but above which entrainment at the Project facilities markedly increases. 4/1/10 Tr. 139:11–16. The threshold level identified by NMFS is -5,000 cfs. *Id.* at 139:18–21.

124. There is evidentiary support for the conclu-

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sions that: (1) entrainment data show that as exports increase, so does juvenile salvage; and (2) that at flows more negative than -5,000 cfs, OMR salvage increases more rapidly than at lower flow levels.

125. However, The comparisons of salvage to negative OMR flows relied upon in the BiOp utilize raw salvage numbers, rather than scaling salvage to population size. *See* Doc. 179, Declaration of Richard B. Deriso at¶¶ 3–5. Scaling salvage to population size is standard fisheries science practice and could have been accomplished for several of the Listed Species based on existing population data. *See id.* at ¶¶ 5–6. This failure is a fundamental and inexplicable error. Salvage may have been higher in some years simply because the population was higher, not because of any differences in negative OMR flows. Salvage may have been lower in other years because the population was lower. Dr. Deriso demonstrated the potential significance of this failure by plotting the population adjusted Juvenile Chinook Incidental take rate against OMR flow. Based upon this revised analysis for spring-run and winter-run, Dr. Deriso concluded that there is no statistically significant relationship between the take index and OMR flows. *Id.* at 6.

126. The BiOp's conclusions reached about the spring-run and winter-run Chinook failed to utilize the best available scientific methodology, because population data was available at the time the BiOp was issued that would have permitted NMFS to perform the straightforward population adjustment required to conform to standard, generally accepted practices for fisheries population measurements utilized in their field of expertise. If, in those years when salvage was greatest, population sizes overall were 10 or 100 times larger than other years, the effects might not be jeopardizing. Without adjustment for population size, NMFS's reliance on that figure was arbitrary and capricious.

***1143** 127. As to the CV steelhead, for which no population numbers are available, it is less clear whether the use of raw salvage numbers is always inappropriate. Figures 6–65 and 6–66 ambiguously reference monthly CVP and SWP "Older Juvenile Loss" on the y axis. Were most of the salvaged fish represented on these charts Chinook salmon? No reason is offered why NMFS did not segregate the steelhead figures from those of Chinook salmon. If the species had been evaluated separately, would it have been reasonable for NMFS to fail to adjust the steelhead figures for population size? Separate analysis was not done.

(2) *Delta Action 8 Studies.*

128. NMFS relied upon Newman's 2008 analysis of the Delta Action 8 studies discussed above. *See also* BiOp at 373 (General Discussion of Relationship of Exports to Salvage). These results demonstrate that as exports increase there is decreased survival for salmonids passing through the south and central Delta. Georgiana Slough enters the Delta at Station 815.

129. Newman's and Brandes' (2009) Delta Action 8 studies found that determining the proportion of all Sacramento River smolts volitionally migrating through Georgiana Slough is essential to evaluating the population level or biological significance of any export effects, at least on those populations that spawn in the upper Sacramento basin (e.g., winter-run Chinook salmon). DWR Ex. 507 at 24. NMFS did not address relative population impacts in developing or explaining RPA Action IV.2.3.[FN11]

FN11. Although the same failure applies to NMFS's use of the Delta Action 8 data in IV.2.1, that Action was designed to help the SSNDG of CV Steelhead, all of whom must pass through the central Delta on their way to the ocean.

130. Even assuming all smolts traveled through Georgiana Slough, Mr. Cavallo testified that under Newman's weak export-mortality relationship, a 2,000 cfs increase (from 4,000 to 6,000 cfs) in exports would increase total mortality by five percent. 4/1/10 Tr. 63:8–25. However, based on his review of available data, Mr. Cavallo estimated that no more than 22% of smolts originating in the Sacramento River would pass through Georgiana Slough, lowering the impact on these populations of a 2,000 cfs increase to one percent. *Id.*

131. NMFS's failure to evaluate the population level impacts of exports is inexplicable. A population level evaluation would shed light on the relative impact of exports on the winter-run, for which no population spawns in the San Joaquin basin. This failure is less critical to the analysis of impacts on spring-run and CV steelhead, as both species have important

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populations that spawn in tributaries of the San Joaquin and necessarily must pass through the interior Delta on their way to the ocean.

c. *Perry & Skalski.*

132. The BiOp utilized the Perry and Skalski (2008) study that concluded survival of fish moving into Georgiana Slough and nearby channels was reduced compared to those in the mainstem of the Sacramento River. 4/1/10 Tr. 161:20–162:1. These fish enter a portion of the San Joaquin River that NMFS found to be impacted by exports in its PTM simulation. *Id.* at 162:5–17; 4/2/10 Tr. 18:12–20, 19:22–20:11.

133. However, Perry and Skalski 2008 noted that "there is limited understanding of how water management actions in the Delta affect population distribution and route-specific survival of juvenile salmon." SDLMWA Ex. 227 at 3. Mr. Cavallo testified that Perry and Skalski 2008 does not ***1144** provide scientific support for the view that salmonids are lost due to water project-induced alterations to Delta hydrologic conditions. 4/1/10 Tr. 66:5–9.

134. Mr. Stuart admitted that Perry and Skalski 2008 did not address water project impacts on Delta hydrology, fish behavior, or the indirect mortality of fish in the central and southern channels of the Delta. Mr. Stuart further admitted that he reached his conclusions regarding water project impacts on Delta hydrology, fish behavior, and indirect salmonid mortality based upon his personal extrapolation from the data contained in Perry and Skalski 2008, and not from any conclusions reached by Perry and Skalski. 4/2/10 Tr. 19:2–21:24. However, these personal extrapolations are not documented or otherwise explained in the BiOp or elsewhere in the record.

d. *Vogel.*

135. The BiOp also relied upon Vogel (2004), which reviewed telemetry-tagging data to investigate fish route selection in the channels leading to the south Delta. *See* BiOp at 380–81. Based on Vogel's work, the BiOp found that when export levels were reduced and San Joaquin River flows were increased, more fish stayed in the main channel of the San Joaquin River, heading downstream toward the San Francisco Bay. *Id.*

136. Mr. Cavallo maintains that Vogel (2004) does not support the conclusion that a reduction in export pumping resulted in the reduction of salmon leaving the mainstem of the San Joaquin River and entering the southern Delta. 4/1/10 Tr. 47:20–24, 49:8–13, 49:25–50:4, 50:17–23; DWR Ex. 505. The Vogel (2004) study concluded that the experiments it conducted "could not explain *why* some fish move off the mainstem of the San Joaquin River into the south Delta channels," noting that "[d]ue to the wide variation in hydrologic conditions" during the course of the experiments, "it was difficult to determine the principal factors affecting fish migration. Based on the limited data from these studies, it may be that a combination of a neap tide, reduced exports, and increased San Joaquin River flows is beneficial for outmigrating smolts, but more research is necessary." DWR Ex. 505 at 37.

137. When asked about Vogel's inconclusive results, not discussed in the BiOp, Mr. Stuart admitted that the BiOp's failure to disclose the conclusion was "an oversight on my part," for which he had no explanation. 4/2/10 Tr. 15:4–9.

138. It was not rational nor scientifically justified for the BiOp to rely on Vogel (2004) for findings the authors themselves refused to make.

e. *Justification for Specific Flow Levels.*

139. The only discernable and scientifically justifiable support provided in the BiOp for the negative 5,000 cfs ceiling on OMR flows under Action IV.2.3 is the salvage data, represented in Figures 6–65 and 6–66 of the BiOp. *See* Gov't Salmon Ex. 1 at (internal) Exhibit 3. Based on this data, NMFS concluded that - 5,000 cfs represented a "threshold level" of pumping, reflected by OMR flows, below which species entrainment was low, but above which entrainment at the Project facilities markedly increases. 4/1/10 Tr. 139:11–16. The BiOp discusses Figures 6–65 and 6–66:

> Loss of older juveniles at the CVP and SWP fish collection facilities increase sharply at Old and Middle River flows of approximately -5,000 cfs and depart from the initial slope at flows below this.

The record does not explain whether NMFS utilized a statistical analysis to choose -5,000 cfs as the break point, or whether that figure was based on a

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visual inspection of Figures 6–65 and 6–66.

***1145** 140. NMFS considered setting more positive OMR flow requirements, which would have been more beneficial for the listed salmonids, but would place more restrictions on exports. 4/1/10 Tr. 178:17–22. Mr. Stuart testified that he "tried to find a point that would be *equitable*" to balance species protection and burdens on the exports. *Id.* at 178:24–179:6 (emphasis added).

141. Mr. Stuart testified that:

> [T]he minus 5,000 was sufficiently [ ] restrictive to protect the fish from entrainment. To go more positive than that would have been better, but I don't think that I would have gained that much. And, you know, I did, you know, consider that to go more positive you'd have to put more restrictions on the exports. And I tried to balance that relationship. You know, more negative would have taken more [ ] fish, which was less protective of our species. To go more positive would have been more protective, but it would have been a very onerous burden on the exports. [¶] So, you know, I tried to find a point that would be equitable. I didn't run a full detailed hydraulic analysis and water analysis on that, but, you know, to balance those two was in my mind as I was looking at the minus 5,000 as the trigger point.

4/1/10 Tr. 178:17–179:6. This effort to choose a "balance point," is not supported by any scientific analysis.

142. Mr. Stuart testified that he "looked at ... the level where we saw increasing take and use[d] precautionary ... principles to protect the fish." Yet, nowhere in the BiOp (or any other document in the administrative record cited by the parties) does NMFS disclose its intent to use a "precautionary principle" to design the RPA Actions, nor is that "level" specifically defined or justified.

143. The -5,000 cfs OMR ceiling is based, predominantly on speculation.

144. Moreover, Figures 6–65 and 6–66, do not scale salvage to population size. This further undermines NMFS's extrapolation of the -5,000 cfs "break point," and affects the credibility of Mr. Stuart's testimony.

f. *Will Enjoining Action IV.2.3 Appreciably Diminish The Likelihood Of Survival Or Recovery Of The Listed Species Or Adversely Modify Their Critical Habitat?*

145. Although the moving papers seek an unlimited injunction of Action IV.2.3, at the evidentiary hearing, Plaintiff–Intervenor DWR clarified that an injunction was sought only against the so-called "calendar-based triggers" of Action IV.2.3, and that it does not oppose the salvage-based triggers of Action IV.2.3. 4/1/10 Tr. 9:7–10:17. DWR accepts the underlying scientific principle that when significant salvage occurs at project pumps, the projects operations must be altered. *Id.* at 10:11–13. In prior remedial proceedings, some Plaintiffs have acknowledged that at flows more negative than -7,000 cfs, Delta smelt and the continued existence of two Chinook salmon species are jeopardized. *See, e.g., PCFFA v. Gutierrez*, 2008 WL 4657785, *6 (Oct. 21, 2008). The proposed injunction applies only to the "calendar-based triggers" of RPA Action IV.2.3.

146. There are serious questions whether there is support in the record for the general proposition that exports reduce survival of salmonids in the interior Delta.

a. The PTM studies do stand for the proposition that neutrally buoyant particles injected at Station 815 have a higher chance of entrainment as negative OMR flows increase. But, particles are not a reasonably accurate prototype for ***1146** the behavior of strong-swimming Chinook salmon, steelhead, and sturgeon.

b. The salvage data was not scaled for population size, which any prudent and competent fish biologist and statistician would have done, making NMFS' reliance on the salvage data scientifically erroneous for those species for which abundance data are available. The effect of this error on NMFS's evaluation of export impacts on CV steelhead is less clear.

c. NMFS's reliance on the Perry & Skalski and Vogel studies is unjustified and unreasonable, given that NMFS relied upon those studies to sup-

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port conclusions the authors refused to reach without explanation.

d. The Delta Action 8 studies, at the very least, support the proposition that, for those salmonid populations spawning entirely within the San Joaquin basin, increasing exports can negatively impact salmonid smolt survival. This data, coupled with the highly criticized PTM studies, are the questionable foundation underlying NMFS's rationale for Action IV.2.

e. Mr. Stuart testified that if the calendar-based portion of the Action were enjoined, jeopardy to the species would not be avoided because it would "affect a large proportion of the spring-run population, a portion of the steelhead population, and that portion of the green sturgeon population that's currently within the Delta." *Id.* and 186:2–5. (Although, not one sturgeon has been taken as of April 4, 2010.) As further explained in Mr. Stuart's declaration:

> Without the protection of RPA action IV.2.3, OMR flows will increase in relation to the increase in exports, and more fish will be lost to the export actions over current conditions. In addition to the loss [of] salmonids during the salvage process, it is expected that a greater number of listed fish will be exposed to stressors in the delta as they are advected into the channels of the central and southern delta by the altered hydraulic conditions. Loss to predation, as well as other stressors such as contaminants, is expected to occur as a result of this increased exposure.

Gov't Salmon Ex. 4, ¶ 62. Action IV.2.3 is designed to protect the fish from being pulled south towards the facilities; a purely salvage-based operation is reactionary and reflects the pre-biological opinion status quo, which NMFS determined was not sufficiently protective. 4/1/10 Tr. 170:9–171:7.

147. Plaintiffs' offer to use the species' incidental take limits to avoid jeopardy is not sufficiently protective. The ITL is not meant to be a ceiling on mortality, in part because it "doesn't address all of the different forms of take that can occur throughout the whole Central Valley." 4/1/10 Tr. 172:21–73:1.

148. NMFS's choice of -5,000 cfs as the calendar based ceiling for Action IV.2.1 is not scientifically justified and is not based on best available science.

(5) *Indirect Mortality.*

149. Indirect mortality is that mortality that does not occur directly as a result of the entrainment process at the Project pumps. 3/31/10 Tr. 104:22–24. Stated another way, it is the sum of mortality that occurs to fish that are under the influence of the changed hydraulic field within the Delta. *Id.* at 105:1–3.

150. Indirect mortality is observed within the channels and waterways of the northern, central, and southern Dela. *Id.* at 109:23–24.

151. DWR's expert, Mr. Cavallo, does not contend that there is no indirect loss, 4/1/10 Tr. 94:10–12, nor that indirect mortality***1147** is not a stressor on fish as they move through the system, *id.* at 94:13–15. Mr. Cavallo agrees that a reasonable biologist addressing the impacts of the Projects should not have ignored indirect mortality. *Id.* at 94:16–19.

152. This belies DWR's present contention that indirect mortality is not related to Project operations, as does information submitted by DWR in the prior litigation estimating indirect mortality attributable to exports. 4/1/10 Tr. 190:7–191:10; *see* D–I Ex. 1003 at (internal) Exhibit 2. NMFS relied on this information in preparation of the current biological opinion. 4/1/10 Tr. 191:13–18; *see* D–I 1011. The information provided by DWR suggests that, based on certain water year types and export to inflow ("E/I") ratios, there could be substantial export-related mortality in the interior Delta. 4/1/10 Tr. 192:9–14. Such mortality may be substantially greater than direct take at the CVP and SWP. *See id.* at 190:17–190:10; *see also* D–I Ex. 1011.

153. Plaintiffs' expert, Mr. Cramer, did not deny the existence of indirect mortality, but stated that it had not been adequately tested. 3/31/10 Tr. 19:2–15.

154. Acoustic tag studies are beginning to provide estimates of indirect mortality in the Delta. *Id.* at 105:9–10. The Perry and Skalski (2008) paper showed a survival rate of about 30 to 35% for interior Delta waters. *Id.* at 105:15–17, 108:15–18; *see* SLDMWA Ex. 227 (Perry & Skalski (2008)). Perry and Skalski did not attribute any particular portion of

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this to the projects.

(6) *Other Stressors.*

155. It is undisputed that there are numerous stressors unrelated to project operations that adversely affect and jeopardize the viability of the Listed Species and the quality of their critical habitat. The BiOp dedicates a lengthy section to "Factors Responsible for the Current Status of Winter–Run, Spring–Run, CV Steelhead, and the Southern DPS of Green Sturgeon." BiOp at 134–157. Among other causes, this section discusses the following factors adverse to survival and habitat quality:

- Habitat blockage by dams of the CVP SWP and other municipal and private entities;
- Water diversion and storage;
- Anderson–Cottonwood Irrigation District ("ACID") Dam and Red Bluff Diversion Dam ("RBDD");
- Water conveyance and flood control facilities;
- Land use activities throughout the Central Valley;
- Water quality degradation;
- Hatchery operations and practices;
- Over utilization through commercial and/or sport harvest;
- Disease and predation;
- Environmental variation (including natural environmental cycles, ocean productivity, and global climate change); and
- Non–Native Invasive Species.

156. Whether and to what extent these factors are exacerbated by project operations has been the subject of continuing debate in this and the Consolidated Smelt Cases. It was not the subject of briefing in the PI motion in this case.

157. Plaintiffs have argued that Federal Defendants have wrongfully ignored these other causes and have put the burden of remediation wholly on the water supply and Project operations. Plaintiffs contend that the overwhelming causes of jeopardy to the species and their habitats are these other stressors.

158. Federal Defendants have not quantified relative harms, nor has any party***1148** suggested what remedies will effectively address these other causes.

D. *Irreparable Harm.*

159. The evidence has established a variety of adverse impacts to humans and the human environment from reduced CVP and SWP deliveries, including "irretrievable resource losses (permanent crops, fallowed lands, destruction of family and entity farming businesses); social disruption and dislocation; as well as environmental harms caused by, among other things, increased groundwater consumption and overdraft, and possible air quality reduction." Doc. 202, 2/5/10 TRO Decision, at 15:24–24–16:1–4.

160. At the same time, the declining health of the salmonid population is harming other interests, including those of commercial fishermen and Native Americans with cultural and spiritual interests in salmon.

(1) *Water Supply Impacts.*

161. It has previously been recognized that "any lost pumping capacity directly attributable to the 2009 Salmonid BiOp will contribute to and exacerbate the currently catastrophic situation faced by Plaintiffs, whose farms, businesses, water service areas, and impacted cities and counties, are dependent, some exclusively, upon CVP and/or SWP water deliveries." Doc 202, TRO Decision, at 15:17–24.

162. Every acre-foot of pumping foregone during critical time periods is an acre-foot that does not reach the San Luis Reservoir where it can be stored for future delivery to users during times of peak demand in the water year.

163. It is undisputed that, in the three water years prior to the 2009–2010 water year, California has experienced three consecutive years of drought conditions. Gov't Salmon Exh. 5 at (internal) Exhibit 1 at 18. This influences the amount of run-off forecasted for 2010 and is indicative of why reservoir storages

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were at a low state entering the 2009–2010 water year. 4/1/10 Tr. 208:7–15. Hydrologic conditions are not within the control of the parties and have materially contributed to water service reductions to contractors.

164. It is also undisputed that other, non-project factors, such as tides, wind events, storm surges, San Joaquin River flows, Contra Costa Water District operations, and diversions by in-Delta water users impose limitations on how Reclamation must operate the project to meet flow targets. *See id.* at 202:12–204:1.

165. The projects are subject to export reductions required to protect species listed under the California Endangered Species Act, including longfin smelt, delta smelt, winter-run Chinook salmon, and spring-run Chinook salmon, which subject the water project operators to controls under state law that are similar, and, in some cases, identical to those contained in the 2009 Salmonid BiOp and the United States Fish and Wildlife Service's ("FWS") December 15, 2008 Biological Opinion ("2008 Delta Smelt BiOp"). *See id.* at Tr. 212:4–213:8; 4//10 Tr. 20:18–21:20. In the absence of the BiOps' RPAs, those protections are argued to have likely limited export pumping to levels below those allowable under D–1641, which also limits Project pumping at certain times of the year. *See, e.g.,* SWC Ex. 938 (DWR's 3/30/10 allocation announcement considered several "SWP operational constraints" including "the incidental take permit for longfin smelt").

166. Plaintiffs' estimates of water losses do not account for or otherwise offset losses attributable to proposed remedies in the consolidated Delta Smelt and Salmon cases. *See* 4/7/10 Tr. 17:10–20:14.

***1149** a. *Water Supply Impacts of Action IV.2.1.*

167. Action IV.2.1 lasts from April 1, 2010 through May 31, 2010. SLDMWA Ex. 105 at 641–643. The flow requirements in Action IV.2.1 vary depending on the February New Melones Index. SLDMWA Ex. 105 at 642. Based on the February 2010 New Melones Index of 1,779 thousand acre-feet ("TAF") under the 50% exceedance forecast,[FN12] the minimum flows at Vernalis under Action IV.2.1 will be those required to meet the D–1641 requirements or 3,000 cfs, whichever is greatest. Gov't Salmon Ex. 55 at 5. Additionally, flows at Vernalis are anticipated to be less than 6,000 cfs in April and May 2010, which means that combined exports will likely be limited to 1,500 cfs in April and May when Action IV.2.1 controls. Gov't Salmon Ex. 55 at 5; SLDMWA Ex. 105 at 642.

FN12. Reclamation only can estimate what will be controlling CVP operations in the future. 4/1/10 Tr. 204:5–7. The degree of certainty in predicting what will control Project operations, particularly in the winter and spring, declines rapidly past two or three days. *Id.* at 204:7–9. Reclamation uses DWR's monthly run-off forecasts to develop monthly 50% and 90% exceedance forecasts of CVP operations. *Id.* at 206:13–207:15.

168. Action IV.2.1 began affecting pumping and water supply allocations beginning April 1. 4/6/10 Tr. 188:11–14. Terry Erlewine, General Manager of the State Water Contractors, estimated that from April 1 through April 5, 2010 SWP and CVP experienced a loss of exports of approximately 50,000 acre feet. 4/6/10 Tr. 188:18–19. He also estimated that the two Projects would incur additional losses of approximately 50,000 acre feet, or more, during the months of April and May 2010, as a result of the 2009 Salmonid and 2008 Delta Smelt BiOps. 4/6/10 Tr. 196:19–21; 199:10–16, 23; SWC Ex. 939.

169. The 2009 Salmonid BiOp estimates that, on average, Action IV.2.1 could reduce monthly exports by 73 percent in April and 67 percent in May. SLDMWA Ex. 105, App. 5 at 44. NMFS has acknowledged that these reductions are in addition to the reductions mandated under the 2008 Delta Smelt BiOp. *Id.* at 60. If Action IV.2.1, Action IV.2.3, or the 2008 Delta Smelt BiOp RPA are enjoined, Reclamation expects to increase CVP water supply allocations in May and June. 4/1/10 Tr. 213:14–20.

b. *Water Supply Impacts of Action IV.2.3.*

170. Action IV.2.3 began controlling Reclamation's and DWR's operation of the CVP and SWP, respectively, on January 20, 2010. 4/1/10 Tr. 199:8–9; Gov't Salmon Ex. 5 at ¶ 6. This restriction lasted until January 27, 2010. *Id.* at 199:11–13; Gov't Salmon Ex. 5 at 6. From January 27, 2010 through February 5, 2010, Action IV.2.3 required OMR flow reductions which, in turn, required Reclamation to restrict its pumping at the CVP's Jones Pumping

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Plant to approximately 3,300 cfs. Gov't Salmon Ex. 5 at 6. On February 6, 2010, Reclamation increased pumping at the Jones Pumping Plant to approximately 4,200 cfs in order to comply with the temporary restraining order granted on February 5, 2010, 2010 WL 481230. Gov't Salmon Ex. 5 at ¶ 6. On February 10, 2010, the OMR requirement for the 2008 Smelt BiOp began controlling operation of the pumping facilities. 4/1/10 Tr. 200:6–10.

171. From February 19 through March 15, 2010, NMFS and FWS independently made flow recommendations of -5,000 cfs for OMR flow targets, in order to comply with Action IV.2.3 and the 2008 Delta Smelt BiOp, respectively. 4/1/10 Tr. 200:5–7; Gov't Salmon Ex. 5 at ¶ 8.

172. San Luis Plaintiffs estimate that for every day that Action IV.2.3 controls ***1150** under a -5,000 cfs limit, Reclamation's pumping output is reduced by 500 cfs per day. TRO Decision at 14:8–15. Mr. Erlewine estimates that losses to the combined projects between January 20 and January 26, 2010 exceeded 90,000 acre-feet ("AF"), and combined losses from January 27 through February 5, 2010 were approximately another 100,000 AF. TRO Decision at 14:19–22; TR 4/6/10–183:14–15; SWC Ex. 903. It has been recognized that even if estimates of loss by Thomas Boardman and Erlewine "are so excessive that they double actual loss, the figures are still significant." TRO Decision at 15:1–4.

c. *Other Facts Relevant to Water Supply Impacts.*

173. It is undisputed that even in the absence of the RPAs, the quantity of exportable water is still subject to regulation, e.g. under Decision 1641. 4/6/10 Tr. 184–185. However, the quantity of exportable water has been reduced by the implementation of the salmonid and smelt RPAs. *Id.* From January 20 through March 24, 2010, Mr. Erlewine testified that potential and actual exports were diminished by 522,561 acre feet, of which a 433,000 AF loss was attributable to the SWP and a 89,000 AF loss was attributable to the CVP. 4/6/10 Tr. 185:16–19; SWC Demonstrative Ex. 903.

174. DWR made its initial water supply allocation announcement on November 30, 2009, allocating five percent of Table A contracted amounts for SWP water contractors. 4/6/10 Tr. 240:16–22; SWC Ex. 923, Ex. B. As of March 30, 2010, DWR increased the SWP allocation for 2010 to a 20% allocation. 4/6/10 Tr. 189:15–17; SWC Ex. 938; 4/1/10 Tr. 249:22–25.

175. Reclamation announced its initial allocation of CVP water on February 26, 2010. Fed. Salmon Ex. 55 at ¶ 1. Under the 90% exceedance forecast, Reclamation allocated CVP agricultural users 5% of their contract amounts, and CVP municipal and industrial ("M & I") contractors 55% of their contract amounts. Fed. Salmon Ex. 55 at 12. Under the 50% exceedance forecast, north-of-Delta agricultural and M & I contractors would receive 100% of their contract amounts, while south-of-Delta agricultural contractors would receive 30% and M & I contractors 75%. *Id.*

176. CVP water users faced similar reductions to their individual allocations. Farmers on the west side of the San Joaquin Valley have received reduced CVP water supply allocations in the 2007–2008, 2008–2009, and 2009–2010 water years, and face similar reductions in 2010–2011. SLDMWA Ex. 153 at 3; SLDMWA Ex. 154 at ¶ 4; SLDMWA Ex. 156 at ¶ 4. In 2007–2008, Reclamation allocated to Westlands 40% of its contract supply. In 2008–2009, that allocation was 10%. SLDMWA Ex. 155 at ¶ 8. For the 2009–2010 water year, Westlands was advised the initial allocation was zero percent. SLDMWA Ex. 155 at ¶ 9.

177. On March 16, 2010, Reclamation announced an increase in allocations, raising the allocation for south-of-Delta agricultural users to 25% under a 90% forecast and 30% under a 50% forecast. 4/1/10 Tr. 210:14–22; Gov't Salmon Exh. 13.

178. Judicial notice is taken of the fact that as of April 1, 2010, CVP water supply allocations to south-of Delta agricultural contractors were increased from 25% to 30%. *See* Doc. 318–2 (U.S. Department of the Interior Press Release). On April 23, 2010, DWR increased its allocation of SWP deliveries to 30%. *See* Doc. 323–2 (DWR Press Release). This does not alter the fact that water deliveries will likely increase if the two RPAs are enjoined. 4/1/10 Tr. 213:14–20 (acknowledging that deliveries would increase by 5%—10% if the RPAs were enjoined).

***1151** 179. The quantity of water lost through pumping reductions translates directly into water

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losses for urban and agricultural water users. In the SWP service area, one acre-foot of water serves about five to seven people for one year. 4/6/10 Tr. 186:25–187:1–3. The SWP loss of 433,000 AF, if available to urban users, would have supplied approximately 2.6 million people for one year. 4/6/10 Tr. 187:8–11. Seventy-five to eighty-five percent of SWP supply is provided for urban uses, with the remainder provided to agricultural users. 4/6/10 Tr. 187:15–17. The Metropolitan Water District of Southern California alone serves approximately 20 million urban users.

180. Water loss for agricultural users results in reduction in the number of acres that may be sustained with actual water supply. Water duty is the amount of water that a crop needs per acre for a growing season. 4/6/10 Tr. 187:21–22. DWR information indicates that for the SWP service area, the water duty is approximately three AF per acre. 4/6/10 Tr. 187:22–25. If the 433,000 AF were withheld from almond crops, for example, almond production would be reduced by approximately 140,000 acres. 4/6/10 Tr. 188:1–4.

181. Reduced CVP and SWP water supply allocations have increased the cost of supplemental water. Farmers have been forced to purchase supplemental water at drastically increased cost. SLDMWA Ex. 154 at ¶ 7, SLDMWA Ex. 155 at ¶ 17, SLDMWA Ex. 156 at ¶ 6. Since 2007, the cost of securing supplemental water has more than tripled. SLDMWA Ex. 156 at ¶ 6; SLDMWA Ex. 154 at ¶ 7. As of January 2010, the cost for buying replacement water for transfer in a dry year is at least $300 per acre foot, plus transportation costs. SLDMWA Ex. 1¶ 57 at ¶ 12.

182. Increased water allocations may lessen this increased cost, and will mitigate anticipated harms from reduced water allocations. Farmers anticipate that increased water allocations would mitigate anticipated damage to crops in proportion to the amount of water received and prevent further layoffs of farm employees. SLDMWA Ex. 156 at ¶ 10.

183. In 2009, the Department of the Interior accounted for actions taken under the Delta smelt biological opinion, including federal export reductions, as (b)(2) actions, pursuant to section 3406(b)(2) of the CVPIA. 4/1/10 Tr. 213:24–214:2. In 2010, the Department of the Interior intends to follow the same accounting allocation for federal export reductions related to both biological opinions, to the extent that (b)(2) assets are available at the time the action is taken. *Id.* at 214:3–7.

(2) *Other Resource Impacts Caused or Exacerbated by the 2009 Salmonid BiOp RPA Actions.*

184. Plaintiffs attribute a number of other human impacts to reductions in the water supply. There is considerable dispute among the parties regarding the extent to which the 2009 Salmonid BiOp RPA Actions are responsible for a number of other impacts. It is undisputed that these RPA Actions are, at the very least, exacerbating the following impacts.

(1) *Permanent Crops.*

185. Reductions in the quantity of water supply deliveries have resulted in changes to farming practices, including an increased reliance on permanent crops. SLDMWA Ex. 154 at ¶ 6; SLDMWA Ex. 155 at ¶¶ 18, 22; SLDMWA Ex. 157 at ¶ 11.

186. Permanent crops place farmers at greater risk than row crops, as farmers cannot cut back on the water to permanent crops without destroying them. ***1152** SLDMWA Ex. 154 at ¶ 6; SLDMWA Ex. 155 at ¶¶ 18, 22; SLDMWA Ex. 157 at ¶ 11.

(2) *Fallowed Lands.*

187. Because of reduced water forecasts and uncertainty regarding future water supply, farmers have fallowed hundreds and thousands of acres of fields. SLDMWA Ex. 155 at ¶ 10; SLDMWA Ex. 153 at ¶ 3; SLDMWA Ex. 156 at ¶ 5.

188. Fallowed lands and reduced water supply has caused the loss of thousands of acres of crops. Todd Allen, a third-generation farmer in Fresno County, was able to salvage and harvest only 40 acres of a wheat crop out of a total arable 616 acres on his farm in 2009. SLDMWA Ex. 153 at ¶ 3.

189. For every 1,000 AF of water lost by the San Luis Plaintiffs' member agencies, approximately 400 acres of land may remain out of production. SLDMWA Ex. 1¶ 57 at ¶ 13.

190. Fallowing fields also negatively impacts the air quality of the San Joaquin Valley by increasing

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dust and particulate matter. SLDMWA Ex. 155 at ¶ 20. Reduced air quality in turn impairs major transportation routes through the valley. SLDMWA Ex. 155 at ¶ 20.

191. The commander of Lemoore Naval Air Station described increased bird-on-aircraft strikes attributable to land fallowing. 4/7/10 Tr. 213:20–214:6. Reclamation responded by allocating an emergency water supply to farms adjacent to Lemoore. *See id.* at 213.

(3) *Lack of Access to Credit.*

192. The more unreliable the water supply, the more difficult it is for farmers to secure necessary financing for their farming operations. SLDMWA Ex. 153 at ¶ 4; SLDMWA Ex. 154 at ¶ 13, SLDMWA Ex. 155 at ¶ 26, SLDMWA Ex. 156 at ¶ 7, SLDMWA Ex. 157 at ¶ 15. In some cases, lenders deny loan applications because of a lack of reliable water supply. SLDMWA Ex. 153 at ¶ 4; SLDMWA Ex. 154 at ¶ 13, SLDMWA Ex. 155 at ¶ 26, SLDMWA Ex. 156 at ¶ 7, SLDMWA Ex. 1¶ 57 at ¶ 15. In others, lenders' concerns about availability to lands irrigated by federally-supplied water has required farmers to make a 50 percent down payment to secure any loans. SLDMWA Ex. 156 at ¶ 7.

(4) *Social Disruption and Dislocation.*

193. It is undisputed that farm employees and their families have faced devastating losses due to reductions in the available water supply. The impact on the farm economy from the combination of a three-year drought and diversion limitations relating to the delta smelt has already been severe. SLDMWA Ex. 1¶ 57 at ¶ 14.

194. Lost water supply has decreased the number of productive agricultural acres, which has resulted in reductions in employee hours, salaries, and positions, devastating farm employees and their families. SLDMWA Ex. 154 at ¶ 11, SLDMWA Ex. 156 at ¶ 8.

195. The removal of 250,000 acres from production translates to a loss of approximately 4,200 permanent agricultural worker positions. SLDMWA Ex. 155 at ¶ 19. Water shortages also cause jobs to be lost in agriculture-related businesses, such as packing sheds, processing plants, and other related services. *Id.* The projected agriculture-related wage loss for the San Joaquin Valley stands at $1.6 billion. *Id.*

196. Dr. Michael, Defendant Intervenors' economist with expertise in regional and environmental economics, counters that "[a]lthough water impacts have affected parts of the west side, there is no evidence that reduced water deliveries have had a severe effect on farm or nonfarm employment in the Central Valley as a whole." D–I Exh. 1006 (Michael Decl.) ¶ 10. Instead, it is a combination of factors,***1153** including the three-year drought, the global economic recession, the foreclosure crisis, and the collapse of the real estate market and construction industry, that are mainly driving crop and job losses, food bank needs, and credit problems in the Central Valley-not RPA Action IV.2.1. *Id.* at 6–10. Dr. Michael estimates that ESA-related pumping restrictions have resulted in the loss of less than 2,000 jobs. *See id.* at ¶ 4.

197. Unemployment has led to hunger on the west side of the San Joaquin Valley. SLDMWA Ex. 158 at ¶ 8. The Community Food Bank, serving Fresno, Madera and Kings Counties, estimates 435,000 people in the area it serves do not have a reliable source of food. SLDMWA Ex. 158 at ¶ 4. The Chief Executive Officer of the Community Food Bank, Dana Wilkie, believes that hunger in the communities served by the Food Bank in the western San Joaquin Valley will continue to increase in 2010 because of ongoing water shortages. SLDMWA Ex. 158 at ¶ 5. Ms. Wilkie understands that at least 42,000 people served by the Food Bank in October 2009 were employed by farm-related businesses before losing their jobs. SLDMWA Ex. 158 at ¶ 8.

(5) *Groundwater Consumption and Overdraft.*

198. Reductions in the available water supply have caused water users to increase groundwater pumping in attempts to make up the difference between irrigation need and allocated water supplies. SLDMWA Ex. 155 at ¶¶ 4, 7; SLDMWA Ex. 1¶ 57 at 10; 4/6/10 Tr. 216:6–7.

199. However, groundwater pumping is not always available, and cannot be used in all areas or for all crops. SLDMWA Ex. 155 at ¶ 11. Increased groundwater pumping reduces the quality of water applied to the soil by increasing soil salinity. SLDMWA *Id.* at ¶ 15. Not all fields and crops can be irrigated with groundwater. *Id.* at ¶¶ 11, 15.

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200. Increased reliance on and overuse of groundwater has caused groundwater overdraft, which occurs when pumping exceeds the safe yield of an aquifer. *Id.* at ¶ 12. Overdraft causes increased land subsidence and potential damage to CVP conveyance facilities, *id.* at ¶¶ 12–13, although it is not clear that any subsidence of CVP facilities has occurred as a result of the implementation of the 2009 Salmonid BiOp RPA Actions, as the only reported incident of subsidence at a SWP conveyance facility predates current implementation, 4/7/10 Tr. 16:1–13.

201. Increased groundwater pumping also increases demand for energy. SLDMWA Ex. 155 at ¶ 16. Due to the falling water table, wells require increased amounts of energy. *Id.* Westlands estimates that pumping of groundwater in 2009 required approximately 425,000,000 kWh. *Id.* Adverse environmental impacts are associated with such increased demand for and use of energy. *Id.*

202. Increased groundwater pumping has depleted groundwater reserves. Groundwater reserves that were at 2 million acre feet in the beginning of 2007 are now less than 900,000 AF. 4/6/10 Tr. 216:21–24. Within MWD's service area, storage levels are at 1.3 million AF, about half of normal storage levels. 4/6/10 Tr. 217:4–8.

a. *Impacts of Decreased Salmonid Populations.*

203. It is undisputed that declines in salmon populations have caused harm to other residents of California, predominantly the salmon fishing industry, although the extent to which the Projects should be assigned the blame for such harms and the extent to which the RPA Actions will alleviate these harms is a matter of considerable dispute.

***1154** (1) *Impacts on the Commercial and Recreational Salmon Fishing Industries*

204. Mr. Zeke Grader, Executive Director of Defendant–Intervenor Pacific Coast Federation of Fishermen's Associations ("PCFFA"), testified that the commercial fishing industry has suffered tremendous losses as a result of the near total collapse of California's salmon fishery, which precipitated a shutdown of the salmon fishing seasons in 2008 and 2009 and threatens another shutdown in the future. D–I Ex. 1007 (Supp. Declaration of William F. "Zeke" Grader) ¶¶ 5, 8. The fall-run (a non-listed species) collapse is believed to have been brought about by a combination of environmental stressors in the Delta, including reduced flows, water temperature, predation, and non-native species, as well as declining ocean conditions. *Id.* at ¶ 5; *see also* 3/31/10 Tr. 127:22–128:10.

205. The evidence establishes that the costs of these closures are substantial: the 2008–2009 closures cost the states of California, Oregon, and Washington approximately 4,200 jobs and well over $500 million. *See id.* ¶ 7, Att. 3; *see also* D–I Ex. 1006 at ¶ 14.

206. According to Mr. Stuart, fall-run Chinook emigrate through the Delta during the same time period as Central Valley steelhead (April and May). 3/31/10 Tr. 128:17–18. The BiOp notes, "[m]any RPA actions intended to avoid jeopardy to listed winter-run and spring-run, or adverse modification of their critical habitat, are also expected to reduce adverse effects of the action on the short- and long-term abundance and the long-term viability of non-listed fall-run and late-fall run." BiOp at 715. RPA Actions IV.2.1 and IV.2.3 are also designed to "reduce exposure of fall-run and late fall-run juveniles to export facilities and increase survival for fall-run leaving the San Joaquin River." *Id.* at 716, 717.

207. Reduced fall-run populations could lead to further closures in future seasons, which, according to Mr. Grader, "would have devastating effects on the commercial fishermen of PCFFA and likely would lead to additional job and income losses. Continued fishery closures threaten the long term viability of the salmon fishery, as the infrastructure and expertise that sustains the fishery is lost." D–I Ex. 1007 (Supp. Grader Decl.) ¶ 8.

208. Dr. Michael compared the economic impacts to the agricultural and salmon fishing industries and concluded that the "short-run economic impacts of the endangered species pumping restrictions and salmon fishery closure are of a similar scale." D–I Exh. 1006 at ¶ 16.

c. *Impacts On the Winnemem Wintu Tribe's Cultural Interests in Salmon*

209. The Winnemem Wintu, a Native American tribe, also have significant interests in Sacramento River Chinook salmon that could be affected by in-

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junctive relief against Actions IV.2.1 or IV.2.3. *See* D–I Ex. 1008 (Declaration of Gary Hayward Slaughter Mulcahy ("Mulcahy Decl.")) ¶¶ 2–3. The declaration of Gary Mulcahy demonstrates that, for centuries, salmon have sustained the Winnemem Wintu and have formed the foundation of the Tribe's cultural and spiritual ceremonies and beliefs. *Id.* at ¶ 3. However, like the salmon, the Tribe is "struggling to survive," in part due to the decline of native wild salmon and the dietary and health effects this has had on Tribal members. *Id.* at ¶ 5. In addition, the loss of native salmon runs has transformed the Winnemem Wintu's way of life, which once involved community celebrations, salmon bakes, and festivals, all centered around the salmon. *Id.* at ¶¶ 3, 6. The Winnemem Tribe's connection ***1155** to salmon is so strong that they believe "that if the salmon go, the Winnemem Wintu will also disappear." *Id. at* ¶ 3.

210. To the extent that an injunction of either Action IV.2.1 or Action IV.2.3 would harm Sacramento River Chinook salmon, as discussed above, it will threaten the significant cultural and spiritual interests of the Winnemem Wintu.

(3) *Harm to Species.*

211. The potential harms to the species of enjoining Action IV.2.1 and/or IV.2.3 are discussed above.

212. The NMFS's and related fish agencies continuing failure, after more than ten (10) years of disputes, to acquire credible and reliable species population figures, perform impact analyses in light of population levels, and develop appropriate population life-cycle models, with explicit knowledge that such data and modeling are generally accepted scientific methods in the field, is still unexplained, except that it is difficult to accomplish.

VI. *CONCLUSIONS OF LAW*

A. *Jurisdiction.*

1. Jurisdiction over claims brought under NEPA exists under 28 U.S.C. § 1331 (Federal Question) and the Administrative Procedure Act ("APA"), 5 U.S.C. § 702 et seq. Jurisdiction over the ESA claims exists under the ESA citizen-suit provision, 16 U.S.C. § 1540(g)(1)(A). Personal jurisdiction over all the parties exists by virtue of their participation in the lawsuit as Plaintiffs, Defendants, and Intervenors.

B. *Likelihood of Success on the Merits: NEPA Claim.*

[5] 2. Plaintiffs have already succeeded on their NEPA claim. *See* Memorandum Decision Re Cross–Motions for Summary Judgment on NEPA Issues. Doc. 266.

[6] 3. NEPA insures that federal agencies "make informed decisions and 'contemplate the environmental impacts of [their] actions.' " *Ocean Mammal Inst. v. Gates,* 546 F.Supp.2d 960, 971 (D.Hi.2008) (quoting *Idaho Sporting Cong. v. Thomas,* 137 F.3d 1146, 1149 (9th Cir.1998)).

[7] 4. "NEPA emphasizes the importance of coherent and comprehensive up-front environmental analysis to insure informed decision-making to the end that the agency will not act on incomplete information, only to regret its decision after it is too late to correct." *Ctr. for Biological Diversity v. U.S. Forest Serv.,* 349 F.3d 1157, 1166 (9th Cir.2003).

5. The agencies' violations of NEPA prevented the required reasonable evaluation, analysis, "hard look at," and disclosure of the harms and damage of implementing the 2009 Salmonid BiOp RPA Actions to human health and safety, the human environment and other environments not inhabited by the Listed Species.

6. Harms that have been caused by RPA water supply reductions include but are not limited to: destruction of permanent crops; fallowed lands; increased groundwater consumption; land subsidence; reduction of air quality; destruction of family and entity farming businesses; and social disruption and dislocation, such as increased property crimes and intra-family crimes of violence, adverse effects on schools, and increased unemployment leading to hunger and homelessness.

[8] 7. Where a federal agency takes action in violation of NEPA, "that action will be set aside." *High Sierra Hikers Ass'n v. Blackwell,* 390 F.3d 630, 640 (9th Cir.2004).

[9][10] 8. However, a court may not issue an injunction under NEPA that ***1156** would cause a violation of other statutory requirements, such as those found in section 7 of the ESA. *See United States v. Oakland Cannabis Buyers' Coop.,* 532 U.S. 483, 497, 121 S.Ct. 1711, 149 L.Ed.2d 722 (2001) ("A district

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court cannot, for example, override Congress' policy choice, articulated in a statute, as to what behavior should be prohibited"). Nor should an injunction issue under NEPA when enjoining government action would result in more harm to the environment than denying injunctive relief. *Save Our Ecosystems v. Clark*, 747 F.2d 1240, 1250 (9th Cir.1984); *Am. Motorcyclist Ass'n v. Watt*, 714 F.2d 962, 966 (9th Cir.1983) (holding public interest does not favor granting an injunction where "government action allegedly in violation of NEPA might actually jeopardize natural resources"); *Alpine Lakes Prot. Soc'y v. Schlapfer*, 518 F.2d 1089, 1090 (9th Cir.1975) (denying injunctive relief in NEPA case where more harm could occur to forest from disease if injunction was granted).

C. *Likelihood of Success on ESA Claims.*

(1) *Legal Standards.*

9. The Administrative Procedure Act ("APA") requires Plaintiffs to show that NMFS's action was "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A).

a. *Record Review.*

[11][12] 10. A court reviews a biological opinion "based upon the evidence contained in the administrative record." *Arizona Cattle Growers' Ass'n v. FWS*, 273 F.3d 1229, 1245 (9th Cir.2001). Judicial review under the APA must focus on the administrative record already in existence, not some new record made initially in a reviewing court. Parties may not use "post-decision information as a new rationalization either for sustaining or attacking the agency's decision." *Ass'n of Pac. Fisheries v. EPA*, 615 F.2d 794, 811–12 (9th Cir.1980).

[13] 11. Exceptions to administrative record review for technical information or expert explanation make such evidence admissible only for limited purposes, and those exceptions are narrowly construed and applied. *Lands Council v. Powell*, 395 F.3d 1019, 1030 (9th Cir.2005).

[14] 12. Here, the Court has considered expert testimony only for explanation of technical terms and complex subject matter beyond the Court's knowledge; to understand the agency's explanations, or lack thereof, underlying the RPA Actions; and to determine if any bad faith existed.

b. *Deference to Agency Expertise.*

[15][16] 13. The Court must defer to the agency on matters within the agency's expertise, unless the agency completely failed to address some factor, consideration of which was essential to making an informed decision. *Nat'l Wildlife Fed'n v. NMFS*, 422 F.3d 782, 798 (9th Cir.2005). The court "may not substitute its judgment for that of the agency concerning the wisdom or prudence of the agency's action." *River Runners for Wilderness v. Martin*, 593 F.3d 1064, 1070 (9th Cir.2009).

> In conducting an APA review, the court must determine whether the agency's decision is "founded on a rational connection between the facts found and the choices made ... and whether [the agency] has committed a clear error of judgment." *Ariz. Cattle Growers' Ass'n v. U.S. Fish & Wildlife*, 273 F.3d 1229, 1243 (9th Cir.2001). "The [agency's] action ... need be only a reasonable, not the best or most reasonable, decision." ***1157** *Nat'l Wildlife Fed. v. Burford*, 871 F.2d 849, 855 (9th Cir.1989).

Id.

[17][18][19] 14. Although deferential, judicial review under the APA "is designed to ensure that the agency considered all of the relevant factors and that its decision contained no clear error of judgment." *Arizona v. Thomas*, 824 F.2d 745, 748 (9th Cir.1987) (internal citations omitted). "The deference accorded an agency's scientific or technical expertise is not unlimited." *Brower v. Evans*, 257 F.3d 1058, 1067 (9th Cir.2001) (internal citations omitted). Deference is not owed when "the agency has completely failed to address some factor consideration of which was essential to making an informed decision." *Id.* (internal citations and quotations omitted).

> [An agency's decision is] arbitrary and capricious if it has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.

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Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43, 103 S.Ct. 2856, 77 L.Ed.2d 443 (1983); *see also Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416, 91 S.Ct. 814, 28 L.Ed.2d 136 (1971) ("A reviewing court may overturn an agency's action as arbitrary and capricious if the agency failed to consider relevant factors, failed to base its decision on those factors, and/or made a clear error of judgment.").

c. *General Obligations Under the ESA.*

15. ESA Section 7(a)(2) prohibits agency action that is "likely to jeopardize the continued existence" of any endangered or threatened species or "result in the destruction or adverse modification" of its critical habitat. 16 U.S.C. § 1536(a)(2).

16. To "jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. § 402.02; *see also Nat'l Wildlife Fed'n v. NMFS*, 524 F.3d 917 (9th Cir.2008) (" *NWF v. NMFS II* ") (rejecting agency interpretation of 50 C.F.R. § 402.02 that in effect limited jeopardy analysis to survival and did not realistically evaluate recovery, thereby avoiding an interpretation that reads the provision "and recovery" entirely out of the text). An action is "jeopardizing" if it keeps recovery "far out of reach," even if the species is able to cling to survival. *Id.* at 931.

[20] 17. "[A]n agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm." *Id.* at 930.

18. To satisfy this obligation, the federal agency undertaking the action (the "action agency") must prepare a "biological assessment" that evaluates the action's potential impacts on species and species' habitat. 16 U.S.C. § 1536(c); 50 C.F.R. § 402.12(a).

19. If the proposed action "is likely to adversely affect" a threatened or endangered species or adversely modify its designated critical habitat, the action agency must engage in "formal consultation" with NMFS to obtain its biological opinion as to the impacts of the proposed action on the Listed Species. 16 U.S.C. § 1536(a)(2), (b)(3); *see also* 50 C.F.R. § 402.14(a), (g). ***1158** Once the consultation process has been completed, NMFS must give the action agency a written biological opinion "setting forth [NMFS's] opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat." 16 U.S.C. § 1536(b)(3)(A); *see also* 50 C.F.R. § 402.14(h).

20. If NMFS determines that jeopardy or destruction or adverse modification of critical habitat is likely, NMFS "shall suggest those reasonable and prudent alternatives which [it] believes would not violate subsection (a)(2) of this section and can be taken by the Federal agency or applicant in implementing the agency action." 16 U.S.C. § 1536(b)(3)(A). "Following the issuance of a 'jeopardy' opinion, the agency must either terminate the action, implement the proposed alternative, or seek an exemption from the Cabinet-level Endangered Species Committee pursuant to 16 U.S.C. § 1536(e)." *National Ass'n of Home Builders v. Defenders of Wildlife*, 551 U.S. 644, 652, 127 S.Ct. 2518, 168 L.Ed.2d 467 (2007).

d. *Best Available Science.*

[21] 21. Under the ESA, an agency's actions must be based on "the best scientific and commercial data available." 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8) ("In formulating its Biological Opinion, any reasonable and prudent alternatives, and any reasonable and prudent measures, the Service will use the best scientific and commercial data available."). "The obvious purpose of the [best available science requirement] is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise." *Bennett v. Spear*, 520 U.S. 154, 176, 117 S.Ct. 1154, 137 L.Ed.2d 281 (1997). A failure by the agency to utilize the best available science is arbitrary and capricious. *See Pacific Coast Federation of Fishermen's Associations v. Gutierrez (Gutierrez II)*, 606 F.Supp.2d 1122, 1144 (E.D.Cal.2008).

[22] 22. A decision about jeopardy must be made based on the best science available at the time of the decision; the agency cannot wait for or promise future studies. *See Ctr. for Biological Diversity v.*

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Rumsfeld, 198 F.Supp.2d 1139, 1156 (D.Ariz.2002).

23. The "best available science" mandate of the ESA sets a basic standard that "prohibits the [agency] from disregarding available scientific evidence that is in some way better than the evidence [it] relies on." *Am. Wildlands v. Kempthorne*, 530 F.3d 991, 998 (D.C.Cir.2008) (citation omitted).

[23][24] 24. What constitutes the "best" available science implicates core agency judgment and expertise to which Congress requires the courts to defer; a court should be especially wary of overturning such a determination on review. *Baltimore Gas & Elec. Co. v. Natural Res. Defense Council*, 462 U.S. 87, 103, 103 S.Ct. 2246, 76 L.Ed.2d 437 (1983) (a court must be "at its most deferential" when an agency is "making predictions within its area of special expertise, at the frontiers of science"). As explained by the en banc panel of the Ninth Circuit in *Lands Council v. McNair*, 537 F.3d 981, 993 (9th Cir.2008), courts may not "impose on the agency their own notion of which procedures are best or most likely to further some vague, undefined public good." *Id.* In particular, an agency's "scientific methodology is owed substantial deference." *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv.*, 378 F.3d 1059, 1066 (9th Cir.2004).

25. This deference extends to the use and interpretation of statistical methodologies. As explained by the D.C. Circuit in ***1159***Appalachian Power Co. v. EPA*, 135 F.3d 791 (D.C.Cir.1998), in reviewing a challenge to a decision of the Environmental Protection Agency ("EPA") under the "arbitrary and capricious" standard of review:

> Statistical analysis is perhaps the prime example of those areas of technical wilderness into which judicial expeditions are best limited to ascertaining the lay of the land. Although computer models are "a useful and often essential tool for performing the Herculean labors Congress imposed on EPA in the Clean Air Act," [citation] their scientific nature does not easily lend itself to judicial review. Our consideration of EPA's use of a regression analysis in this case must therefore comport with the deference traditionally given to an agency when reviewing a scientific analysis within its area of expertise without abdicating our duty to ensure that the application of this model was not arbitrary.

Id. at 802.

26. More generally, "[w]hen specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive." *Lands Council*, 537 F.3d at 1000 (quoting *Marsh v. Oregon Natural Res. Council*, 490 U.S. 360, 378, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989)).

[25] 27. Mere uncertainty, or the fact that evidence may be "weak," is not fatal to an agency decision. *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1337 (9th Cir.1992) (upholding biological opinion, despite uncertainty about the effectiveness of management measures, because decision was based on a reasonable evaluation of all available data); *Nat'l Wildlife Fed'n v. Babbitt*, 128 F.Supp.2d 1274, 1300 (E.D.Cal.2000) (holding that the "most reasonable" reading of the best scientific data available standard is that it "permits the [FWS] to take action based on imperfect data, so long as the data is the best available").

28. The deference afforded under the best available science standard is not unlimited. For example, *Tucson Herpetological Society v. Salazar*, 566 F.3d 870, 879 (9th Cir.2009), held that an agency may not rely on "ambiguous studies as evidence" to support findings made under the ESA. Because the studies did not lead to the conclusion reached by FWS, the Ninth Circuit held that these studies provided inadequate support in the administrative record for the determination made by FWS. *Id.*; *see also Rock Creek Alliance v. U.S. Fish & Wildlife Service*, 390 F.Supp.2d 993 (D.Mont.2005) (rejecting FWS's reliance on a disputed scientific report, which explicitly stated its analysis was not applicable to the small populations addressed in the challenged opinion); *Greenpeace v. NMFS*, 80 F.Supp.2d 1137, 1149–50 (W.D.Wash.2000) (where agency totally failed to develop any projections regarding population viability, it could not use as an excuse the fact that relevant data had not been analyzed).

[26] 29. The presumption of agency expertise may be rebutted if the agency's decisions, although based on scientific expertise, are not reasoned.

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Greenpeace, 80 F.Supp.2d at 1147. Agencies cannot disregard available scientific evidence better than the evidence on which it relies. *Kern County Farm Bureau v. Allen,* 450 F.3d 1072, 1080 (9th Cir.2006); *S.W. Ctr. for Biological Diversity v. Babbitt,* 215 F.3d 58, 60 (D.C.Cir.2000).

30. Courts routinely perform substantive reviews of record evidence to evaluate the agency's treatment of best available science. The judicial review process is not one of blind acceptance. *See, e.g., Kern County,* 450 F.3d 1072 (thoroughly reviewing three post-comment studies and FWS's ***1160** treatment of those studies to determine whether they "provide[d] the sole, essential support for" or "merely supplemented" the data used to support a listing decision); *Home Builders Ass'n of N. Cal. v. U.S. Fish and Wildlife Serv.,* 529 F.Supp.2d 1110, 1120 (N.D.Cal.2007) (examining substance of challenge to FWS's determination that certain data should be disregarded); *Trout Unlimited v. Lohn,* 645 F.Supp.2d 929 (D.Or.2007) (finding best available science standard had been violated after thorough examination of rationale for NMFS's decision to withdraw its proposal to list Oregon Coast Coho salmon); *Oceana, Inc. v. Evans,* 384 F.Supp.2d 203, 217–18 (D.D.C.2005) (carefully considering scientific underpinnings of challenge to Service's use of a particular model, including post decision evidence presented by an expert, to help the court understand a complex model, applying one of several record review exceptions articulated in *Esch v. Yeutter,* 876 F.2d 976, 991 (D.C.Cir.1989), which are similar to those articulated by the Ninth Circuit).

[27][28] 31. Courts are not required to defer to an agency conclusion that runs counter to that of other agencies or individuals with specialized expertise in a particular technical area. *See, e.g., Am. Tunaboat Ass'n v. Baldrige,* 738 F.2d 1013, 1016–17 (9th Cir.1984) (NMFS's decision under the Marine Mammal Protection Act was not supported by substantial evidence because agency ignored data that was product of "many years' effort by trained research personnel"); *Sierra Club v. U.S. Army Corps of Eng'rs,* 701 F.2d 1011, 1030 (2d Cir.1983) ("court may properly be skeptical as to whether an EIS's conclusions have a substantial basis in fact if the responsible agency has apparently ignored the conflicting views of other agencies having pertinent experience[ ]") (internal citations omitted). Here, DWR has a scientifically-based, contrary view of the science, has considered the economic consequences of the RPA Actions, and has intervened to protect humans and the human environment. A court should "reject conclusory assertions of agency 'expertise' where the agency spurns unrebutted expert opinions without itself offering a credible alternative explanation." *N. Spotted Owl v. Hodel,* 716 F.Supp. 479, 483 (W.D.Wash.1988) (citing *Am. Tunaboat Ass'n,* 738 F.2d at 1016).

32. In *Conner v. Burford,* 848 F.2d 1441, 1453–54 (9th Cir.1988), the agency attempted to defend its biological opinions by arguing that there was a lack of sufficient information. In rejecting this defense, the court held that "incomplete information about post-leasing activities does not excuse the failure to comply with the statutory requirement of a comprehensive biological opinion using the best information available," and it noted that FWS could have completed more analysis with the information that was available. *Id.* at 1454 (emphasis added). The Ninth Circuit stated:

> In light of the ESA requirement that the agencies use the best scientific and commercial data available ... the FWS cannot ignore available biological info or fail to develop projections of oil and gas activities which may indicate potential conflicts between development and the preservation of protected species. We hold that the FWS violated the ESA by failing to use the best information available to prepare comprehensive biological opinions.

848 F.2d at 1454 (emphasis added).

(2) *Environmental Baseline.*

33. Plaintiffs argue that the BiOp is flawed because NMFS improperly attributed negative effects to the Project that should have been included in the environmental baseline. Doc. 164 at 10–16.

***1161** 34. The relevant regulatory definition of the "environmental baseline" is provided within the definition of the "effects of the action":

> the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added

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> to the environmental baseline. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

50 C.F.R. § 402.02.

35. When determining the "effects of the action," the agency first must evaluate the status of the species or critical habitat, which will involve "consideration of the present environment" in which the species or habitat exists as well as "the environment that will exist when the action is completed, in terms of the totality of factors affecting the species or critical habitat." 51 Fed. Reg. 19,926, 19,932 (June 3, 1986). This evaluation is to serve as the "baseline" for determining the effects of the action on the species or critical habitat. *Id.* However, it is all evaluated together as the "effects of the action."

[29] 36. If additional data would provide a better information base from which to formulate a biological opinion, the Director may request an extension of formal consultation and that the action agency obtain additional data to determine how or to what extent the action may affect listed species or critical habitat. 50 C.F.R. § 402.14(f); U.S. Fish and Wildlife Service and National Marine Fisheries Service, Endangered Species Consultation Handbook (March 1998) at 4–6.[FN13]

> FN13. Judicial notice may be taken of this Handbook, which is available at: http://www. fws. gov/ endangered/ consultations/ s 7 hndbk/ s 7 hndbk. htm.

37. The Ninth Circuit directed NMFS to consider the effects of its actions "within the context of other existing human activities that impact the listed species." *NWF v. NMFS II*, 524 F.3d at 930. "[T]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and future human and natural contexts." *Id.* The relevant jeopardy analysis is whether this Project will tip a species into a state of "likely extinction." 524 F.3d at 930.

> Even under the so-called aggregation approach NMFS challenges, then, an agency only "jeopardize[s]" a species if it causes some new jeopardy. An agency may still take action that removes a species from jeopardy entirely, or that lessens the degree of jeopardy. However, an agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm. Our approach does not require NMFS to include the entire environmental baseline in the "agency action" subject to review. It simply requires that NMFS appropriately consider the effects of its actions "within the context of other existing human activities that impact the listed species." [citation]. ***1162** This approach is consistent with our instruction (which NMFS does not challenge) that "[t]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and future human and natural contexts." [citation].

Id. (footnote omitted).

[30] 38. The agency is not required to quantify and/or parcel out the "proportional share" of harms among the baseline and the proposed action. *See Pacific Coast Fed'n of Fishermen's Ass'ns v. U.S. Bureau of Reclamation*, 426 F.3d 1082, 1093 (9th Cir.2005); *see also Pacific Coast Fed'n of Fishermen's Ass'ns v. U.S. Bureau of Reclamation*, 226 Fed.Appx. 715, 718 (9th Cir.2007) (rejecting water users' argument that agency action must be the "historical cause" of the jeopardy to salmon). However, the record must reasonably demonstrate that the agency's proposed actions, when viewed in the present and future human and natural contexts, will cause jeopardy or adverse modification.[FN14]

> FN14. Plaintiffs' motion for preliminary injunction specifically addresses the treatment of hatcheries and gravel loss below Whiskeytown Dam. Doc. 164 at 11–12. However,

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this issue was not presented or discussed at the evidentiary hearing or in Plaintiffs' proposed findings. It appears that these specific arguments have been abandoned.

39. Here, Plaintiffs identify only two potential flaws in the environmental baseline in their Proposed Findings of Fact and Conclusions of Law, namely NMFS's general failure to segregate discretionary from non-discretionary actions, Doc. 316, Pltf's Proposed Findings of Fact 65–66, 80, and, more specifically, NMFS's failure to treat certain obligations arising under the Coordinated Operations Agreement ("COA") as "mandatory," *id.* at Proposed Findings of Fact 67–80.[FN15]

FN15. It is unclear whether Plaintiffs contend that all other stressors now jeopardizing the San Joaquin and Sacramento Rivers and the Delta are part of the Baseline and must not be considered cumulatively with the effects of coordinated Project operations.

a. *Treatment of Discretionary v. Non–Discretionary Operations.*

[31] 40. Plaintiffs complain that the BiOp does not distinguish between discretionary and non-discretionary actions. *Home Builders,* 551 U.S. 644, 127 S.Ct. 2518, held that ESA 7's consultation requirements do not apply to non-discretionary actions. Where an agency is *required* by law to perform an action, it lacks the power to insure that the action will not jeopardize the species. *Id.* at 667, 127 S.Ct. 2518.

41. However, *Home Builders says nothing about whether, once section 7 consultation is triggered, the jeopardy analysis should segregate discretionary and non-discretionary actions, relegating the non-discretionary actions to the environmental baseline. Home Builders* fundamentally concerns whether the section 7 consultation obligation attaches to a particular agency action at all. *See Home Builders,* 551 U.S. at 679–80, 127 S.Ct. 2518 ("duty does *not attach* to actions ... that an agency is required by statute to undertake....") (emphasis added).

b. *Reclamation's Treatment of the Coordinated Operations Agreement.*

The same reasoning applies to Plaintiffs' related argument that Federal Defendants acted unlawfully by attributing to the project the effects of "mandatory" compliance with the Coordinated Operations Agreement ("COA"). Even assuming, *arguendo,* ***1163** that any mandatory obligation exists under the COA, a proposition that is questionable given the open-ended wording of the COA and language in the CVPIA subjecting project operations to the ESA, *Home Builders* does not require the agency to segregate discretionary from non-discretionary activities during an ESA § 7 consultation.[FN16] Moreover, this argument was not presented in Plaintiffs' opening brief. *See Alaska Ctr. for Envt. v. U.S. Forest Serv.,* 189 F.3d 851, 858 n. 4 (9th Cir.1999) ("Arguments not raised in opening brief are waived").

FN16. To the extent that Plaintiffs suggest that section 7 does not apply to the projects at all under *Home Builders,* this paradigm-shifting argument has not properly been raised or briefed.

(3) *Southern Resident Indirect Effects Analysis.*

[32] 42. Plaintiffs raise another argument based on an alleged error in the effects analysis pertaining to the impacts of the projects on Southern Resident Killer whales. Doc. 164 at 16–19. While the parties briefed the issue, engaging in considerable debate over both the appropriate standard to be applied to indirect effects analyses and the sufficiency of the evidence cited in the record to support NMFS's conclusions, this issue was not a focus of the evidentiary hearing.

43. It is unnecessary to reach this issue because, even if, *arguendo,* Plaintiffs demonstrated a likelihood of success on this claim, the alleged deficiencies in the BiOp's analysis of impacts to orcas do not justify enjoining either RPA Action IV.2.1 or IV.2.3. An injunction must be "narrowly tailored" to give only the relief to which plaintiffs are entitled. *See Orantes–Hernandez v. Thornburgh,* 919 F.2d 549, 558 (9th Cir.1990). Here, NMFS adopted Actions IV.2.1 and IV.2.3 primarily for the benefit of salmon, steelhead, and green sturgeon that migrate through the Delta and are harmed by export pumping that interferes with their migrations, not orcas which reside in the ocean. *See* 4/1/10 Tr. 184:4–17 (Action IV.2.3 was not designed with the objective to protect orcas or fall-run Chinook salmon). The indirect effect of alleged reductions of orca prey is not mentioned as a direct justification for either challenged RPA.

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(4) *Challenges to Action IV.2.1.*

a. *Viable Salmonid Population Methodology/ Population Modeling/ Life Cycle Analysis.*

[33] 44. Plaintiffs' argument that NMFS failed to apply the VSP methodology in a sufficiently rigorous manner is unpersuasive. The BiOp did not ignore the VSP methodology. Rather, it chose to use VSP in a qualitative manner as a conceptual framework, as recommended by Lindley (2006). Although the analysis in the BiOp may have benefited from the application of quantitative VSP methodologies, it is disputed whether the failure to do so represents a breach of accepted scientific practice. A court must defer to the agency in such scientific disputes.

45. The agency is not required to generate new studies. For example, in *Southwest Center for Biological Diversity v. Babbitt,* 215 F.3d 58, 60–61 (D.C.Cir.2000), the district court found the available evidence regarding FWS's decision not to list the Queen Charlotte goshawks "inconclusive" and held that the agency was obligated to find better data on the species' abundance. The D.C. Circuit reversed, emphasizing that, although "the district court's view has a superficial appeal ... this superficial appeal cannot circumvent the statute's clear wording: The secretary must make his decision as to whether to list a species as threatened or endangered ***1164** 'solely on the basis of the best scientific and commercial data available to him....' 16 U.S.C. § 1533(b)(1)(A)." *Id.* at 61. Requiring NMFS to adapt the VSP methodology to operate as a quantitative model would be the equivalent of requiring NMFS to generate data. The court has no authority to do so.

[34] 46. The same conclusion is required for Plaintiffs' contention that NMFS should have engaged in population modeling and/or life cycle analysis. Although such modeling is scientifically preferred, Plaintiffs presented no evidence that they, or anyone else, presented NMFS with *then-existing* best available science representing appropriate population or life cycle models for the species of concern prior to the issuance of the BiOp. Moreover, the primary purpose of Action IV.2.1 is to protect outmigrating juvenile members of the SSNDG of CV steelhead, for whom no population indices (whether absolute or relative) are available.

b. *Correlation Between Exports and Effects on Salmonid Survival.*

47. NFMS relied on a number of circumstances to support its general conclusion that salmonid survival in the interior Delta was adversely affected by export pumping.

a. The VAMP data demonstrated some observable negative impacts, but no statistically significant connection, albeit the lack of statistical significance was likely due to limitations in the data.

b. Figure 10 of Appendix 5 supports the conclusion that, at least when HORB is in place, there is an observable (but not statistically significant) negative relationship between survival and exports. Questions exist whether it is appropriate to rely on data collected when HORB was in place, given that HORB cannot be used under the Smelt BiOp. However, NMFS presented evidence that a workable substitute (the bubble barrier) for HORB will be utilized. Plaintiffs have not suggested the barrier would be inadequate.

c. Highly questionable support for the BiOp's conclusion that exports negatively influence survival derives from a comparison of exports and adult escapement two and a half years later, from 1951 through 2003. *See* BiOp App. 5 at Figure 11. All parties agreed that adult escapement can be significantly influenced by factors such as ocean conditions and harvest. It is undisputed that Figure 11 did not adjust for these factors. However, NMFS relied on a conceptual model that suggests because ocean conditions and harvest were likely to fluctuate over time, long-term downward trends in population could be caused by declining freshwater conditions.

d. NMFS also relied extensively on Newman's 2008 analysis of the Delta Action 8 studies, which released coded-wire tagged salmon into Georgiana Slough and compared their survival to coded-wire tagged salmon released into the mainstem Sacramento River. Newman found a statistically significant, although weak, negative relationship between exports and salmonid survival.

e. There is no question that the remaining data connecting exports to reduced salmonid survival is not what NMFS represents it to be. Recognizing that "[w]hen specialists express conflicting views, an agency must have discretion to rely on the *rea-*

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sonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive," *Lands Council,* 537 F.3d at 1000 (quoting *Marsh,* 490 U.S. 360, 109 S.Ct. 1851) (emphasis added), deference is not required "where the agency offers an explanation for an action that runs counter ***1165** to the evidence before the agency," *Tucson Herpetological Society,* 566 F.3d at 878. NMFS did not just rely on "ambiguous studies." Rather, it uncritically examined the body of evidence, sometimes disregarding the express qualifications and reservations of independent studies, to reach the conclusion that the exports negatively impact salmonid survival. This conclusion, although not scientifically unassailable, has marginal support in the record.

48. NMFS's opinion that low Vernalis flow to export ratios threaten to appreciably increase the likelihood that the SSNDG of CV steelhead will become extinct is also based on incomplete and conflicting evidence. Although no absolute or relative population numbers are available for either the SSNDG or the entire ESU, it is undisputed that both are small and imperiled. It is also undisputed that, pursuant to the VSP approach, every extant population of the CV steelhead must be protected. All members of the SSNDG must pass through the interior Delta on their way to the ocean. As exports increase, their chances of survival decrease. On the whole, the record corroborates NMFS's conclusion that planned project operations will jeopardize the CV steelhead.[FN17]

FN17. It is not necessary to now examine whether NMFS was justified in concluding that planned project operations during this time period will jeopardize any of the other Listed Species. Action IV.2.1 is designed primarily to aid CV steelhead.

49. Other adverse impacts from toxics, invasive species, predators, in-Delta pumping, and other nonoperational hazards were not compared with Project operations to determine the extent these other stressors contribute to the jeopardy to the species and their habitat.

c. *Did NMFS Adequately Justify the Ratios Imposed?*

[35] 50. The fundamental flaw in NMFS's justification of Action IV.2.1 is its selection of the specific ratios imposed under the Action. As discussed in the Findings of Fact, the record reveals no *biological* explanation why NMFS chose to impose a 1,500 cfs limit on exports when flows at Vernalis are lower than 6,000 cfs,[FN18] and a ratio of 4:1, as opposed to any other ratio, when Vernalis flows are between 6,000 cfs and 21,750 cfs. *Id.* at 71–72.

FN18. This 1,500 cfs limit is the minimum export level NMFS found necessary to maintain health and safety criteria. BiOp App. 5 at 22. At flows of 5,000 cfs, for example, the ratio would be 5,000/1,500 or approximately 3.33:1.

[36] 51. This is a quintessential example of arbitrary action. There is no way to know whether these levels are sufficiently protective, not protective enough, or far more protective than necessary.[FN19] Particularly in light of the enormous human impacts caused by even small changes in the flow regime reducing exports, the agency must provide a reasoned and scientifically justified basis for selecting the specific remedial measures chosen. They have failed to do so.

FN19. It may be scientifically justifiable to build a margin of error (i.e. to take a precautionary approach) when designing an RPA, but this must be properly justified and disclosed by the record.

52. This conclusion is particularly justified in light of the concurrent NEPA violation. Had either NMFS or Reclamation performed a proper NEPA evaluation of the human and environmental impacts of the RPA Actions before implementing them, or if both NMFS and Reclamation had worked together to do so, this would have at least forced the agencies to fully ***1166** consider and rationally balance the biological need for certain flow levels against the adverse water supply and resulting human impacts those restrictions effectuate.

53. There is insufficient record evidence to conclude what alternative flow/export ratio would be sufficiently protective of the SSNDG of CV steelhead, the population Action IV.2.1 was designed to protect. NMFS's scientifically justified conclusion that a low Vernalis flow to export ratio during the spring threatens to jeopardize CV steelhead makes it inappropriate to completely remove any Vernalis

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flow to export ratio restriction. Plaintiffs offered no scientifically justifiable alternative except the unjustified argument there is no jeopardy caused by project operations and no evidence of peril to the species.

(5) *Challenges to Action IV. 2.3.*

54. Action IV.2.3 operates from January 1 through June 15 or until the average daily water temperature at Mossdale is greater than 72° F, whichever is earlier. It limits OMR flows to no more negative than -2,500 to -5,000 cfs, depending on juvenile entrainment levels. BiOp at 648–52.

55. Plaintiffs and DWR only seek an injunction against the -5,000 cfs "calendar-based" ceiling.

a. *Use of PTM for salmonids.*

56. Although the PTM model, a hydrodynamic simulation used to assess the fait of particles as a function of flow, tides, project operations, and other factors, has shortcomings, it is an indicator of directions of river flows that salmonids follow, recognizing their strong swimming ability. NMFS relied on the PTM studies to support its conclusions that: (a) as exports increase, negative OMR flows also increase; and (b) that at Station 815 (the confluence of the Mokelumne River and the San Joaquin River), *particle entrainment* increases as negative OMR flows increase. Above -5,000 cfs, 40% of particles injected at that station are entrained, while 90% are entrained at -7,000 cfs.

57. Although particles decidedly do not mirror the behavior of salmonid smolts, which move approximately 3.5 times faster, they provide a very rough approximation of salmonid behavior, one ground supporting NMFS's utilization of the PTM as part of its overall rationale for Action IV.2.1.

b. *Salvage Data.*

58. NMFS also relied on salvage data, which demonstrated that, as negative OMR flows increases, salvage increases, and that at some point more negative than - 5,000 cfs, salvage increases much more rapidly than at lower levels.

59. The data utilized does not scale salvage to population size, an undisputed failure to use the best available scientific methods, at least with respect to the winter-run and spring-run, for which population data is available. Dr. Deriso opined that scaling salvage to population size is standard accepted practice in the field of fisheries science. Even from a lay perspective, it is obvious that absolute salvage numbers vary depending on the size of the extant population. NMFS's reliance on comparisons of raw salvage numbers to negative OMR flow was clear scientific error and not the best available science.

60. Action IV.2.3 is also designed to protect CV steelhead, for which no population data is available. It is less certain whether NMFS could legitimately apply comparisons of raw salvage data to OMR flows to assess the impact of negative OMR flows on CV steelhead.

c. *Delta Action 8 Studies.*

61. As with Action IV.2.1, NMFS also relied extensively on Newman's 2008 analysis of the Delta Action 8 studies, which released coded-wire tagged salmon into Georgiana Slough. Newman found a statistically***1167** significant, although "weak," negative relationship between exports and salmonid survival.

62. There are additional concerns that, as to upper Sacramento River populations, NMFS failed to consider the relative number of fish that are exposed to conditions in the interior Delta, compared to those that remain in the mainstem of the Sacramento River. This critique is not relevant to NMFS's application of the Delta Action 8 Studies to those populations of CV steelhead and spring-run that originate in the San Joaquin basin. For those populations, the Delta Action 8 studies support the conclusion that the higher the export levels, the lower the chance a salmonid smolt may survive to reach the ocean.

d. *Perry & Skalski and Vogel.*

[37] 63. Perry and Skalski (2008) concluded that survival of fish moving into Georgiana Slough and nearby channels was reduced compared to those in the mainstem of the Sacramento River. 4/1/10 Tr. 161:20–162:1. However, Perry and Skalski observed that "there is limited understanding of how water management actions in the Delta affect population distribution and route-specific survival of juvenile salmon." SDLMWA Ex. 227 at 3. Mr. Stuart admitted that Perry and Skalski 2008 did not address water project impacts on Delta hydrology, fish behavior, or the indirect mortality of fish in the central and southern channels of the Delta. Mr. Stuart further admitted

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that he reached his conclusions regarding water project impacts on Delta hydrology, fish behavior, and indirect salmonid mortality based upon his personal extrapolation from the data contained in Perry and Skalski 2008, and not from any conclusions reached by the study. 4/2/10 Tr. 19:2–21:24. The BiOp and Stuart used Perry and Skalski (2008) to support a proposition that Perry and Skalski themselves disclaimed. The BiOp provides no explanation to justify this use of Perry and Skalski for this purpose, which is arbitrary and capricious.

64. A similar problem exists with the BiOp's reliance on the Vogel (2004) review of telemetry-tagging data to investigate fish route selection in the channels leading to the south Delta. *See* BiOp at 380–81. The BiOp used Vogel's work to find that when export levels were reduced and San Joaquin River flows were increased, more fish stayed in the main channel of the San Joaquin River, heading downstream toward the San Francisco Bay. *Id.* However, the Vogel study concluded its experiments "could not explain *why* some fish move off the mainstem of the San Joaquin River into the south Delta channels," noting that "[d]ue to the wide variation in hydrologic conditions" during the course of the experiments, "it was difficult to determine the principal factors affecting fish migration. Based on the limited data from these studies, it may be that a combination of a neap tide, reduced exports, and increased San Joaquin River flows is beneficial for outmigrating smolts, but more research is necessary." DWR Ex. 505 at 37 (emphasis added).

65. The BiOp's reliance on the Perry and Skalski and Vogel studies presents the same infirmities as in *Tucson Herpetological Society,* 566 F.3d at 879, where the FWS wrongfully "affirmatively relie[d] on ambiguous studies."

e. *Does the Record Support NMFS's General Conclusion that Negative OMR Flows Appreciably Reduce Salmonid Smolts' Chances of Survival?*

[38] 66. There are undeniable problems with NMFS's basis for Action IV.2.3. However, the Delta Action 8 studies support the proposition that, for those populations spawning entirely within the San Joaquin basin, increasing exports negatively impact salmonid smolt survival. The highly disputed PTM studies constitute the ***1168** other colorable support for Action IV.2.3. In such a scientific dispute, deference is owed unless the Agency is unreasonably wrong.

f. *Did NMFS Adequately Justify the Calendar-based -5,000 cfs Ceiling of Action IV.2.3?*

67. The -5,000 cfs OMR ceiling is based, in large measure, on speculation. It is also based upon BiOp Figures that do not scale salvage to population size. This is not the best available science and is arbitrary and capricious.

(6) *Reclamation's ESA Responsibility.*

68. The ESA regulations require the action agency to 123 "determine whether and in what manner to proceed with the action in light of its section 7 obligations and the Service's biological opinion." 50 C.F.R. § 402.15(a). Prior to accepting and implementing the 2009 Salmonid BiOp RPA, Reclamation had an independent obligation under ESA section 7(a)(2) to ensure that it "use[d] the best scientific and commercial data available."

[39] 69. Reclamation, as the federal action agency, "may not rely solely on a FWS biological opinion to establish conclusively its compliance with its substantive obligations under section 7(a)(2)." *Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of the Navy,* 898 F.2d 1410, 1415 (9th Cir.1990). "[T]he action agency must not blindly adopt the conclusions of the consultant agency." *City of Tacoma v. Fed. Energy Regulatory Comm'n,* 460 F.3d 53, 76 (D.C.Cir.2006).

70. Reclamation did not ensure that the RPA utilized the best available science, nor did it independently identify and analyze alternative RPA Actions that minimized jeopardy to humans and the human environment while protecting threatened species.

D. *Balancing of the Harms.*

(1) *Balancing of the Harms in ESA Cases.*

[40] 71. The Supreme Court held in *TVA v. Hill,* 437 U.S. 153, 194, 98 S.Ct. 2279, 57 L.Ed.2d 117 (1978), that Congress struck the balance in favor of affording endangered species the highest of priorities. In adopting the ESA, Congress intended to "halt and reverse the trend toward species' extinction, *whatever*

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the cost." *Id.* at 184, 98 S.Ct. 2279 (emphasis added). *TVA v. Hill* continues to be viable. *See Home Builders,* 551 U.S. at 669–71, 127 S.Ct. 2518; *see also Oakland Cannabis Buyers' Co-op.,* 532 U.S. at 496–97, 121 S.Ct. 1711; *Amoco Prod. Co. v. Village of Gambell,* 480 U.S. 531, 543 n. 9, 107 S.Ct. 1396, 94 L.Ed.2d 542 (1987).

72. Winter does not modify or discuss the *TVA v. Hill* standard.[FN20] Although Winter altered the Ninth Circuit's general preliminary injunctive relief standard by making that standard *more rigorous,* Winter did not address, nor change, the approach to the balancing of economic hardships where endangered species and their critical habitat are jeopardized. *See Biodiversity Legal Found. v. Badgley,* 309 F.3d 1166, 1169 (9th Cir.2002) (Congress removed the courts' traditional equitable discretion to balance parties' competing interests in ESA injunction proceedings); *Nat'l Wildlife Fed'n v. Burlington N. R.R., Inc.,* 23 F.3d 1508, 1510–11 (9th Cir.1994) (same).

FN20. Although *Winter* involved ESA-listed species, the *Winter* decision did not address any ESA claims.

73. Prior decisions involving the coordinated projects' operations found that ***1169** *TVA v. Hill* and related Ninth Circuit authorities foreclose the district court's traditional discretion to balance equities under the ESA. There is no such bar in NEPA injunction proceedings.

74. Plaintiffs have advanced a human health and safety exception and contend that unlike any of the prior cases, this case juxtaposes species' survival against human welfare, requiring a balancing of the BiOp's threats of harm to humans, health, safety and protection of affected communities. No case, including *TVA v. Hill,* which concerned the competing economic interest in the operation of a hydro-electric project, expressly addresses whether the ESA precludes balancing of harms to humans and the human environment under the circumstances presented here.

75. Even if it is permissible to balance harm to humans and the human environment against Congress' stated desire to protect the Listed Species, doing so in practice is complicated by the harm caused to other human communities by the reduced abundance of salmonids, such as to the salmon fishing industry and the Winnemem Wintu Tribe.

76. This case is at the intersection of harm to threatened species and humans and their environment. Congress has not nor does *TVA v. Hill* elevate species protection over the health and safety of humans.

(2) *Balancing the Harms under NEPA.*

[41] 77. Although it is undisputed that all harms may be considered in evaluating a claim for injunctive relief under NEPA, an injunction should not issue if enjoining such government action would result in more harm to the environment than denying injunctive relief. *Save Our Ecosystems,* 747 F.2d at 1250.

78. Here, it appears that interim relief is justified, if deepening of the species' jeopardy can be avoided.

E. *The Public Interest.*

79. In adopting the ESA, Congress explicitly found that all threatened and endangered species "are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." 16 U.S.C. § 1531(a)(3). The ESA advances a Congressional policy to "halt and reverse the trend toward species extinction, whatever the cost." *TVA v. Hill,* 437 U.S. at 184, 98 S.Ct. 2279 (emphasis added).

80. The public policy underlying NEPA favors protecting the balance between humans and the environment. *See* 42 U.S.C. § 4321 (declaring a national policy to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; [and] to enrich the understanding of the ecological systems and natural resources important to the Nation....").

81. If both these objectives can all be realized by astute management, it is the government's obligation to do so.

82. It is in the public interest that relief be granted to Plaintiffs, who represent a substantial population of water users in California, to enhance the water supply to reduce the adverse harms of de-

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struction of permanent crops; fallowed lands; increased groundwater consumption; land subsidence; reduction of air quality; destruction of family and entity farming businesses; and social disruption and dislocation, such as increased property crimes and intra-family crimes of violence, adverse effects on schools, and increased unemployment leading to hunger and homelessness. This must be done without jeopardizing the species and their critical habitat.

***1170** VII. *CONCLUSION*

1. Plaintiffs have succeeded on the merits of their NEPA claim.

a. NEPA requires that the responsible agency take a hard look at the environmental consequences of its actions, *Robertson v. Methow Valley Citizens Council,* 490 U.S. 332, 350, 109 S.Ct. 1835, 104 L.Ed.2d 351 (1989), obligating federal agencies to prepare an environmental impact statement ("EIS") for all "major federal actions significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C).

b. Federal Defendants are required to evaluate the impact of the coordinated operations of the CVP and SWP, which constitutes major federal action. The evidence overwhelmingly establishes significant detrimental effects visited on the quality of the human environment by implementation of the BiOp's RPA Actions, which impose virtually year-round substantial restrictions on the water supply to California to protect the Listed Species.

c. Where required, an EIS discloses environmental affects of a proposed action and considers alternative courses of action. *Id.* Here, Federal Defendants completely abdicated their responsibility to consider alternative remedies in formulating RPA Actions that would not only protect the species, but would also minimize the adverse impact on humans and the human environment.

d. In considering RPA alternatives, the record shows the burden of other causes is allocated to the water supply, without the required analysis whether alternatives, less harmful to humans and the human environment, exist.

2. Plaintiffs have also shown a likelihood of success on the merits of their ESA claim. Although the premise underlying the RPA Actions—that the species may be jeopardized by increased negative flows occasioned by export pumping—has some record support, NMFS has failed to adequately justify by generally recognized scientific principles the precise flow prescriptions imposed by RPA Actions IV.2.1 and IV.2.3. The exact restrictions imposed, which are inflicting material harm to humans and the human environment, are not supported by the record. Rather, they are product of guesstimations and attempts to try to achieve "equity," rendering it impossible to determine whether the RPA Actions are adequately protective, too protective, or not protective enough. Judicial deference is not owed to such arbitrary, capricious, and scientifically unreasonable agency action.

3. It is highly significant that the co-operator of the Projects, DWR, with access to scientific competence in the fields of fish biology and ecology, and project operations, strongly criticizes some of the science NMFS used to justify RPA Action IV.2.3, seeks to enjoin Action IV.2.3, and does not oppose enjoining Action IV.2.1

4. Under the balance of hardships analysis, Defendants' contention that the ESA, under *TVA v. Hill,* precludes equitable weighing of Plaintiffs' interests is not supported by that case, as evidence of harm to the human environment in the form of social dislocation, unemployment, and other threats to human welfare were not present in *Hill.* They are in this case.

5. Defendants argue that jeopardy to the species cannot be avoided without continuing substantial reduction of pumping, with resultant reduction of water supply to Plaintiffs, representing over 20,000,000 persons, affected communities, and the agricultural industry in Northern, Central, and Southern California. Harm to the species has had equally detrimental effects on the Pacific Coast salmon fishing industry and impairs the interests of Native ***1171** Americans. These additional harms are deserving of equal protection.

6. Congress created public expectations in the Amended Reclamation Act by instructing Reclamation to contract for water service to hundreds of public-entity water service providers that supply water to millions of people and thousands of acres of productive agricultural land. The agencies have not fully discharged their responsibility to effectively allocate

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Project water resources. Federal Defendants have acted arbitrarily and capriciously in formulating RPA Actions to protect threatened species under the ESA that lack factual and scientific justification, while effectively ignoring the irreparable harm those RPA Actions have inflicted on humans and the human environment.

7. The species and their critical habitats are entitled to protection under the ESA. The species have been and will be protected. That is the law. Nonetheless, NMFS and Reclamation, as the consulting and action agencies, must take the hard look under NEPA at the draconian consequences visited upon Plaintiffs, the water supply of California, the agricultural industry, and the residents and communities devastated by the water supply limitations imposed by the RPA Actions. Federal Defendants have failed to comprehensively and competently evaluate whether RPA alternatives can be prescribed that will be mutually protective of all the statutory purposes of the Projects.

8. This is a case of first impression. The stakes are high, the harms to the affected human communities great, and the injuries unacceptable if they can be mitigated. NMFS and Reclamation have not complied with NEPA. This prevented in-depth analysis of the potential RPA Actions through a properly focused study to identify and select alternative remedial measures that minimize jeopardy to affected humans and their communities, as well as protecting the threatened species. No party has suggested that humans and their environment are less deserving of protection than the species. Until Defendant Agencies have complied with the law, some injunctive relief pending NEPA compliance is appropriate, so long as it will not further jeopardize the species or their habitat.

9. Injunctive relief is also warranted under the ESA, because, although the general premises underlying Actions IV.2.1 and IV.2.3 find marginal support in the record, the precise flow prescriptions imposed on coordinated project operations as part of Action IV.2.1's Vernalis flow/export ratio and Action IV.2.3's -5,000 cfs "calendar based" ceiling are not supported by the best available science and are not explained as the law requires.

10. Injunctive relief cannot be imposed without up-to-date evidence of the status of the species to assure that altered operations will not deepen jeopardy to the affected species or otherwise violate other laws. The evidence has not sufficiently focused on remedies to provide a confidence level that completely removing the Vernalis flow to export ratio prescriptions of Action IV.2.1 or permitting negative flows in excess of the -5,000 cfs OMR flow ceiling imposed by Action IV.2.3 to increase water supply will not jeopardize the continued existence of the species and/or adversely modify their critical habitats.

11. Legal and equitable grounds for injunctive relief have otherwise been established by a preponderance of the evidence.

12. A hearing to address the proposed injunction and any imminence of harm to species shall be held May 19, 2010 in Courtroom 3 at 10:00 a.m.

SO ORDERED.

***1172** SUPPLEMENTAL FINDINGS OF FACT AND CONCLUSIONS OF LAW RE: PLAINTIFFS' REQUEST FOR PRELIMINARY INJUNCTION (SUPPLEMENTING DOC. 347)

I. *INTRODUCTION*

On May 18, 2010, the Court issued findings of fact and conclusions of law concerning motions for interim relief/ preliminary injunction. Findings of Fact and Conclusions of Law re: Plaintiffs' Request for Preliminary Injunction (Docs. 161 & 230), Doc. 347 ("Findings & Conclusions"). The motions were brought by Plaintiffs San Luis & Delta–Mendota Water Authority and Westlands Water District (collectively "San Luis Plaintiffs"). Docs. 164, 230, 233. Plaintiffs State Water Contractors, Stockton East Water District, Oakdale Irrigation District, and South San Joaquin Irrigation District; and Plaintiff–Intervenor California Department of Water Resources ("DWR") filed statements of non-opposition regarding San Luis Plaintiffs' request to enjoin Action IV.2.1. Docs. 247, 248, 251. The motion regarding Action IV.2.3 was joined by plaintiffs Kern County Water Agency and Coalition for a Sustainable Delta. Doc. 181. DWR filed a partial joinder in and statement of non-opposition to the Action IV.2.3 motion. Doc. 249.

The Findings and Conclusions explained that the

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requested relief could not be ordered without further evidence to establish that the requested relief would not violate section 7 of the federal Endangered Species Act ("ESA"). Specifically, "[i]njunctive relief cannot be imposed without up-to-date evidence of the status of the species to assure that altered operations will not deepen jeopardy to the affected species or otherwise violate other laws." Findings & Conclusions 134:4–7. A hearing to address the proposed injunction and any imminence of harm to the species was scheduled for May 19, 2010. Findings & Conclusions 134:21–23. After hearing argument from the parties on May 19, further proceedings were scheduled for May 25, 2010. 5/19/10 Rough Tr. 39:16–19.

Plaintiffs filed the declarations of Terry Erlewine (Doc. 356) and Bradley Cavallo (Doc. 358), and exhibits thereto. Federal Defendants filed the declarations of Jeffrey Stuart and exhibits thereto (Doc. 364) and Ronald Milligan (Doc. 366), and a partial joinder in Defendant–Intervenors' supplemental opposition (Doc. 369). Defendant–Intervenors filed a supplemental memorandum in opposition to Plaintiffs' motions for preliminary Injunction (Doc. 365), and a related request for judicial notice (Doc. 368) and supporting declaration (Doc. 368–2). At the May 25, 2010 hearing, the parties presented evidence concerning the status of the species

The original Findings and Conclusions are incorporated by this reference. After considering additional testimony, exhibits received in evidence, the parties' additional submissions, and oral arguments, the Court makes these supplemental findings of fact and conclusions of law.

To the extent any finding of fact may be interpreted as a conclusion of law or any conclusion of law may be interpreted as a finding of fact, it is so intended.

II. *FINDINGS OF FACT*

A. *Limited Time Period.*

1. Under the National Marine Fisheries Service's ("NMFS") June 4, 2009 Biological Opinion ("BiOp" or "Salmonid BiOp"), the pumping restrictions associated with Action IV.2.1 terminate May 31. BiOp at 641–42. The proposed injunction would enjoin the implementation of Action IV.2.1 from May 26 to May 31, 2010 only.

2. Under the BiOp, the pumping restrictions associated with Action IV.2.3 terminate on June 15 or when the average ***1173** daily water temperature at Mossdale is greater than 72° Fahrenheit for seven consecutive days, whichever is sooner. BiOp at 650.

3. Given the time limit in the BiOp, the proposed injunction against Action IV.2.3 will be in effect at most from May 26 to June 15, 2010. The requested injunction includes a three day "ramping-up" period, during which time exports will be gradually increased. 5/25/10 Rough Tr. 207:25–208:8.

B. *Current Status Of The Species.*

4. The parties agreed at the May 25 hearing that only the

current status of the Central Valley spring-run Chinook salmon ("spring-run") and Central Valley steelhead ("CV steelhead") are relevant to the requested relief.[FN1] 5/25/10 Rough Tr. 20:1–21:9; 37:13–38:5; 5/25/10 Rough Tr. 139:22–25. These findings focus on these two species.

FN1. Defendant–Intervenors advance an argument about fall-run Chinook salmon, which are not a listed species.

(1) *Central Valley Spring–Run Chinook Salmon (O. tshawytscha).*

5. NMFS listed the spring-run as a "threatened" species under the ESA on January 5, 2006. 71 Fed. Reg. 834 (Jan. 5, 2006). NMFS designated critical habitat for the spring-run on September 2, 2005. 70 Fed. Reg. 52,604 (Sept. 2, 2005).

6. The current population figure for spring-run returning in 2009 is 3,802 fish. Gov't Salmon Exh. 102 at internal Exhibit 7. This is a decrease from 10,828 returning spring-run adults in 2006, the last time this cohort spawned in the Central Valley. *Id.*; *id.*, ¶ 10.

7. Mr. Stuart testified that based on the historical salvage data, the majority of spring-run emigrate through the Delta in April, with emigration tailing off into May and early June. 5/25/10 Rough Tr. 108:9–16.

8. Mr. Cavallo estimated that 90 percent of the

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mixed pool of spring-run and fall-run Chinook young-of-the-year will exit the Delta by May 25, 2010. 5/25/10 Rough Tr. 23:21–24:1; DWR Ex. 519 at ¶ 7. Mr. Stuart testified that typically 98 percent of the spring-run have passed through the Delta by the end of May. Gov't Salmon Ex. 102 at ¶ 12. This means between 90 to 98 percent of spring-run are not within the influence or affect of the remedy sought by Plaintiffs. 5/25/10 Rough Tr. 207:21–24.

9. The total direct seasonal loss of spring-run size Chinook salmon at the export facilities as of May 17, 2010, was 4,419 fish. Gov't Salmon Ex. 102 at 112. Mr. Stuart testified that the Salmonid BiOp does not use spring-run sized Chinook salmon as a metric to determine the ESA take limit. 5/25/10 Rough Tr. 150:18–20. This is because spring-run Chinook are not reliably distinguishable from fall-run Chinook using a length at date criteria. 5/25/10 Rough Tr. 21:17–22. Instead, the one percent incidental take limit for spring-run Chinook uses hatchery late-fall Chinook salmon as surrogates for the yearling spring-run. 5/25/10 Rough Tr. 150:6–10.

10. Mr. Stuart testified that if the proposed preliminary injunction were issued, he did not anticipate that the incidental take limit for yearling spring-run Chinook would be exceeded. 5/25/10 Rough Tr. 161:10–14. However, the purpose of the incidental take limit is to identify a point at which reinitiation of consultation should occur. 3/31/10 Tr. 113:20–22. It is not the default level at which the facilities should be operated. If the RPA works as designed,***1174** the incidental take limit should never be reached. *Id.* at 113:25–114:7, 133:15–24. Mr. Stuart's testified that the low number of steelhead taken at the pumps is evidence that the RPA is "functioning" as it was "designed." *Id.,* 126: 12–20.

11. Because spring-run and fall-run Chinook are "indistinguishable when captured in the Delta or its salvage facilities," the breakdown between spring-run and fall-run within the 4,419 fish figure is unknown. 5/25/10 Rough Tr. 24:2–11, 31:5–18; *see* 5/25/10 Rough Tr. 147:20–23. Mr. Cavallo opined that it is "reasonable to assume ... that most of those fish [4,419 salvage] are, in fact, fall-run." 5/25/10 Rough Tr. 31:5–18.

12. In the BiOp, NMFS stated that "for Chinook salmon, the losses are probably overestimated due to the inability to identify individuals to race (e.g., most Chinook salmon reported to be within the spring-run size category are actually fallrun)." BiOp at 776; 5/25/10 Rough Tr. 143:21–12. Mr. Stuart agreed with this statement. 5/25/10 Rough Tr. 144:4–12.

13. Mr. Stuart testified that he was not aware of the existence of any studies that specifically determined late-emigrating spring-run Chinook are genetically diverse from fish that out-migrated at an earlier date. 5/25/10 Rough Tr. 157:18–25. However, Mr. Stuart relied upon the McElhany study and his general knowledge as a molecular biologist to support his opinion that the tail of the spring-run possess specific genetic diversity that make them sufficiently valuable genetically and deserving of protection. 5/25/10 Rough Tr. 156:18–157:17. Mr. Stuart's testimony has foundation, making this a dispute among scientists about the value in terms of genetic diversity of the tail end of the spring-run. 5/25/10 Rough Tr. 212:25–213:12.

14. Mr. Stuart testified that he could not provide a quantified estimate of the proportion of the spring-run Chinook that have not exited the Delta that would have to be adversely affected before there is a negative impact on spatial or genetic diversity of the species. 5/25/10 Rough Tr. 159:20–24.

15. There is no reasonable prospect that the proposed remedy will salvage all of the remaining 2 to 10 percent of spring-run in the Delta. 5/25/10 Rough Tr. 208:9–16.

16. Mr. Cavallo testified that the best available coded wire tag studies do not demonstrate any export related mortality effect for fish emigrating from the San Joaquin system. 5/25/10 Rough Tr. 39:1–24. Mr. Cavallo also opined that the proposed remedy would not "significantly reduce the survival or recovery probability" of the spring-run, nor would it "significantly diminish the value of their critical habitat for survival or recovery." *Id.;* DWR Ex. 519 at ¶ 12. "17. This opinion that unlimited pumping will have no adverse effect on the species is contrary to the evidence. There is ample record evidence that at elevated pumping levels, the hydrologic influence of exports directs the listed salmonids into areas of the Delta that are hostile because of temperature, toxics, and other influences.

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17. Mr. Stuart admitted he could not state unequivocally that the proposed injunction would result in jeopardy to the spring-run Chinook or would result in adverse modification to their critical habitat, nor could Mr. Stuart state that such jeopardy or adverse modification would be avoided. 5/25/10 Rough Tr., 160:9–19; *id.,* 174: 15–21.

(2) *Central Valley Steelhead (O. mykiss).*

18. NMFS listed the CV steelhead as a "threatened" species under the ESA on January 5, 2006. ***1175**71 Fed. Reg. 834 (Jan. 5, 2006). NMFS designated critical habitat for the CV steelhead on September 2, 2005. 70 Fed. Reg. 52,604.

19. There is limited information on the overall population size of CV steelhead. Findings & Conclusions 14:21–23. However, Mr. Stuart testified to an approximate population of 3,000 adult steelhead spawners. 5/25/10 Rough Tr. 121:19–122:7.

20. It is unknown what percentage of the total CV steelhead population is comprised of the Southern Sierra Nevada Diversity Group of CV steelhead. 5/25/10 Rough Tr. 67:1–8.

21. Mr. Cavallo estimated that 87 percent of the CV non-clipped steelhead will have exited the Delta past Chipps Island by May 25, 2010. DWR Ex. 519 at ¶ 9. Mr. Stuart agreed with this estimate. 5/25/10 Rough Tr. 154:14–155:2.

22. The incidental take limit for unmarked juvenile and adult CV steelhead is 3,000. BiOp at 776. Eight hundred seventy four (874) juvenile non-clipped CV steelhead have been salvaged so far this year. 5/25/10 Rough Tr. 155:3–8. Daily salvage of non-clipped CV steelhead peaked toward the end of January or beginning of February, and then tapered off. 5/25/10 Rough Tr. 32:17–25.

23. Mr. Stuart testified that if the proposed preliminary injunction were issued, he did not anticipate that the incidental take limit for CV steelhead would be exceeded. 5/25/10 Rough Tr. 155:9–14. However, the incidental take limit is not the default level at which the facilities should be operated. If the RPA works as designed, the incidental take limit should never be reached. *Id.* at 113:25–114:7, 133:15–24.

24. Approximately 13% of the population of Central Valley steelhead are within the influence of export operations. Mr. Stuart indicated that an important criteria in determining the necessity of protection of the steelhead, particularly at this time, is that the end of their run can extend into June. 5/25/10 Rough Tr. 211:17–24.

25. Mr. Stuart opined that increased salvage of CV steelhead that exhibit late migratory behavior would diminish the genetic diversity present in the population. Gov't Salmon Ex. 102 at ¶ 35. Although Mr. Stuart acknowledged that he was not aware of the existence of any studies that specifically showed that late emigrating CV steelhead were genetically diverse from fish that out-migrated at an earlier date, 5/25/10 Rough Tr. 157:10–14, he relied upon the McElhany study to support his opinion that the tail run of the steelhead possess specific genetic diversity that make them sufficiently valuable genetically and deserving of protection. 5/25/10 Rough Tr. 212:16–25. Mr. Stuart's testimony has record support, making this a dispute among scientists about the value in terms of genetic diversity of the tail end of the steelhead run. 5/25/10 Rough Tr. 212:25–213:12.

26. Mr. Stuart testified that he could not provide a quantified estimate of the proportion of the CV steelhead that have not exited the Delta that would have to be adversely affected before an adverse impact on spatial or genetic diversity of the species, but recognized that any such proportion would be lower for the Southern Sierra Nevada diversity group because of their small population size. 5/25/10 Rough Tr., 160:4–8.

27. Of the remaining 13 percent of the CV steelhead population potentially within the influence of the pumps, Mr. Stuart could not testify that there would be a total extirpation of this remaining percentage. 5/25/10 Rough Tr. 213:21–214:1.

28. Mr. Cavallo opined that the proposed remedy would not "significantly reduce the survival or recovery probability" ***1176** of the CV steelhead, nor would it "significantly diminish the value of their critical habitat for survival or recovery." 5/25/10 Rough Tr. 39:1–24; DWR Ex. 519 at ¶ 12. This was based in part, however, on his unsupported conclusion that exports do not affect smolt survival.

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29. Mr. Stuart admitted he could not state unequivocally that the proposed injunction would result in jeopardy to the spring-run Chinook or would result in adverse modification to their critical habitat, nor could Mr. Stuart state that such jeopardy or adverse modification would be avoided. 5/25/10 Rough Tr., 160:9–19; *id.,* 174: 15–21.

C. *Findings Of Fact Regarding Operation Of The Projects For The Period Of May 26th Through June 15th (With RPA Actions IV.2.1 And IV.2.3 Enjoined).*

(1) *Summary of RPA Actions IV.2.1 And IV.2.3.*

30. RPA Action IV.2.1 limits combined water exports by the CVP and SWP based on San Joaquin River flows as measured at Vernalis. BiOp at 642. When flows at Vernalis range from 0 to 6,000 cfs, Action IV.2.1 limits combined CVP and SWP exports to 1,500 cfs. BiOp at 642. When flows at Vernalis range from 6,000 to 21,750, Action IV.2.1 imposes an inflow to combined CVP and SWP exports ratio of 4:1. BiOp at 642.

31. RPA Action IV.2.3 limits Old and Middle River ("OMR") flows to no more negative than -2,500 to -5,000 cubic feet per second ("cfs") between January 1 and June 15, or until the average daily water temperature at Mossdale is greater than 72 degrees Fahrenheit for one week, whichever occurs first. BiOp at 648–50.

(2) *The Delta Smelt BiOp and/or State Water Resources Control Board Decision D–1641 Will Likely Limit Combined Project Exports During The Period That The Injunction Applies.*

32. If RPA Actions IV.2.1 and IV.2.3 are enjoined through June 15, 2010, the 2008 Delta Smelt Biological Opinion ("Smelt BiOp") would control Project operations between May 26th and June 15th, unless it is also enjoined. The Smelt BiOp requires OMR flows to be no more negative than -1,250 to -5,000 cfs over a fourteen-day running average through June 30 or until water temperatures reach 25 degrees Celsius at Clifton Court. *See* Fourth Milligan Declaration (Gov't Salmon Exh. 105), ¶ 5.

33. If the Delta Smelt BiOp is enjoined as well, State Water Resources Control Board Water Rights Decision 1641 ("D–1641") will control. Declaration of Terry Erlewine in Support of Preliminary Injunction ("Erlewine Decl.") (Doc. No. 356; SWC Ex. 968) ¶ 2; D–1641 (SWC Ex. 965); 5/25/10 Rough Tr. 79:4–8.

34. D–1641 sets forth requirements that the Projects must meet in order to implement applicable water quality and other objectives for the Delta. *See* Erlewine Decl. (SWC Ex. 968) at A–1; D–1641 (SWC Ex. 965) at 1.

35. Two specific restrictions in D–1641 are likely to control combined Project pumping on various days in the period from May 26 to June 15, 2010, the 35% Export/Inflow (E/I) ratio and the "spring X2" standard. Specifically, D–1641 limits Project exports to a combined total of not more than 35% of total Delta inflow and further limits Project operations to ensure that certain water quality standards are met as measured by the location of X2 (2.64 mmhos/cm electrical conductivity). 5/25/10 Rough Tr. 80:21–81:1, 92:22–24; ***1177** Erlewine Decl. (SWC Ex. 968) at ¶¶ 5, 11; D–1641 (SWC Ex. 965).

a. *Project Exports Are Currently Limited By D–1641 To A Combined Total of Not More than 35% of Total Delta Inflow.*

36. D–1641 requires that the Projects export a total of not more than 35% of Delta inflows during the period of February through June. Erlewine Decl. (SWC Exs. 968) Exhibit A at A–5; D–1641 (SWC Ex. 965) at 5; 5/25/10 Rough Tr. 80:21–24. Delta inflow is the combined total of the Sacramento River inflow at Freeport, the Yolo Bypass inflow, inflow from streams including the Mokelumne River and the San Joaquin River, and all other flows entering the Delta. 5/25/10 Rough Tr. 81:10–14.

37. Total Delta inflows and outflows are reported daily, including on the Bureau of Reclamation's ("Reclamation") website. 5/25/10 Rough Tr. 81:16–18; see also Erlewine Decl. (SWC Ex. 968) at ¶ 5; Erlewine Decl. Exhibit B (SWC Ex. 968).

38. For the calculation of maximum percent Delta inflow diverted, the export rate is a 3–day running average and the Delta inflow is a 14–day running average, except when the CVP or the SWP is making storage withdrawals for export, in which case both the export rate and the Delta inflow are 3–day running averages. Erlewine Decl. Exhibit A (SWC Exs. 968) at A–7; D–1641 (SWC Ex. 965) at 7;

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5/25/10 Rough Tr. 86:4–9.

b. *Combined Project Exports Are Also Limited by D–1641's Requirement That X2 Be Maintained At Specified Locations.*

39. During February through June, D–1641 requires that exports be limited to ensure that X2 is positioned at one of three locations in the western Delta, most notably near Chipps Island, based on unimpaired runoff as indicated by the Central Valley 8–Stream/River Index. Erlewine Decl. (SWC Ex. 968) ¶ 11; Erlewine Decl. Exhibit A (SWC Exs. 968) at A–9, fn (b); D–1641 (SWC Ex. 965) at 9, fn(b); *see also* 5/25/10 Rough Tr. 93:5–10 (the purpose of maintaining X2 near Chipps Island is "to keep salinity low").

40. More specifically, this spring X2 standard operates in addition to the 35% E/I ratio limitation described above and requires that Project exports be limited to hold X2 at or westerly of Chipps Island on a daily or 14–day average basis and, in any event, to provide Delta outflows of at least 11,400 cubic feet per second ("cfs"). Erlewine Decl. (SWC Exs. 965, 968) ill; Erlewine Decl. Exhibit A (SWC Ex. 968) at A–9; D–1641 (SWC Ex. 965) at 9.

c. *The Anticipated Effect Of D–1641.*

41. Although it cannot be estimated with certainty what total Delta inflows will be in the upcoming weeks, Mr. Erlewine prepared two sets of hydrology projections to determine what Project operations would likely be between May 26th and June 15th, given D–1641's requirement that Projects export be no greater than 35% of Delta inflows. Erlewine Decl. (SWC Ex. 968) at ¶ 6.

42. The first projection assumed that total Delta inflows from all sources would continue to decline through June 15th. Erlewine Decl. (SWC Ex. 968) at ¶ 7 and Table 1; Erlewine Decl. Exhibit C (SWC Ex. 967). Under that scenario, total Project exports are likely to progressively decline from 7,300 cfs to 5,100 cfs between May 26th and June 15th. Erlewine Decl. (SWC Ex. 968) at 17 and Table 1; Erlewine Decl. Exhibit C (SWC Ex. 967). This decline in Project exports does not directly correlate to OMR flows, but the OMR flows under this projection would likely range from approximately -4,691 cfs to -5,432 cfs during the same May to June period. Erlewine Decl. (SWC Ex. 968) at ***1178** ¶ ¶ 8–9 and Table 1; Erlewine Exhibit D (SWC Ex. 968).

43. The second projection assumed that total Delta inflows would remain constant through June 15th. Erlewine Decl. (SWC Ex. 968) at 110 and Table 1. As of May 25, 2010, it appears that San Joaquin River flows will likely remain about 4,000 cfs through the first week of June due to releases caused by snow melt and for flood control purposes on the Tuolumne River. 5/25/10 Rough Tr. 87:15–22, 99:8–11. Under this scenario, total Project exports are likely to remain steady at approximately 7,500 cfs, and OMR flows would range between - 5,350 cfs and -6,000 cfs. Erlewine Decl. (Doc. No. 356) at ¶ 10 and Table 1.

44. Regarding D–1641's further restrictions vis-a-vis the location of X2 through June 15, and based on current water quality, Delta inflow patterns, and other conditions, it is "nearly certain" that the spring X2 limitation will be triggered in June, likely for a period of at least 20 days. Erlewine Decl. (SWC Ex. 968), ¶ 11; Milligan Decl., (Gov't Salmon Ex. 105), ¶ 9; 5/25/10 Rough Tr. 94:1. Although the Project operators have discretion about which 20 days in June will be utilized to meet the D–1641 spring X2 requirement, it is likely the 20 day period will occur earlier in the month. 5/25/10 Rough Tr. 98:9–14. To meet these further restrictions, "Project exports would have to be reduced to levels more restrictive than those summarized above" related to the 35% limitation. Erlewine Decl. (SWC Ex. 968) ¶ 11. These additional restrictions will further reduce the magnitude of reverse flows in Old and Middle Rivers to a likely range of -5,700 cfs to less negative than -3,000 cfs and, ultimately, will lower the rate of combined Project exports to a range well below 7,000 cfs, to as low as 3,000 cfs. Erlewine Decl. (SWC Ex. 968) ¶ 11; 5/25/10 Rough Tr. 95:5–7.

(3) *Ramping Period And Daily Monitoring.*

45. Plaintiffs proposed that Project operations not be instantaneously operated at the highest allowable levels of exports under D–1641, but instead that exports be ramped up from their current levels to higher levels over a three day period beginning May 26, 2010 if Actions IV.2.1 and IV.2.3 are enjoined. 5/25/10 Rough Tr. 200:10–15.

46. In conjunction with ramping up and throughout the period of injunctive relief, NMFS, Reclama-

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tion and DWR will be ordered to monitor take at the CVP and SWP export pumps on a day-by-day basis. If NMFS or Reclamation believe that any increased salvage is sufficient to jeopardize either the spring-run Chinook or CV steelhead species, or there is adverse modification to the species' critical habitat, they may immediately file notice seeking to dissolve the injunctive relief. 5/25/10 Rough Tr., 215:23–216:3. Any such application will be heard on shortened time.

(4) *Salvage–Triggered OMR Flow Restrictions Remain In Effect.*

47. Plaintiffs propose that Action IV.2.3's calendar-based -5,000 cfstrigger be enjoined, but that its salvage triggers remain in effect. Therefore, if during the period May 26 through June 15, the density of juvenile salmonid losses at the export pumps increases sufficiently to pose an increased risk to the species as contemplated by these salvage-based triggers, export pumping will be reduced to meet Action IV.2.3's OMR flow restrictions. BiOp at 648–52.

III. *CONCLUSIONS OF LAW*

A. *Legal Standards For Injunctive Relief.*

1. Plaintiffs must establish four factors by a preponderance of the evidence to receive temporary injunctive relief:

***1179** (1) Likelihood of success on the merits;

(2) Likelihood the moving party will suffer irreparable harm absent injunctive relief;

(3) The balance of equities tips in the moving parties' favor; and

(4) An injunction is in the public interest.

Winter v. Natural Resources Defense Council, 555 U.S. 7, ——, 129 S.Ct. 365, 374, 172 L.Ed.2d 249 (2008); *Am. Trucking Ass'n v. City of Los Angeles,* 559 F.3d 1046, 1052 (9th Cir.2009).

[42] 2. As explained in the Findings and Conclusions, Plaintiffs have already succeeded on their NEPA claim and have shown a likelihood of success on the merits of the ESA claims raised in their preliminary injunction motion. Findings & Conclusions 129:2–3; 130:11–12. Additionally, Plaintiffs have shown a likelihood of irreparable harm from loss of water supply. Findings & Conclusions 69:6–85:17; 5/25/10 Rough Tr. 204:8–205:7. Plaintiffs have further shown that the balance of harms and the public interest favor injunctive relief, provided such relief will increase the water supply available to the CVP and SWP without jeopardizing the continued existence of the species and/or adversely modifying their critical habitats. Findings & Conclusions 134:4–20.

B. *Central Valley Spring–Run Chinook Salmon.*

3. Plaintiffs' expert Mr. Cavallo testified that if Plaintiffs' injunction were granted, operations would not jeopardize the spring-run Chinook salmon or adversely modify its critical habitat. 5/25/10 Rough Tr. 39:1–24; DWR Ex. 519 at ¶ 12.

4. On cross examination, NMFS's expert Mr. Stuart could not say whether or not these injunctions will jeopardize the continued existence of the species or adversely impact their habitats. 5/25/10 Rough Tr. 210:18–25; 160:9–19.

5. The small percentage of the population in the area of concern that might be potentially affected by the injunction and the fact that there is no reasonable prospect that all of the remaining spring-run Chinook will be subject to salvage justifies the conclusion that the short period of injunctive relief requested will not deepen the jeopardy or adversely modify the critical habitat of the spring-run. 5/25/10 Rough Tr. 208:4–16.

C. *Central Valley Steelhead.*

6. Mr. Stuart testified that the tail end of the CV steelhead migration was important to the species as a whole due to a genetic characteristic for late migration. Gov't Salmon Ex. 102 at ¶ 35. Mr. Cavallo disagreed and stated there was no evidence of a genetic difference between CV steelhead that migrate during the other portions of the migration period and the late migratory steelhead. 5/25/10 Rough Tr. 33:20–34:24. This is a scientific dispute that must be resolved in favor of the government.

7. Mr. Stuart testified that he could not opine whether or not the proposed injunction would jeopardize the CV steelhead or adversely modify their critical habitat. 5/25/10 Rough Tr. 160:9–19.

8. Only a small percentage of the population re-

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mains in the area of concern that might be potentially affected by the injunction. In addition, there is no reasonable prospect that all of the remaining individuals in the tail end of the CV steelheads' migration would be subject to salvage or extirpation, and therefore any important genetic contribution from these late-migrating individuals to the overall species will remain even if the injunction is granted. 5/25/10 Rough Tr. 214:16–20.

9. Accordingly, granting the requested injunction is not likely to deepen the jeopardy of the the CV steelhead or destroy ***1180** adversely modify its critical habitat during the limited period May 26 through June 15.

D. *Green Sturgeon, Orca, And Winter–Run Chinook Salmon.*

10. The parties agreed that the proposed injunction will not cause harm that would rise to the level of jeopardizing or adversely modifying the critical habitat of the green sturgeon, orcas, and winter-run Chinook.

E. *Stay Pending Appeal.*

11. At the May 25, 2010 hearing, Federal Defendants and Defendant–Intervenors requested a stay pending appeal of the preliminary injunction ordered by this Court. This request was denied because any stay would effectively deprive Plaintiffs of any benefit of the preliminary injunction.

F. *Bond.*

12. Plaintiffs are required to post a $5,000.00 bond.

SO ORDERED.

E.D.Cal.,2010.
Consol. Salmonid Cases
713 F.Supp.2d 1116, 72 ERC 1291

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APPENDIX DOC. 5

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THE CONSOLIDATED SALMONID CASES; SAN LUIS & DELTA-MENDOTA WATER AUTHORITY; WESTLANDS WATER DISTRICT v. GARY F. LOCKE, as Secretary of the United States Department of Commerce; et al. (1:09-cv-01053-OWW-DLB); STOCKTON EAST WATER DISTRICT, et al. v. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, et al. (1:09-cv-01090-OWW-DLB); STATE WATER CONTRACTORS v. GARY F. LOCKE, et al. (1:09-cv-01378-OWW-SMS); KERN COUNTY WATER AGENCY, et al. v. UNITED STATES DEPARTMENT OF COMMERCE, et al. (1:09-cv-01520-OWW-SMS); OAKDALE IRRIGATION DISTRICT, et al. v. UNITED STATES DEPARTMENT OF COMMERCE, et al. (1:09-cv-01580-OWW-DLB); THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA v. NATIONAL MARINE FISHERIES SERVICE, et al. (1:09-cv-01625-OWW-SMS)

1:09-CV-01053 OWW DLB,1:09-CV-01090 OWW DLB,1:09-cv-01378-OWW-SMS,1:09-CV-01520 OWW SMS,1:09-CV-01580 OWW DLB,1:09-CV-01625 OWW SMS

UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF CALIFORNIA

791 F. Supp. 2d 802*; *2011 U.S. Dist. LEXIS 109012*; *41 ELR 20300

September 20, 2011, Decided
September 20, 2011, Filed

PRIOR HISTORY: *Delta Smelt Consol. Cases v. Salazar, 2010 U.S. Dist. LEXIS 70770 (E.D. Cal., June 30, 2010)*

JUDGES: Oliver W. Wanger, United States District Judge.

OPINION BY: Oliver W. Wanger

OPINION

[*811] MEMORANDUM DECISION RE CROSS MOTIONS FOR SUMMARY JUDGMENT (DOCS. 430, 435, 446, 474, 477)

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No comments

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[*812] I. [**15] INTRODUCTION

These consolidated cases arise out of continuing efforts to protect several species listed under the Endangered Species Act ("ESA"), namely the endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) ("winter-run"), threatened Central Valley spring-run Chinook salmon (*O. tshawytscha*) ("spring-run"), threatened Central Valley [*813] steelhead (*O. mykiss*) ("CV steelhead"), threatened Southern Distinct Population Segment ("DPS") of North American green sturgeon (*Acipenser medirostris*), and endangered Southern Resident killer whales (*Orcinus orca*) (collectively, "Listed Species"); and associated impacts to the water supply for more than half the State of California.

Plaintiffs, San Luis & Delta Mendota Water Authority and Westlands Water District; State Water Contractors ("SWC"); Kern County Water Agency and Coalition for a Sustainable Delta; and Metropolitan Water District of Southern California ("MWD" or "Metropolitan") (collectively "Export Plaintiffs") move for summary judgment on their claims that the United States National Marine Fisheries Service's ("NMFS") June 4, 2009 Biological Opinion, addressing the impacts of the coordinated operations of the federal [**16] Central Valley Project ("CVP") and State Water Project ("SWP") (collectively the "Project") on the Listed Species ("2009 Salmonid BiOp" or "BiOp") and its Reasonable and Prudent Alternative ("RPA"), violates the ESA and the Administrative Procedure Act ("APA"). Doc. 430. [1] Plaintiffs Stockton East Water District, Oakdale Irrigation District, and South San Joaquin Irrigation District ("Stanislaus River Plaintiffs" or "SR Plaintiffs") filed a separate motion for summary judgment, raising unique challenges to the BiOp. Doc. 435. Plaintiff-in-Intervention, the California Department of Water Resources ("DWR") filed a separate motion for summary judgment on narrower grounds. Doc. 446.

1 Export Plaintiffs previously prevailed on their claims that the Bureau of Reclamation violated the National Environmental Policy Act ("NEPA") by failing to perform any NEPA analysis prior to provisionally adopting and implementing the BiOp and its RPA. Doc. 288.

Federal Defendants, the United States Department of Commerce ("DOC"), the National Oceanic and Atmospheric Administration ("NOAA"), the agency within DOC of which NMFS is a part, NMFS, the United States Department of the Interior ("DOI"), and its sub-agency [**17] the United States Bureau of Reclamation ("Reclamation"), oppose and cross move for summary judgment on all remaining claims, Doc. 477, as do Defendant-Intervenors California Trout, Friends Of The River, Natural Resources Defense Council, Northern California Council of the Federation of Fly Fishers, Pacific Coast Federation of Fishermen's Associations/Institute for Fisheries Resources, Sacramento River Preservation Trust, San Francisco Baykeeper, The Bay Institute, and the Winnemem Wintu Tribe, Doc. 474. All parties filed replies. Docs. 487, 492, 513, 515. These cross motions, which included over 700 pages of briefing and thousands of pages of supporting declarations and exhibits, came on for hearing on December 16 and 17, 2010.

II. BACKGROUND

A. The Listed Species.

1. Sacramento River Winter-Run Chinook Salmon.

Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) ("winter-run") is listed as "endangered" under the *ESA. 70 Fed. Reg. 37,160 (June 28, 2005).* Historical winter-run population estimates were as high as approximately 230,000 fish in the 1960s, BiOp at 82, but declined to under 200 fish in the 1990s. *Id.* at 81. In recent years, population surveys of winter-run [**18] estimated a high of 17,344 fish in 2006, followed by a decline in 2007 (2,542 fish) that persisted into 2008 (2,830 fish). *Id.* [2]

2 More recent population figures were presented during hearings on motions for injunctive relief; only data available at the time the BiOp was issued has been considered.

[*814] Adult winter-run Chinook salmon migrate upstream from the Pacific Ocean through the Bay-Delta estuary during November through July, moving upstream past Red Bluff Diversion Dam ("RBDD") from mid-December through early August, with peak passage occurring in mid-March. BiOp at 80. Spawning typically

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occurs in the mainstem Sacramento River downstream of Keswick Dam during April through August, with the greatest spawning activity typically taking place during May and June. *Id.*

Winter-run fry begin to emerge from the gravel beds where eggs are laid in late June and early July, continuing through October. *Id.* Juvenile rearing and emigration typically occurs between July and February in the upper Sacramento River, with juvenile migration downstream past RBDD beginning as early as mid-July, peaking in September, and continuing through March in some years. *Id.* at 80-81.

Juvenile winter-run occur in the [**19] Delta from November through May. *Id.*; *Pac. Coast Fed'n of Fishermans' Ass'ns. v. Gutierrez ("Gutierrez II"), 606 F. Supp. 2d 1195, 1216-17 (E.D. Cal. 2008).* Winter-run juveniles typically remain in the Delta until they reach a fork length of approximately 118 millimeters and are from 5 to 10 months of age. BiOp. at 81. Juveniles begin exiting to the ocean as early as November and continue to do so through May. *Id.*

Designated critical habitat for winter-run includes the Sacramento River, the Delta, and downstream bays to the *Golden Gate Bridge. 58 Fed. Reg. 33,212 (June 16, 1993). Gutierrez II, 606 F. Supp. 2d at 1217*. The following physical and biological features are identified as essential for the conservation of winter-run:

> (1) access from the Pacific Ocean to appropriate spawning areas in the upper Sacramento River, (2) the availability of clean gravel for spawning substrate, (3) adequate river flows for successful spawning, incubation of eggs, fry development and emergence, and downstream transport of juveniles, (4) water temperatures between 42.5 and 57.5 °F for successful spawning, egg incubation, and fry development, (5) habitat areas and adequate prey that are not contaminated, [**20] (6) riparian habitat that provides for successful juvenile development and survival, and (7) access downstream so that juveniles can migrate from spawning grounds to San Francisco Bay and the Pacific Ocean.

BiOp at 90. Currently, the value of winter-run critical habitat is "degraded," by, among other things, the presence of dams, temperature control issues on the upper Sacramento River, unscreened diversions, and degraded spawning and riparian habitat. *Id.* at 93.

2. Spring Run Chinook.

Central Valley spring-run Chinook salmon (*O. tshawytscha*) ("spring-run") is listed as "threatened" under the *ESA. 71 Fed. Reg. 834 (June 5, 2005); 70 Fed. Reg. 37160 (June 28, 2005)* (critical habitat designated). There are three "independent" populations of spring-run, located on Butte, Deer and Mill Creeks, several "dependent" populations (which rely on the three independent populations for continued existence), and a population of hatchery fish from the Feather River Hatchery (FRH). BiOp at 93-94.

Spring-run Chinook have been declining over recent years. The Central Valley as a whole is estimated to have supported spring runs as large as 600,000 fish between the late 1880s and 1940s. *Id.* at 94. [*815] The 2007 [**21] escapement was 7,819 for all tributary populations (all independent and dependent populations, excluding those fish returning to FRH). *Id.* at 97.

Adult spring-run enter freshwater in the spring, beginning in late January, entering the Sacramento River between March and September, primarily in May and June, and entering spawning grounds between mid-April and mid-June. *Id.* at 93. Adults hold over the summer in cool, high elevation streams while they sexually mature, and then spawn in the fall, between September and October, depending on water temperatures. *Id.* at 93.

Juveniles typically spend a year or more in freshwater before emigrating to the ocean. *Id.* at 93. The emigration period for spring-run extends from November to June and is highly variable. *Id.* at 94.

Designated critical habitat for spring-run includes the Sacramento River, tributaries supporting spring-run, the Delta, and downstream bays to the Golden Gate Bridge. *Gutierrez II, 606 F. Supp. 2d at 1217*. The value of spring-run critical habitat currently is "degraded." BiOp at 101, 104.

3. Central Valley Steelhead.

Central Valley steelhead (*O. mykiss*) ("CV steelhead") is listed as "threatened" under the *ESA. 71 Fed. Reg. 834 (Jan. 5, 2006).* [**22] Wild CV steelhead are confined mostly to the upper Sacramento River and its tributaries. BiOp at 107. Recent surveys also have detected small, self-sustaining populations on the Stanislaus, Mokelumne, and Calaveras Rivers, as well as observations of juvenile steelhead on the Tuolumne and Merced Rivers. *Id.* These small populations make up the remaining representatives of the Southern Sierra Nevada Diversity Group ("SSNDG") of CV Steelhead. *Id.* at 198.

While there is limited information on population size, NMFS estimates that the current population for the entire distinct population segment ("DPS") [3] (including

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the SSNDG as well as all other populations) in the Central Valley is less than 3,628 spawning females, compared with 40,000 spawners in the 1960s. BiOp at 106. The CV Steelhead population has shown a pattern of negative growth since the late 1960s, and there is no indication that the trend has changed. BiOp at 108-09 & Figures 4-4 & 4-5.

3 The term "species" includes "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." *16 U.S.C. § 1532*. NMFS has issued guidance on how to apply [**23] the ESA's DPS concept, *see Modesto Irr. Dist v. Gutierrez, 619 F.3d 1024, 1028 (9th Cir. 2010)* (citing *56 Fed. Reg. 58,612 (Nov. 20, 1991)*), and has "struggled for two decades over how to apply the term DPS to steelhead," *id.*

CV steelhead generally leave the ocean from August through April and spawn from December through April in small streams and tributaries where cool, well-oxygenated water is available year-round. *Id.* at 104. Unlike Pacific salmon, steelhead are capable of spawning more than once before death. Although one-time spawners are the great majority, approximately 17.2 percent in California streams are repeat spawners. *Id.* at 103-104.

Steelhead eggs hatch approximately 30 days after spawning, and fry emerge from the gravel four to six weeks later into shallow areas where they feed. *Id.* at 105. Steelhead rear during the summer and emigrate "episodically" from their natal streams during fall, winter, and spring high flows. *Id.* at 106. Emigrating CV Steelhead use the lower reaches of the Sacramento River and Delta for rearing and as a migration corridor to the ocean. *Id.* Juvenile CV steelhead typically emigrate [*816] through the Delta from late September through June. *Id.* at 105 (Table 4-6).

Approximately [**24] 80% of historical CV Steelhead range is blocked by dams. *Id.* at 109. CV steelhead critical habitat is degraded. *Id.* at 113.

4. Green Sturgeon.

The southern distinct population segment of the North American green sturgeon ("green sturgeon") (*Acipenser medirostris*) is listed as "threatened" under the *ESA. 71 Fed. Reg. 17757 (Apr. 7, 2006)*; *73 Fed. Reg. 52,084* (critical habitat designated).

Green sturgeon are anadromous fish that spawn and rear in freshwater rivers and estuaries but spend most of their lives in the ocean. *See* BiOp at 114-15. They are a long-lived, slow-growing species. *68 Fed. Reg. 4,433, 4,436 (Jan. 29, 2003)*. Juvenile green sturgeon are present in the Delta year round. BiOp at 119.

There are no definitive population counts or figures for the Southern DPS green sturgeon. Evidence available at the time the BiOp was written suggests that the population in the Delta watershed is "relatively small," ranging from several hundred to a few thousand adults. *Id.* at 124.

Critical habitat for the Southern DPS of green sturgeon was proposed on September 8, 2008, *73 Fed. Reg. 52,084*, but had not been adopted as of the issuance of the BiOp. Proposed critical habitat included "approximately [**25] 325 miles of riverine habitat and 1,058 square miles of estuarine habitat in California, Oregon, and Washington, and 11,927 square miles of coastal marine habitat off California, Oregon, and Washington within the geographical area presently occupied by the Southern DPS of green sturgeon." BiOp at 126. In addition, approximately 136 square miles of habitat within the Yolo and Sutter bypasses, adjacent to the Sacramento River, are proposed for designation. *Id.* The BiOp concluded that the current condition of proposed critical habitat for the Southern DPS of green sturgeon is "degraded over historical conditions." *Id.* at 134.

5. Southern Resident Killer Whale.

The Southern Resident DPS of killer whale (*Orcinus orca*) ("Southern Residents") was listed as "endangered" under the ESA on November 18, 2005, *70 Fed. Reg. 69,903 (Nov. 18, 2005)*, and the DPS is designated as "depleted" under the Marine Mammal Protection Act. BiOp at 158-59. Southern Residents are found throughout the coastal waters off Washington, Oregon, and Vancouver Islands and are known to travel as far south as central California. *Id.* at 159.

The BiOp addresses the impact of Project operations on Southern Residents and concludes [**26] that extinction of winter-run and spring-run Chinook salmon, as well as reductions in fall-run [4] Chinook salmon populations, "would reduce prey availability and increase the likelihood for local depletions of prey in particular locations and times," which would, in turn, increase the risk of extinction of the Southern Residents. BiOp at 573-74.

4 Fall-run Chinook salmon are not listed as threatened or endangered under the ESA.

B. The 2009 Salmonid BiOp and RPA.

The 2009 Salmonid BiOp, prepared pursuant ESA § 7, *16 U.S.C. § 1536(a)(2)*, concluded that "the long-term operations of the CVP and SWP are likely to jeopardize the continued existence" of the Listed Species and "destroy or adversely modify" critical habitat for winter-run,

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spring-run, and CV steelhead. BiOp at 575. As required by law, the BiOp includes an RPA designed to allow the projects to continue [*817] operating without causing jeopardy to the species or adverse modification to its critical habitat. *Id.* at 575-671. The RPA "is composed of numerous elements for each of the various project divisions and associated stressors," which, according to the BiOp, "must be implemented in its entirety to avoid jeopardy and adverse modification." [**27] *Id.* at 578. The BiOp provides a succinct overview of the RPA:

> There are several ways in which water operations adversely affect listed species that are addressed in this RPA. We summarize the most significant here:
>
> 1) Water operations result in elevated water temperatures that have lethal and sub-lethal effects on egg incubation and juvenile rearing in the upper Sacramento River. The immediate operational cause is lack of sufficient cold water in storage to allow for cold water releases to reduce downstream temperatures at critical times and meet other project demands. This elevated temperature effect is particularly pronounced in the Upper Sacramento for winter-run and mainstem spring-run, and in the American River for steelhead. The RPA includes a new year-round storage and temperature management program for Shasta Reservoir and the Upper Sacramento River, as well as long-term passage prescriptions at Shasta Dam and reintroduction of winter-run into its native habitat in the McCloud and/or Upper Sacramento rivers.
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> 2) In Clear Creek, recent project operations have led to increased abundance of Clear Creek spring-run, which is an essential population for the short-term and long-term [**28] survival of the species. Nonetheless, in the proposed action, continuation of these operations is uncertain. The RPA ensures that essential flows and temperatures for holding, egg incubation and juvenile survival will be maintained.
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> 3) Red Bluff Diversion Dam (RBDD) on the Sacramento River impedes both upstream migration of adult fish to spawning habitat and downstream migration of juveniles. Effects are significant for winter-run and spring-run, but are particularly pronounced for green sturgeon and its proposed critical habitat in that a significant portion of the population is blocked from its spawning and holding habitat. The RPA mandates gate openings at critical times in the short term while an alternative pumping plant is built, and, by 2012, opening of the gates all year.
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> 4) Both project and non-project effects have led to a significant reduction in necessary juvenile rearing habitat in the Sacramento River Basin and Delta. The project's flood control operations result in adverse effects through reduced frequency and magnitude of inundation of rearing habitat. To minimize these effects, the RPA contains both short-term and long-term actions for improving juvenile rearing habitat [**29] in the Lower Sacramento River and northern Delta.
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> 5) Another major effect of water operations is diversion of out-migrating juveniles from the north Delta tributaries into the interior Delta through the open DCC gates. Instead of migrating directly to the outer estuary and then to sea, these juveniles are caught in the interior Delta and subjected to pollution, predators, and altered food webs that cause either direct mortality or impaired growth. The RPA mandates additional gate closures to minimize these adverse effects to winter-run, spring-run, and steelhead.
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> 6) Similarly, water pumping causes reverse flows, leading to loss of juveniles migrating out from the Sacramento River system in the interior Delta and more juveniles being exposed to the State and [*818] Federal pumps, where they are salvaged at the facilities. The RPA prescribes Old and Middle River flow levels to reduce the number of juveniles exposed to the export facilities and prescribes additional measures at the facilities themselves to increase survival of fish.
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> 7) The effects analysis shows that juvenile steelhead migrating out from the San Joaquin River Basin have a particularly high rate of loss due to both project and non-project [**30] related stressors. The RPA mandates additional measures to improve survival of San Joaquin steelhead smolts, including both increased San Joaquin River flows and export curtailments. Given the uncertainty of the relationship

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between flow and exports, the RPA also prescribes a significant new study of acoustic tagged fish in the San Joaquin Basin to evaluate the effectiveness of the RPA and refine it over the lifetime of the project.

8) On the American River, project-related effects on steelhead are pronounced due to the inability to consistently provide suitable temperatures for various life stages and flow-related effects caused by operations. The RPA prescribes a flow management standard, a temperature management plan, additional technological fixes to temperature control structures, and, in the long term, a passage at Nimbus and Folsom Dams to restore steelhead to native habitat.

9) On the Stanislaus River, project operations have led to significant degradation of floodplain and rearing habitat for steelhead. Low flows also distort cues associated with out-migration. The RPA proposes a year-round flow regime necessary to minimize project effects to each life-stage of steelhead, including [**31] new spring flows that will support rearing habitat formation and inundation, and will create pulses that cue out-migration.

10) Nimbus Fish Hatchery steelhead program contribute to both loss of genetic diversity and mixing of wild and hatchery stocks of steelhead, which reduces the viability of wild stocks. The Nimbus and Trinity River Hatchery programs for non-listed fall-run also contribute to a loss of genetic diversity, and therefore, viability, for fall-run. The RPA requires development of Hatchery Genetics Management Plans to improve genetic diversity of both steelhead and fall-run, an essential prey base of Southern Resident.

Id. at 576-78.

III. STANDARD OF DECISION

Summary judgment is appropriate when the pleadings and the record demonstrate that "there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." *Fed. R. Civ. P. 56(c).* The claims in this case involve NMFS's issuance of a biological opinion, final agency action subject to judicial review under the APA, *5 U.S.C. § 702. Nat'l Wildlife Fedn v. Nat'l Marine Fisheries Serv., 524 F.3d 917, 925 (9th Cir. 2008) ("NWF v. NMFS II")* . A court conducting APA judicial review may [**32] not resolve factual questions, but instead determines "whether or not as a matter of law the evidence in the administrative record permitted the agency to make the decision it did." *Sierra Club v. Mainella, 459 F. Supp. 2d 76, 90 (D.D.C. 2006)* (quoting *Occidental Eng'g Co. v. INS, 753 F.2d 766, 769 (9th Cir. 1985)).* "[I]n a case involving review of a final agency action under the [APA] ... the standard set forth in *Rule 56(c)* does not apply because of the limited role of a court in reviewing the administrative record." *Id. at 89.* In this context, summary judgment becomes the "mechanism for deciding, as a matter of law, whether the agency action is supported by the administrative [*819] record and otherwise consistent with the APA standard of review." *Id. at 90.*

IV. BASIC LEGAL FRAMEWORK

A. Review under the APA.

APA invalidation of a biological opinion requires Plaintiffs to prove that NMFS's action was "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." *5 U.S.C. § 706(2)(A).*

1. Record Review.

APA review of a biological opinion is "based upon the evidence contained in the administrative record." *Arizona Cattle Growers' Ass'n v. U.S. Fish and Wildlife Serv., 273 F.3d 1229, 1245 (9th Cir. 2001).* [**33] Judicial review under the APA must focus on the administrative record already in existence, not some new record made initially in a reviewing court. Parties may not use "post-decision information as a new rationalization either for sustaining or attacking the agency's decision." *Ass'n of Pac. Fisheries v. EPA, 615 F.2d 794, 811-12 (9th Cir. 1980).* Exceptions to administrative record review for technical information or expert explanation make such evidence admissible only for limited purposes, and those exceptions are narrowly construed and applied. *Lands Council v. Powell, 395 F.3d 1019, 1030 (9th Cir. 2005).*

Here, as evidentiary rulings explained, *see, e.g.*, Docs. 387, 392 (10/19/09 Hearing Transcript ("Tr.")), 406, 407, 462, 740 (7/8/10 Tr.), 750, expert testimony has been considered solely for explanation of technical terms and complex scientific subject matter beyond the Court's knowledge; and to understand the agency's explanations, or lack thereof, and the parties' arguments.

2. Deference to Agency Expertise.

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A court must defer to the agency on matters within the agency's expertise, unless the agency completely failed to address some factor, consideration of which was essential [**34] to making an informed decision. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv., 422 F.3d 782, 798 (9th Cir. 2005) ("NWF v. NMFS I").* A court "may not substitute its judgment for that of the agency concerning the wisdom or prudence of the agency's action." *River Runners for Wilderness v. Martin, 593 F.3d 1064, 1070 (9th Cir. 2009)*:

> In conducting an APA review, the court must determine whether the agency's decision is "founded on a rational connection between the facts found and the choices made ... and whether [the agency] has committed a clear error of judgment." *Ariz. Cattle Growers' Ass'n v. U.S. Fish & Wildlife, 273 F.3d 1229, 1243 (9th Cir. 2001).* "The [agency's] action ... need be only a reasonable, not the best or most reasonable, decision." *Nat'l Wildlife Fed. v. Burford, 871 F.2d 849, 855 (9th Cir. 1989).*

Id.

Although deferential, judicial review under the APA is designed to "ensure that the agency considered all of the relevant factors and that its decision contained no clear error of judgment." *Arizona v. Thomas, 824 F.2d 745, 748 (9th Cir. 1987)* (internal citation and quotation omitted). "The [**35] deference accorded an agency's scientific or technical expertise is not unlimited." *Brower v. Evans, 257 F.3d 1058, 1067 (9th Cir. 2001).*

> [An agency's decision is] arbitrary and capricious if [it] has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, [*820] or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.

Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43, 103 S. Ct. 2856, 77 L. Ed. 2d 443 (1983); *see also Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 416, 91 S. Ct. 814, 28 L. Ed. 2d 136 (1971)* (reviewing court may overturn an agency's action as arbitrary and capricious if the agency failed to consider relevant factors, failed to base its decision on those factors, and/or made a "clear error of judgment"), *overruled on other grounds by Califano v. Sanders, 430 U.S. 99, 105, 97 S. Ct. 980, 51 L. Ed. 2d 192 (1977)).*

More generally, "[u]nder the APA 'the agency must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice [**36] made.'" *Humane Soc. of U.S. v. Locke, 626 F.3d 1040, 1048 (9th Cir. 2010)* (quoting *Motor Vehicle Mfrs. Ass'n, 463 U.S. at 43*). "The reviewing court should not attempt itself to make up for an agency's deficiencies: We may not supply a reasoned basis for the agency's action that the agency itself has not given." *Id.*

B. General Obligations Under the ESA.

ESA Section 7(a)(2) prohibits agency action that is "likely to jeopardize the continued existence" of any endangered or threatened species or "result in the destruction or adverse modification" of its critical habitat. *16 U.S.C. § 1536(a)(2).* To "jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." *50 C.F.R. § 402.02*; *see also NWF v. NMFS II, 524 F.3d 917* (rejecting agency interpretation of *50 C.F.R. § 402.02* that in effect limited jeopardy analysis to survival and did not realistically evaluate recovery, thereby avoiding an interpretation that reads the provision "and recovery" entirely out [**37] of the text). An action is "jeopardizing" if it keeps recovery "far out of reach," even if the species is able to cling to survival. *NWF v. NMFS II, 524 F.3d at 931.* "[A]n agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm." *Id. at 930.*

To satisfy this obligation, the federal agency undertaking the action (the "action agency") must prepare a "biological assessment" that evaluates the action's potential impacts on species and species' habitat. *16 U.S.C. § 1536(c)*; *50 C.F.R. § 402.12(a).* If the proposed action "is likely to adversely affect" a threatened or endangered species or adversely modify its designated critical habitat, the action agency must engage in "formal consultation" with NMFS [5] to obtain its biological opinion as to the impacts of the proposed action on the listed species. *See 16 U.S.C. § 1536(a)(2), (b)(3)*; *see also 50 C.F.R. § 402.14(a), (g).* Once the consultation process has been completed, NMFS must give the action agency a written biological opinion [**38] "setting forth [NMFS's] opin-

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ion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat." *16 U.S.C. § 1536(b)(3)(A)*; [*821] *see also 50 C.F.R. § 402.14(h)*.

> 5 Generally, where the listed species in question is marine or anadromous, consultation must involve NMFS. For terrestrial and freshwater species, the United States Fish and Wildlife Service ("FWS") must be consulted.

If NMFS determines that jeopardy or destruction or adverse modification of critical habitat is likely, NMFS "shall suggest those reasonable and prudent alternatives which [it] believes would not violate *subsection (a)(2)* of this section and can be taken by the Federal agency or applicant in implementing the agency action." *16 U.S.C. § 1536(b)(3)(A)*. "Following the issuance of a 'jeopardy' opinion, the agency must either terminate the action, implement the proposed alternative, or seek an exemption from the Cabinet-level Endangered Species Committee pursuant to *16 U.S.C. § 1536(e)*." *Nat'l Ass'n of Home Builders v. Defenders of Wildlife, 551 U.S. 644, 652, 127 S. Ct. 2518, 168 L. Ed. 2d 467 (2008)*.

1. Best Available Science.

Under the ESA, an agency's actions must be based on "the [**39] best scientific and commercial data available." *16 U.S.C. § 1536(a)(2)*; *50 C.F.R. § 402.14(g)(8)* ("In formulating its Biological Opinion, any reasonable and prudent alternatives, and any reasonable and prudent measures, the Service will use the best scientific and commercial data available...."). A failure by the agency to utilize the best available science is arbitrary and capricious. *See Gutierrez II, 606 F. Supp. 2d at 1200*.

"The obvious purpose of the [best available science requirement] is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise." *Bennett v. Spear, 520 U.S. 154, 176, 117 S. Ct. 1154, 137 L. Ed. 2d 281 (1997)*.

> While this no doubt serves to advance the ESA's overall goal of species preservation, we think it readily apparent that another objective [of the best available science requirement] (if not indeed the primary one) is to avoid needless economic dislocation produced by agency officials zealously but unintelligently pursuing their environmental objectives. That economic consequences are an explicit concern of the ESA is evidenced by *§ 1536(h)*, which provides exemption from *§ 1536(a)(2)*'s no-jeopardy mandate where there are no reasonable and prudent alternatives [**40] to the agency action and the benefits of the agency action clearly outweigh the benefits of any alternatives. We believe the "best scientific and commercial data" provision is similarly intended, at least in part, to prevent uneconomic (because erroneous) jeopardy determinations.

Id. at 176-77.

A decision about jeopardy must be made based on the best science available at the time of the decision; the agency cannot wait for or promise future studies. *See Ctr. for Biological Diversity v. Rumsfeld, 198 F. Supp. 2d 1139, 1156 (D. Ariz. 2002)* (the best scientific and commercial data available standard "recognizes that better scientific evidence will most likely always be available in the future"). The "best available science" mandate of the ESA sets a basic standard that "prohibits the [agency] from disregarding available scientific evidence that is in some way better than the evidence [it] relies on." *Am. Wildlands v. Kempthorne, 530 F.3d 991, 998, 382 U.S. App. D.C. 78 (D.C. Cir. 2008)* (internal quotation omitted).

What constitutes the "best" available science implicates core agency judgment and expertise to which Congress requires the courts to defer; a court should be especially wary of overturning such a determination [**41] on review. *Baltimore Gas & Elec. Co. v. Natural Res. Defense Council, 462 U.S. 87, 103, 103 S. Ct. 2246, 76 L. Ed. 2d 437 (1983)* (a court must be "at its most deferential" when an agency is "making predictions within its area of special expertise, at the frontiers of science"). As explained in the *en banc* decision in *Lands* [*822] *Council, 537 F.3d at 993*, courts may not "impose on the agency their own notion of which procedures are best or most likely to further some vague, undefined public good." In particular, an agency's "scientific methodology is owed substantial deference." *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv., 378 F.3d 1059, 1066 (9th Cir. 2004)*.

When specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive." *Lands Council, 537 F.3d at 1000* (quoting *Marsh v. Oregon Natural Res. Council, 490 U.S. 360, 378, 109 S. Ct. 1851, 104 L. Ed. 2d 377 (1989)*). Mere uncertainty, or the fact that evidence may be "weak," is not fatal to an agency decision. *Greenpeace Action v. Franklin, 14 F.3d 1324, 1337 (9th Cir. 1992)* (upholding biological opinion, despite uncertainty about the effectiveness [**42] of management measures, because deci-

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sion was based on a reasonable evaluation of all available data); *Nat'l Wildlife Fed'n v. Babbitt, 128 F. Supp. 2d 1274, 1300 (E.D. Cal. 2000)* (holding that the "most reasonable" reading of the best scientific data available standard is that it "permits [NMFS] to take action based on imperfect data, so long as the data is the best available"). NMFS "must utilize the best scientific ... data available, not the best scientific data possible." *Building Indus. Ass'n v. Norton, 247 F.3d 1241, 1246, 345 U.S. App. D.C. 426 (D.C. Cir. 2001)*, cited with approval in *Kern County Farm Bureau v. Allen, 450 F.3d 1072, 1080-81 (9th Cir. 2006)* ("Absent superior data occasional imperfections do not violate" the ESA best available data standard); *see also Defenders of Wildlife v. Babbitt, 958 F. Supp. 670, 680 (D.D.C. 1997)* (best available science standard does not require "conclusive evidence," only that agency use best science available and not ignore contrary evidence).

The deference afforded under the best available science standard is not unlimited. For example, *Tucson Herpetological Society v. Salazar, 566 F.3d 870, 879 (9th Cir. 2009)*, held that an agency may not rely on "ambiguous [**43] studies as evidence" to support findings made under the ESA. There, in the context of an ESA § 4 listing determination, NMFS "affirmatively relie[d] on ambiguous studies as evidence of persistence (i.e., stable and viable populations), and in turn argue[d] that this 'evidence' of persistence ... proves that the lizard's lost range is insignificant for purposes of the ESA." *Id.* The Ninth Circuit found this conclusion to be unreasonable because "[t]he studies do not lead to the conclusion that the [species] persists in a substantial portion of its range, and therefore cannot support [NMFS's] conclusion. *Id.* [6]; *see also Rock Creek Alliance v. U.S.* [*823] *Fish & Wildlife Service, 390 F. Supp. 2d 993, 1008 (D. Mont. 2005)* (rejecting section 7 biological opinion's reliance on a disputed scientific report, which explicitly stated its analysis was not applicable to the small populations addressed in the challenged opinion).

6 Export Plaintiffs repeatedly rely on *Tucson* to argue that NMFS erred by relying on "ambiguous studies" as affirmative proof of scientific fact. Federal Defendants suggest that Export Plaintiffs' reading of this holding is incorrect, and emphasize that the Ninth Circuit re-affirmed [**44] the general rule that "when examining decisions made under conditions of scientific uncertainty 'a reviewing court must be at its most deferential.'" *Tucson, 566 F.3d at 879*. Federal Defendants suggest that the holding in *Tucson* resulted from the special circumstances in that case, where FWS relied on a single study to affirmatively conclude that a species persisted in a significant portion of its range, even though that one study only addressed two discrete sections of the species' current range. Doc. 484 at 34 (citing *Tucson, 566 F.3d at 882*). This is a distinction without a difference. *Tucson* stands generally for the proposition that, while a court must be deferential in areas where there is scientific uncertainty, such deference is not unlimited. More specifically, an agency may not rely on an ambiguous study for affirmative proof of something the study does not establish.

Alternatively, the presumption of agency expertise may be rebutted if the agency's decisions, although based on scientific expertise, are not reasoned, *Greenpeace v. NMFS, 80 F. Supp. 2d 1137, 1147 (W.D. Wash. 2000)*, or if the agency disregards available scientific evidence better than the evidence on which it [**45] relies, *Kern County Farm Bureau, 450 F.3d at 1080*.

Courts routinely perform substantive reviews of record evidence to evaluate the agency's treatment of best available science. The judicial review process is not one of blind acceptance. *See, e.g., Kern County, 450 F.3d at 1078-79* (thoroughly reviewing three post-comment studies and FWS's treatment of those studies to determine whether they "provide[d] the sole, essential support for" or "merely supplemented" the data used to support a listing decision); *Home Builders Ass'n of N. Cal. v. U.S. Fish and Wildlife Serv., 529 F. Supp. 2d 1110, 1120 (N.D. Cal. 2007)* (examining substance of challenge to FWS's determination that certain data should be disregarded); *Trout Unlimited v. Lohn, 645 F. Supp. 2d 929 (D. Or. 2007)* (finding best available science standard had been violated after thorough examination of rationale for NMFS's decision to withdraw its proposal to list Oregon Coast Coho salmon); *Oceana, Inc. v. Evans, 384 F. Supp. 2d 203, 217-18 (D.D.C. 2005)* (carefully considering scientific underpinnings of challenge to FWS's use of a particular model, including post decision evidence presented by an expert to help the court understand [**46] the complex model, applying one of several record review exceptions articulated in *Esch v. Yeutter, 876 F.2d 976, 991, 278 U.S. App. D.C. 98 (D.C. Cir. 1989)*, which are similar to those articulated by the Ninth Circuit).

Courts are not required to defer to an agency conclusion that runs counter to that of other agencies or individuals with specialized expertise in a particular technical area. *See, e.g., American Tunaboat Asso. v. Baldrige, 738 F.2d 1013, 1016-17 (9th Cir. 1984)* (NMFS's decision under the Marine Mammal Protection Act was not supported by substantial evidence because agency ignored data that was product of "many years' effort by trained research personnel"); *Sierra Club v. U.S. Army Corps of Eng'rs, 701 F.2d 1011, 1030 (2d Cir. 1983)* ("court may properly be skeptical as to whether [the conclusions of an environmental impact statement prepared

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under the National Environmental Policy Act] have a substantial basis in fact if the responsible agency has apparently ignored the conflicting views of other agencies having pertinent experience[]"). A court should "reject conclusory assertions of agency 'expertise' where the agency spurns unrebutted expert opinions without itself offering a credible alternative [**47] explanation." *N. Spotted Owl v. Hodel, 716 F. Supp. 479, 483 (W.D. Wash. 1988)* (citing *Am. Turnboat Asso., 738 F.2d at 1016*).

In *Conner v. Burford, 848 F.2d 1441, 1453-54 (9th Cir. 1988)*, the agency attempted to defend its biological opinions by arguing that there was a lack of sufficient information to perform additional analysis. In rejecting this defense, the Ninth Circuit held that "incomplete information ... does not excuse the failure to comply with the statutory requirement of a comprehensive biological opinion using the best information available," and noted that FWS could have completed more analysis with the information that was available. *Id. at 1454*.

> In light of the ESA requirement that the agencies use the best scientific and commercial data available ... the FWS [*824] cannot ignore available biological info or fail to develop projections of ... activities which may indicate potential conflicts between development and the preservation of protected species. We hold that the FWS violated the ESA by failing to use the best information available to prepare comprehensive biological opinions.

Id.

2. Best [**48] Available Science Standards and the Application of Analytical/Statistical Methodologies.

These above-described standards apply with equal force to the use and interpretation of statistical methodologies. As the D.C. Circuit in *Appalachian Power Co. v. EPA, 135 F.3d 791, 328 U.S. App. D.C. 379 (D.C. Cir. 1998)*, explained in reviewing a challenge to a decision of the Environmental Protection Agency ("EPA") under the "arbitrary and capricious" standard of review:

> Statistical analysis is perhaps the prime example of those areas of technical wilderness into which judicial expeditions are best limited to ascertaining the lay of the land. Although computer models are "a useful and often essential tool for performing the Herculean labors Congress imposed on EPA in the Clean Air Act," [citation] their scientific nature does not easily lend itself to judicial review. Our consideration of EPA's use of a regression analysis in this case must therefore comport with the deference traditionally given to an agency when reviewing a scientific analysis within its area of expertise without abdicating our duty to ensure that the application of this model was not arbitrary.

Id. at 802.

The model must fit the available data. *See Nat'l Wildlife Fed'n v. EPA, 286 F.3d 554, 565, 351 U.S. App. D.C. 42 (D.C. Cir. 2002)* [**49] ("*NWF v. EPA*") (a court will only reject the choice of a model "when the model bears no rational relationship to the characteristics of the data to which it was applied"). For example, *Oceana, 384 F. Supp. 2d at 220*, rejected a challenge to NMFS's use of a particular analytical model that used data drawn from existing literature, even though experts "suggested that reliable take limits cannot be established without quantitative data gathered from in-water' surveys." Although NMFS conceded "a thorough quantitative analysis based on empirical estimates of population size would be a superior way to analyze the impact [] on [the species]," it was undisputed that "given the paucity of information on sea turtles and the difficulties of using the data that does exist, [a] different or more complex model [than that used by NMFS] was not available and could not even be constructed." *Id.* (internal quotations omitted). Likewise, "the fact that a given model has some imperfections does not prevent it from constituting the 'best scientific information available.'" *Oceana v. Evans, 2005 U.S. Dist. LEXIS 3959, 2005 WL 555416, *16-*17 (D.D.C. Mar. 9, 2005)* (citing *16 U.S.C. § 1851(a)(2)*) (approving NMFS's use of a model despite [**50] known limitations, where it was the only model available and the agency supplemented its analysis with other sources to address areas where the model was unable to make accurate predictions).

V. EXPORT PLAINTIFFS' & DWR'S CLAIMS.

A. Alleged Clear Scientific Errors Pertaining to Delta Operations.

A major premise of the BiOp is that pumping "causes reverse flows, leading to loss of juveniles migrating out from the Sacramento River system in the interior Delta and more juveniles being exposed to the State and Federal pumps, where they are salvaged ? at the facilities." BiOp at [*825] 577. The effects analysis also concluded "that juvenile steelhead migrating out from

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the San Joaquin River Basin have a particularly high rate of loss due to both project and non-project related stressors." *Id.* at 577-78. To mitigate for these impacts, the RPA "prescribes Old and Middle River flow levels to reduce the number of juveniles exposed to the export facilities and prescribes additional measures at the facilities themselves to increase survival of fish." *Id.* at 577. In addition, "to improve survival of San Joaquin steelhead smolts," the RPA prescribes "both [**51] increased San Joaquin River flows and export curtailments." *Id.* at 578.

> 7 The State and Federal pumping facilities use louvers to divert salmonids entrained by the pumping process into collection tanks where operators attempt to "salvage" them by returning them to other areas of the Delta. BiOp at 341, 345.

Plaintiffs strenuously argue that NMFS made certain "clear" scientific errors in reaching the conclusion that exports adversely affect juvenile salmonid survival.

1. Challenged Statistical Methodologies.

a. Use of Raw Salvage in Figures 6-65 and 6-66.

NMFS relied on salvage data provided by Plaintiff-Intervenor, DWR, presented in Figures 6-65 and 6-66 of the BiOp:

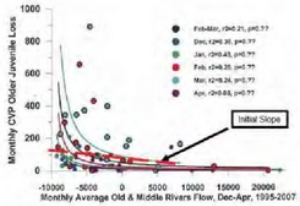

Figure 6-65. Relationship between OMR flows and entrainment at the CVP, 1995-2007 (DWR 2008).

[*826]

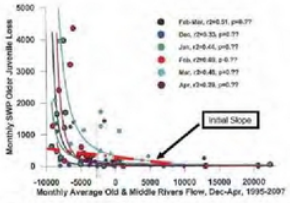

Figure 6-66. Relationship between OMR flows and entrainment at the SWP, 1995-2007 (DWR 2007).

Id. at 361-62. These figures were cited to demonstrate that "[l]oss of older juveniles at the CVP and SWP fish collection facilities increase sharply at [OMR] flows of approximately -5,000 cfs and depart from the initial slope at flows below this." *Id.* at 361. Federal Defendants' cross motion explains that NMFS used this data to "help evaluate where along the spectrum of OMR flows any significant change in salvage could be observed." Doc. 477-1 at 53.

These figures, which are based upon average salvage figures over many years, [**52] use "raw" salvage numbers that are not scaled to reflect the size of the population from which the fish were salvaged at the time the particular sample was taken. Previous rulings in this and the related *Consolidated Delta Smelt Cases* have discussed at length why the use of such data is not consistent with standard practice in the fields of fish biology and population dynamics. *See San Luis & Delta-Mendota Water Authority v. Salazar, 760 F. Supp. 2d, 855, 885-90* (E.D. Cal. 2010). The May 18, 2010 Findings of Fact and Conclusions of Law Re Plaintiffs' Request for Preliminary Injunction ("PI Decision") in this case found:

> 125. ...The comparisons of salvage to negative OMR flows relied upon in the BiOp utilize raw salvage numbers, rather than scaling salvage to population size. *See* Doc. 179, Declaration of Richard B. Deriso at ¶¶ 3-5. Scaling salvage to population size is standard fisheries science practice and could have been accomplished for several of the Listed Species based on existing population data. *See id.* at ¶¶ 5-6. This failure is a fundamental and inexplicable error. Salvage may have been higher in some years simply because the population was higher, not because of any differences [**53] in negative OMR flows. Salvage may have been lower in other years because the population was lower. Dr. Deriso demonstrated the potential significance of this failure by plotting the population adjusted Juvenile Chinook Incidental take rate against OMR flow. Based upon this revised analysis for spring-run and winter-run, Dr. Deriso concluded that there is no statistically significant relationship between the take index and OMR flows. *Id.* at ¶6.
>
> 126. The BiOp's conclusions reached about the spring-run and winter-run Chinook failed to utilize the best available [*827] scientific methodology, because

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population data was available at the time the BiOp was issued that would have permitted NMFS to perform the straightforward population adjustment required to conform to standard, generally accepted practices for fisheries population measurements utilized in their field of expertise. If, in those years when salvage was greatest, population sizes overall were 10 or 100 times larger than other years, the effects might not be jeopardizing. Without adjustment for population size, NMFS's reliance on that figure was arbitrary and capricious.

127. As to the CV steelhead, for which no population numbers are [**54] available, it is less clear whether the use of raw salvage numbers is always inappropriate. Figures 6-65 and 6-66 ambiguously reference monthly CVP and SWP "Older Juvenile Loss" on the y axis. Were most of the salvaged fish represented on these charts Chinook salmon? No reason is offered why NMFS did not segregate the steelhead figures from those of Chinook salmon. If the species had been evaluated separately, would it have been reasonable for NMFS to fail to adjust the steelhead figures for population size? Separate analysis was not done.

Consol. Salmonid Cases, 713 F. Supp. 2d 1116, 1142-43 (E.D. Cal. 2010) (emphasis added).

Federal Defendants attempt to explain their use of these figures in two ways. First, Jeffrey Stuart, NMFS Fisheries Biologist and the primary author of the Delta section of the BiOp, opines that "the general trend in fish loss should still be apparent regardless of scaling." Fourth Stuart Decl., Doc. 485 at ¶ 72. He insists that this data "indicates that additional loss of fish occurs with increasing export levels as measured by the OMR flow values." *Id.* This explanation simply defies common sense. When trying to discern trends from data points that range across [**55] many years, an obvious "confounding variable" is population size. A trend observed in data that is unscaled for population size may change or completely disappear when scaled for population size. *See* Deriso Decl., Doc. 440 at ¶¶ 13 - 31. Federal Defendants had the information needed to perform such a simple analysis of the available data, but did not do so, and unjustifiably relied on the unscaled data to form a quantitative conclusion that salvage rates increased sharply above -5,000 cfs OMR. This was a clear scientific error.

Defendant-Intervenors argue that the agency cannot violate the ESA by failing to take an additional step to scale the salvage data to salmonid population abundance. They maintain that all the ESA requires is that NMFS consider the "available" evidence not that it create new data or "follow scientific practices defined by Export Plaintiffs experts." Doc. 484 at 51. It is true that the best available science standard does not require NMFS to create new data or apply new models to existing data, *Building Indus. Ass'n, 247 F.3d at 1246*. However, here, NMFS put data to a use for which it is not appropriate, as it produces unreliable results. *Cf. NWF v. EPA, 286 F.3d at 565* [**56] (a court may reject agency's choice of model when it "bears no rational relationship to the characteristics of the data to which it was applied"). Every biostatistics expert who presented evidence in this and related fish cases has agreed that it is wholly inappropriate and scientifically unreasonable to draw management conclusions from a plot comparing unscaled salvage data to OMR flows collected over a period of years when population varied. The agency is required to apply generally recognized and accepted biostatistical principles, which constitute best available science, in reaching its decisions.

[*828] b. Was the BiOp's Reliance on Figures 6-65 and 6-66 Harmless?

Alternatively, Federal Defendants argue that any such error was harmless given the other record evidence that supports the BiOp's conclusions. No party has provided authority that a harmless error rule applies when the agency commits a substantive error under the ESA. [8] *Arguendo*, Defendants' alternative evidence is considered.

8 ESA procedural errors are subject to a harmless error analysis. *See Idaho Farm Bureau Fed'n v. Babbitt, 58 F.3d 1392, 1405 (9th Cir. 1995).*

(1) Record Citations Provided by Mr. Stuart.

Mr. Stuart states: "[additional [**57] assessment of the effects of the OMR flow levels on salmon loss was derived from data provided by NMFS staff for the BDCP. NMFS 79238-239; 79240-83808; 90852-98." Fourth Stuart Decl., Doc. 485 at ¶ 73. These are several thousand pages of documents. Mr. Stuart does not explain how the voluminous referenced information was used or analyzed. It is impossible to determine whether these referenced pages provide a sufficient alternative basis for the BiOp's conclusions. NMFS has provided no explanation for an alternative to its scientifically unreliable conclusions. *Humane Soc. v. Locke, 626 F.3d at 1048* (holding NMFS did not offer a satisfactory explanation for its findings); *Am. Turnboat Asso., 738 F.2d at*

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1016 (finding that despite broad discretion afforded NOAA, where record evidence detracts from that relied upon by the agency, a court may find the agency's decision arbitrary and capricious). Citing this information and then failing to explain it is arbitrary and capricious.

(2) Particle Tracking Model Results.

The BiOp also relied on outputs from computer model runs utilizing the so-called Particle Tracking Model ("PTM"). Export Plaintiffs' and DWR's 2010 PI Motion challenged the use [**58] of PTM, arguing that while PTM is useful to track the fate of neutrally buoyant particles, it does not accurately reflect the behavior of salmonids, which are strong, volitional swimmers. These challenges were rejected in the May 18, 2010 PI Decision on the grounds that the BiOp acknowledged the limitations of PTM and reasonably relied on PTM studies to support certain conclusions:

> 120. This is a dispute among scientists. While DWR criticizes PTM modeling, Stuart and NMFS recognized its limitations and found PTM studies helpful to support its conclusions that: (a) as exports increase, negative OMR flows also increase; and (b) that at Station 815 (the confluence of the Mokelumne River and the San Joaquin River), particle entrainment increases from 10% at -2,500 cfs, to 20% at -3,500 cfs, to 40% at -5,000 cfs, and 90% at -7,000 cfs. NMFS, through Mr. Stuart, took into account inherent differences in the movement of neutrally buoyant particles and their speed and direction of travel. Administrative law requires deference to the Agency. Additional record analysis is necessary to determine the extent of support for NMFS's additional opinion that exports affect salmonid survival.

Cosol. Salmonid Cases, 713 F. Supp. 2d at 1141. [**59] These challenges are discussed in other sections of this decision. Here, it is sufficient to note that the PTM results are not a complete replacement for Figures 6-65 and 6-66, as they only explain how particles, not actual fish, would respond to increased OMR flow. Nor do Federal Defendants point to any other information in the record that delineates "where along the spectrum of OMR flows any significant change in salvage could be observed," the [*829] purposes for which Federal Defendants use 6-65 and 6-66.

The same reasoning applies to acoustic tag studies and other data the BiOp relies upon. This other data was treated in the May 18, 2010 decision and below in greater detail. It is undisputed that none of these studies or additional data pinpoint for management purposes at what point negative OMR flows must be controlled. Doc. 347 ¶¶ 128-138.

It is not appropriate to speculate how NMFS's analysis and/or conclusions would have changed had the data used in figures 6-65 and 6-66 been scaled to population size. This must be done on remand.

Whether there is sufficient data to scale CV steelhead salvage information to population size is unclear. *Compare* BiOp at 107 (discussing existing population [**60] data and difficulties posed by "lack of monitoring program") *with* Doc. 431 at 11 (citing Burnham Decl., Doc. 439 at ¶ 42 ("NMFS has access to the number of hatchery-produced salmon each year), for the proposition that NMFS had "readily available" data regarding how many CV Steelhead were released from hatcheries each year)). That scaling for population size may not be possible for all species may limit NMFS's efforts. If population data is unavailable for certain species, the agency must nevertheless explain how it can make management conclusions without such information. The extent to which any such limitations mitigate NMFS's failure to scale raw salvage data cannot be discerned from the present record.

(3) Figures 6-71, 6-72, and 6-73.

The BiOp also relies on a series of plots, taken directly from Reclamation's Biological Assessment ("BA" or "OCAP BA"), of monthly juvenile salmonid "loss" against average exports. The first set of plots, Figure 6-71, depicts loss of juvenile Chinook salmon versus average monthly CVP and SWP exports for a period from 1995 through 2007.

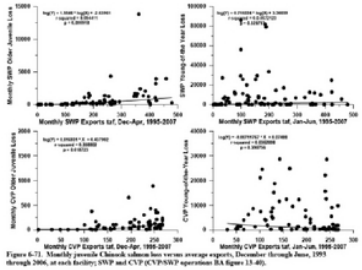

Figure 6-71. Monthly juvenile Chinook salmon loss versus average exports, December through June, 1995 through 2006, at each facility; SWP and CVP (CVP/SWP operations BA figure 13-40).

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[*830] BiOp at 370. This plot was specifically cited as quantitative evidence of a relationship between exports and loss at [**61] the pumps:

> The CVP/SWP operations BA presented data that regressed the loss of older juvenile Chinook salmon against exports (figure 6-71) and found that a significant relationship existed. The relationship was stronger for exports at the SWP (p = 0.000918) than for exports at the CVP (p = 0.0187). The months of December through April resulted in the most informative relationship based on the historical number of older juvenile Chinook salmon salvaged each month and the relationship of each month to salvage and exports. Conversely, regressions performed for monthly salvage of YOY Chinook salmon against exports did not result in a significant relationship at either the SWP or CVP facilities....

Id. at 368-69. In this way, the BiOp used Figure 6-71 as quantitative evidence of a statistically significant connection between loss of older juvenile Chinook salmon and export levels. These plots suffer from the same flaw of mis-using raw salvage data. They must be re-analyzed and explained on remand if they are to be used as scientific justification for the BiOp's conclusions.

Figures 6-72 and 6-73 present a more difficult issue, as they concern CV steelhead salvage, for which much less data [**62] is available. Figure 6-72 plots monthly CV Steelhead salvage (both clipped/hatchery and unclipped/wild [9]) against exports:

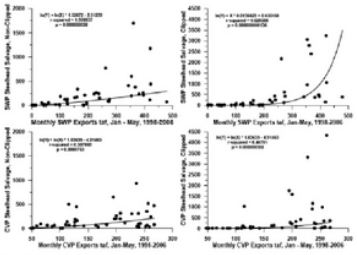

Figure 6-72. Monthly steelhead salvage versus average exports, January through May, 1998 through 2006, at each facility; SWP and CVP (CVP/SWP operations BA figure 15-45).

Id. at 371. The BiOp indicates that these "regressions resulted in significant relationships [*831] between exports and salvage of steelhead at the facilities, more so for the SWP than the CVP." *Id.* at 369. Figure 6-73 plots monthly CV Steelhead salvage against the monthly average export to inflow ratio, finding significant relationships:

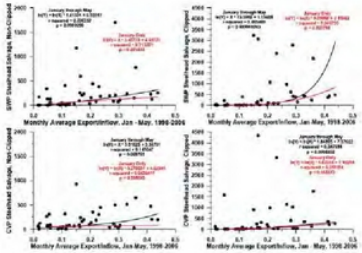

Figure 6-73. Monthly steelhead salvage versus average Export/Inflow ratio in TAF, January through May, and January alone, 1998 through 2006, at each facility; SWP and CVP (CVP/SWP operations BA figure 15-46).

Id. at 370-71. The 2010 PI Decision found that "[a]s to the CV steelhead, for which no population numbers are available, it is less clear whether the use of raw salvage numbers is always inappropriate." *Consol. Salmonid Cases, 713 F. Supp. 2d at 1143.* Export Plaintiffs do not explain how it would be possible to scale to overall population size the wild CV steelhead salvage data, referenced in Figure 6-73 as "unclipped" CV steelhead. However, plaintiffs point out that the exact number of hatchery CV steelhead released each year is known, and therefore argue that NMFS could have scaled the hatchery or "clipped" CV Steelhead data to population size. Doc. 431 at 11. Federal Defendants do not respond to this assertion. There appears to be no [**63] reason to distinguish between the clipped CV steelhead analyses and Chinook salmon analyses, for which population scaling is the best available scientific methodology.

> 9 The term "unclipped" refers to wild fish with intact adipose fins, while "clipped" fish have had their adipose fins clipped before release from a hatchery. BiOp at 337

More importantly, Federal Defendants do not explain how these figures, even if valid, serve the same purpose as Figures 6-65 and 6-66, which were cited to demonstrate that "[l]oss of older juveniles at the CVP and SWP fish collection facilities increase sharply at [OMR] flows of approximately -5,000 cfs and depart from the initial slope at flows below this." *Id.* at 361.

None of the alternative bases offered by Federal Defendants are sufficient to render NMFS's reliance on Figures 6-65 and 6-66 "harmless error." The significance of

No comments

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[*832] Mr. Stuart's voluminous record citations is unexplained. Neither the PTM Modeling Results, nor Figures 6-71, 6-72, or 6-73 provide alternative bases for NMFS's conclusions regarding the negative OMR flows below which loss of juvenile salmonids "increases sharply." Export Plaintiffs' motion for summary judgment that Federal Defendants [**64] acted unlawfully by relying on raw salvage analyses is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

c. Separate Challenges to Statistical Analyses in Figures 6-71, 6-72, and 6-73.

Export Plaintiffs also maintain that all three sets of graphs misrepresent the statistical significance of the data because "the decision to divide the data by month created an arbitrarily large sample size." Doc. 431 at 10. According to Export Plaintiffs, this "produce[d] facially incredible P-values (the standard statistical measure of significance) that misrepresented the validity of the models that were fit to the data." *Id.* A P-value "represents the probability that the result obtained in a statistical test is due to chance rather than a genuine relationship between the variables." Burnham Decl., Doc. 439 at ¶ 43. Regression analysis is generally considered statistically significant when the P-value is smaller than 0.05. *Id.*

The upper right graph from Figure 6-72, which plots monthly SWP exports for January through May of 1998 through 2006 against the raw salvage of hatchery steelhead, presents a P-value of 0.000000000136. This is several million times smaller than 0.05. [**65] Dr. Burnham opines that while "[s]uch a P-value is not impossible ... it would be surprising and especially so with this graph" because "[t]he scatter of the data points indicates that the regression is not a very good fit." *Id.* at ¶ 44.

Dr. Burnham describes the R^2 value of 0.62 as not very strong. The R^2 value is a statistical measure of how well the regression explains the data. "Roughly speaking an R^2 of 0.5 means that the regression accounts for 50% of the variation observed in the data, while the other 50% is explained by other, unknown factors. Generally speaking an R^2 of 0.5 is considered weak, while an R^2 of 0.8 or above is considered strong." *Id.* at ¶ 36.

Dr. Burnham opined that this high level of apparent "significance" is the result of treating each of the monthly export points as an independent data point, which increases the sample size and influences the P-value. *Id.* at ¶ 45. Because the monthly data is "highly correlated with each individual year, due to the unique natural conditions that characterize each year, such as the abundance of the salmon cohort, patterns of flow, changes in temperature, etc." *Id.* at 47. Dr. Burnham offers a helpful explanation of why this is [**66] a problem:

> For example, a medical researcher could misrepresent the significance of a drug study by performing [a] test on 10 people, and then treating the results for each individual person as if that person was 100 people. If the initial result of the test on 10 people was that 80% had been cured by the drug, nothing would change by acting as if the test had been performed on 1000 people: 80% would still be cured. However, the study would appear more significant because of the claim the results were true for a 1000 people rather than 10 people.

Id. at ¶ 46. In the present case, Dr. Burnham opines that NMFS's approach caused the relationship between exports and salvage to "appear more significant than it really is," when in fact "the high salvage levels in [certain] years may have actually been primarily caused by one independent factor, such as a large hatchery release [*833] that year." *Id.* at ¶ 49. The results of the "January Only" data depicted in red on Figure 6-73, are different, showing much higher P-values, with only one of the four graphs showing statistical significance. *Id.* at 51.

Mr. Stuart responds to these critiques in his Fourth Declaration:

> ... Dr. Burnham critiques the statistical [**67] analysis of the data that was presented to NMFS in the biological assessment by DWR. NMFS reported the data presented by DWR in the BA as it was written without altering its content. While the probability of the regressions lines is unusual, having an unusually low "p" value, this is not a reason to completely disregard the data because the general trend of the lines is consistent with trends previously seen in consultations and reports provided to NMFS. This data is also consistent with the results of the radio tagged salmon studies conducted by Vogel in the South Delta in 2000 and 2001 in which tagged fish were drawn to the export facilities in higher numbers when exports were high as compared to lower levels of exports (Vogel 2002 cited in Vogel 2004). NMFS regarded the trends as more explanatory biologically than the accuracy of the statistical analysis being reported.

No comments

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Doc. 485 at ¶ 75. Mr. Stuart now argues that the trend lines have biological significance even if the statistical analyses were incorrectly performed. Yet, the BiOp specifically emphasizes how these graphs demonstrated "significant relationship[s]" between the variables. *See, e.g.*, BiOp at 369.

Mr. Stuart also provides [**68] a substantive rebuttal to Dr. Burnahm's critique of the statistical analyses, premised on Dr. Burnham's argument that it was clear error to use monthly data points in the correlation analysis because they are highly correlated within years. Mr. Stuart opines that this premise is flawed because "[m]onthly exports do not necessarily correlate with each other between months or between years." Fourth Stuart Decl., Doc. 485 at ¶ 76.

> For example, exports in March do not correlate with exports in April and May from 2000 to 2006, as Dr. Burnham has alleged, since exports are curtailed in April and May for the VAMP experiment during this time period. So regardless of what the March pumping rate is, the exports in April and May will be lower. Likewise, exports in January are allowed to reach a maximum of 65 percent of the inflow to the Delta, while exports from February through June are only allowed to reach a maximum of 35 percent of inflow.

Id. This provides a partial explanation for the statistical analyses.

This is an area of disagreement among experts. The agency is due deference in such circumstances, unless its experts' opinions are unsupported or wrong. *Cactus Corner, LLC v. U.S. Dept. of Agric., 346 F. Supp. 2d 1075, 1113 (E.D. Cal. 2004).*

> When [**69] specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive.

Marsh v. Oregon Natural Resources Council, 490 U.S. 360, 378, 109 S. Ct. 1851, 104 L. Ed. 2d 377 (1989) (explaining in the context of an agency's decision not to supplement a NEPA environmental impact statement that "courts should not automatically defer to the agency's express reliance on an interest in finality without carefully reviewing the record and satisfying themselves that the agency has made a reasoned decision based on its evaluation [*834] of the significance-or lack of significance-of the new information" and noting that "[a] contrary approach would not simply render judicial review generally meaningless, but would be contrary to the demand that courts ensure that agency decisions are founded on a reasoned evaluation "of the relevant factors").

This is a close call. Dr. Burnham's opinion suggests that it was unreasonable for NMFS to rely on the statistical analyses it performed. Mr. Stuart offers some explanation to counter certain aspects Dr. Burnham's critique, but does not satisfactorily explain the [**70] anomalous statistical results. Because the BiOp's reliance on these graphs must be remanded for other reasons, the agency must explain the flaws in its approach to the statistical analyses on remand.

2. Failure to Perform a Population-Level Quantitative Analysis.

Plaintiffs maintain that the BiOp violated the best available science requirement because it failed to employ a "population-level quantitative analysis." Doc. 431 at 15. It is undisputed that quantitative population dynamics models, or life cycle models, are the most reliable method to evaluate the impacts of various stressors on a fish population. This has been indisputably established in these related cases. Plaintiffs' expert Dr. Hilborn opined:

> Life cycle modeling for salmonids is widely recognized as an available and necessary scientific tool, and is generally accepted in the scientific community as the best method for identifying the factors affecting fish population abundance and determining the significance or relative importance of distinct factors causing salmonid fish population increases or decreases.

Hilborn Decl., Doc. 443 at ¶ 5. The BiOp concedes that "[i]deally, a life cycle approach, in which the effects on individual [**71] life stages on the life cycle could be estimated independent of the effects on other stages, would be implemented to assess the relative impacts on abundance...." BiOp at 66.

However, such models only qualify as "best available science" where an appropriate model is available. [10] In the *Consolidated Delta Smelt Cases*, an appropriate smelt population dynamics was not available at the time the biological opinion in dispute in that case was issued:

No comments

- n/a -

The ESA does not require FWS[] to generate new studies. In *Southwest Center for Biological Diversity v. Babbitt, 215 F.3d 58, 342 U.S. App. D.C. 58 (D.C. Cir. 2000)*, the district court found "inconclusive" the available evidence regarding FWS's decision not to list the Queen Charlotte goshawk, and held that the agency was obligated to find better data on the species' abundance. The D.C. Circuit reversed, emphasizing that, although "the district court's view has a superficial appeal ... this superficial appeal cannot circumvent the statute's clear wording: The secretary must make his decision as to whether to list a species as threatened or endangered 'solely on the basis of the best scientific and commercial data available to him....' *16 U.S.C. § 1533(b)(1)(A)*." *Id. at 61* [**72] (emphasis added); *see also American Wildlands v. Kempthorne, 530 F.3d 991, 998,* [*835] *382 U.S. App. D.C. 78 (D.C. Cir. 2008)* (the "best available data" standard "requires not only that the data be attainable, but that researchers in fact have conducted the tests").

Plaintiffs advocate a narrow reading of both *Southwest Center* and *American Wildlands*, arguing these cases only mean that the agency is not required to gather new data in the field regarding a species if such information is not already available. Doc. 697 at 22. Plaintiffs object that "[n]either of these cases supports Defendants' position that FWS could disregard the smelt abundance data that were already in its possession and fail to undertake the necessary statistical analyses to satisfy its statutory mandate to determine 'whether the action ... is likely to jeopardize the continued existence of the species.' *50 C.F.R. § 402.14(g)(4)*." *Id.*

Plaintiffs cite no authority suggesting that the nonexistence of an analytical model should be treated any differently from the non-existence of raw field data. FWS did not have an off-the-shelf form of "statistical analysis" it could apply to determine the effects of Project Operations on the delta smelt population. [**73] Although life-cycle modeling is standard practice in the field of fisheries biology, and a life-cycle model is being (and should have been) developed for delta smelt, it is undisputed that an appropriate life cycle model had not been developed at the time the BiOp issued. FWS must apply the best "available" science; not the best science possible. FWS's failure to apply a life cycle model did not per se violate the ESA or the APA.

San Luis v. Salazar, 760 F. Supp. 2d at 884-85.

10 Plaintiffs also point to several documents in the administrative record where scientific experts recommended that NMFS use a quantitative life cycle model. *See, e.g.*, AR 00108170 (CALFED Science Panel commissioned by NMFS to review a draft version of the BiOp noted that the "lack of quantitative modeling ... and lack of integrative life-cycle modeling for salmon" was "[o]ne of the most important limitations to the analyses used in the draft [BiOp]"). However, these recommendations are not dispositive of whether the models discussed were "available."

The 2010 PI Decision in this case found that Plaintiffs' were not likely to succeed on the merits of their life cycle modeling claim because they had not "present[ed] [**74] evidence that they, or anyone else[,] developed or made available to NMFS an appropriate life cycle model or the results of an appropriate life cycle analysis prior to the issuance of the BiOp." *Consol. Salmonid Cases, 713 F. Supp. 2d at 1132*. However, the PI Decision is not law of the case. *S. Or. Barter Fair v. Jackson County, Or., 372 F.3d 1128, 1136 (9th Cir. 2004)* ("[D]ecisions on preliminary injunctions are just that-preliminary-and must often be made hastily and on less than a full record.") (citing *Univ. of Tex. v. Camenisch, 451 U.S. 390, 395, 101 S. Ct. 1830, 68 L. Ed. 2d 175 (1981))*.

Plaintiffs insist that NMFS did have access to "several fully featured quantitative life-cycle models[,] which had been specifically designed for use in the Delta...." Doc. 431 at 15. Plaintiffs focus on the Interactive Object-Oriented Salmon simulation ("IOS") model, developed by Bradley Cavallo, and the *Oncorhynchus* Bayesian Analysis ("OBAN") model, which was developed in coordination with NMFS. *Id.* at 19

a. IOS.

The BiOp discussed its decision not to use IOS, which was designed to evaluate the influence of different Central Valley water operations on the life cycle of winter-run using simulated historical flow and water temperature [**75] inputs." BiOp at 65.

No comments

- n/a -

NMFS did not use the results of the IOS model for our analysis in this Opinion because the intended application of the model in the CVP/SWP operations BA was not useful for estimating, in an overall sense, how winter-run might respond to the proposed action. For example, the CVP/SWP operations BA cautions the use of the IOS model results in making inferences related to how winter-run abundance is affected by the proposed action: "*In evaluating effects of the proposed actions, differences* [*836] *between the three studies rather than absolute trends should be examined*" (Appendix O in CVP/SWP operations BA). Thus, it seems that the IOS model results presented in the CVP/SWP operations BA are not intended to reflect either abundance estimates observed in the past or future abundance with implementation of the proposed Project. Estimates based on observations are much different than estimates based on modeling without observation input. Results of the IOS model presented in the CVP/SWP operations BA show an increasing trend in winter-run escapement throughout the entire simulation period (i.e., from 1923 through 2002), such that by 2002, escapement is above 40,000 fish for [**76] all CALSIM II studies examined (figure 11-5 in CVP/SWP operations BA). Those results contrast with observed winter-run escapement estimates, which show a dramatic population crash during this period (see Grandtab at http://www.delta.dfg.ca.gov/afrp/), eventually leading to their endangered status under the ESA.

In the Opinion, NMFS must consider how winter-run is expected to respond to implementation of the proposed action. Model results, such as the IOS model results presented in the CVP/SWP operations BA, that are not intended to at least generally approximate past or future conditions, do not inform us in this consideration. If the IOS model results in the CVP/SWP operations BA are intended to be used strictly as an alternatives comparison tool, as the CVP/SWP operations BA indicates, instead of one that produces somewhat meaningful trend information for individual model runs, then the utility of those results for the Opinion is limited, particularly considering that a model alternative representing just baseline conditions does not exist. The CALFED Peer Review Panel stated that, "*The default should be comparing the CALSIM studies of future scenarios (with different scenarios for* [**77] *climate change) to baseline*"(Anderson *et al.* 2009). The context of this statement was that comparisons among alternatives such as those used in the IOS model (e.g., CALSIM studies 6, 7, and 8) are inconsistent with the Opinion's analytical approach. As such, NMFS did not use the IOS model results presented in the CVP/SWP operations BA as evidence for analyzing how winter-run will be affected by the proposed action.

Another consideration for not using the IOS model in the Opinion is that the model has not yet been published in peer reviewed scientific literature, and NMFS does not understand either the model's limitations or its extent. As described in Paine *et al.* (2000), mathematical models intended to help guide management of natural populations must be used wisely and with understanding of limitations. One potential limitation associated with applying large scale models over the entire life cycle of a species, as is done in the IOS model, is whether enough data are available to reliably estimate model parameters. Paine *et al.* (2000) state: "*When the data are not available for the needed estimates of parameter values, there is a tendency to insert values based on opinion or expert* [**78] *testimony. This practice is dangerous. The idea that opinion and "expert testimony" might substitute for rigorous scientific methodology is anathema to a serious modeler and clearly represents a dangerous trend.*" With these considerations in mind, NMFS did not utilize the IOS model in this Opinion.

Id. at 65-65 (italics in original). It is ironic that NMFS's reverence for "rigorous scientific methodology" is honored in the breach by the agency's failure to utilize [*837] the most rigorous method possible in the disputed BiOp.

No comments

- n/a -

Garwin Yip, supervisor for the Water Operations and Delta Consultations branch of NMFS's Sacramento Area Office, elaborated on the first explanation provided in the BiOp -- that IOS estimates did not match actual historic winter run population levels -- by pointing out that even Plaintiffs' expert Dr. Burnham stated that: "If the data does generally not match the model, then we know that our assumption is somehow incorrect and needs refinement." Yip Decl., Doc. 481 at ¶ 9 (citing Burnham Decl., Doc. 439, at ¶ 24). Mr. Yip points out that "[h]ad NMFS based our conclusion for winter-run on the quantitative approach of the IOS life cycle model results contained in the BA, we [**79] would have erroneously concluded that the proposed CVP/SWP operations would help a great deal in recovering the species, rather than jeopardizing it." *Id.* at ¶ 10.

Second, Mr. Yip points out that the CalFed Science Panel, in its review of the December 11, 2008, draft BiOp, discussed NMFS's decision not to use IOS in the BiOp and acknowledged that "the IOS model is relatively new and has not been extensively vetted and published, but all of these types of models are flexible and the Panel wonders if, with sufficient time and with some adjustments and modifications, whether a new version of the IOS could be used." *Id.* at ¶ 11 (citing AR [11] 00108178 (Anderson, *et al.* 2009)). The CalFed Science Panel did not recommend or encourage the use of IOS in its current state at the time the BiOp was being developed.

> 11 All references to the NMFS administrative record are noted as "AR" references. References to the separate Reclamation administrative record will be noted as "USBR AR."

Mr. Yip points out that the NMFS Central Valley Office requested that NMFS's Southwest Fisheries Science Center ("NMFS-SWFSC") review various models, including IOS, for overall assumptions and limitations. According to [**80] Yip, NMFS-SWFSC "did not have the considerable staff resources and time it would take to adequately review and comment on the IOS model, it did have previous experience with similar models developed by Cramer Fish Sciences, and therefore, offered some comments." *Id.* at ¶ 12.

> To adequately review such a model [IOS model] one must thoroughly examine the model's foundation, functional relationships, error structure, and parameter values in order to assess the quality of the model's resulting inferences. The range of elements incorporated in similar models developed by this contractor [Cramer Fish Sciences] is extensive, many of which are hypothetical in nature and remain the focus of active research. For those model elements that are well-founded, many of the parameter values will, given the data poor situation we find ourselves in, have been set using data from other populations, locations, species, or simply by assumption. Adequate review of the appropriateness of the assumed functional relationship and parameter values would require a significant amount of time.... Parenthetically, we note that the use of large and complex models in data-poor situations runs directly counter to the [**81] advice given to NMFS by expert scientific review panels concerned with salmon recovery.

AR 00101045-6 (emphasis added).

NMFS contends that the IOS model was not available in a reliable, appropriate, and usable form at the time the BiOp was developed, and denies that IOS could have been adapted in a reasonable amount of time for use in the BiOp. NMFS knows all experts agree a life cycle model is the best methodology for measuring population effects. The agency continues to dodge serious [*838] questions the parties are entitled to have answered by refusing employ existing models. At the same time, NMFS continues to plead poverty by describing this case as a "data-poor situation." If the data is so sparse that a workable model cannot be formulated, when does NMFS's failure to ensure appropriate data collection is taking place constitute bad faith? After more than five years of dispute, future pleas of data poverty will no longer be accepted.

As to the IOS model, although it is a close call, Federal Defendants' contention that IOS was not available in a reliable form at the time the BiOp issued has not been rebutted. Plaintiffs' motion for summary judgment that NMFS violated the ESA by failing [**82] to apply IOS in the BiOp is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

b. OBAN.

Plaintiffs further argue that NMFS acted unlawfully by failing to apply the OBAN model in the BiOp. The BiOp mentions OBAN, but does not specifically address it, opting instead to generally explain that because existing life-cycle models only address population abundance, leaving out other aspects of the Viable Salmonid Population ("VSP") framework (e.g., spatial structure and genetic and life history diversity), the BiOp's analysis is superior because it encompasses these other factors:

No comments

- n/a -

An alternative approach recommended by the CALFED Science Review Panel for estimating an ASR for the Central Valley includes the use of computer models. In particular, the IOS model (Cavallo *et al.* 2008) and the Oncorhynchus Bayesian Analysis (OBAN) model (Hendrix 2008) were referenced as potentially useful tools. IOS is a detailed mechanistic model that describes the entire life cycle of both winter-run and spring-run in the Sacramento River, while the OBAN model is a Bayesian statistical model for winter-run in the Sacramento River. Although the CALFED Science Review Panel identified [**83] these models as potentially viable options either in combination or independently, it acknowledged the necessary refinement and implementation of this type of model by NMFS for the Opinion may not have been practical because of time constraints and the need for additional modeling expertise. Further development of mortality rates at different life stages specific to the Central Valley could be incorporated into the model to reduce the amount of assumptions currently required, and lead to more realistic and informative results. However, as previously mentioned, this type of information will not be available in the near term. Moreover, in order to sufficiently address the issue of fish routing through the Delta, identified as a critical component by the CALFED Science Review Panel, additional data collection and modeling over the long term (i.e., beyond the timeline allowed for the development of this Opinion) would be required.

As discussed above, this Opinion equates a listed species' probability or risk of extinction with the likelihood of both the survival and recovery of the species, and uses "likelihood of viability" as a standard to bridge between the VSP framework (McElhany *et* [**84] *al.* 2000) and the jeopardy standard. Assessing the viability of salmonid populations requires the consideration of other parameters in addition to population abundance, including productivity (*i.e.*, population growth rate), spatial structure, and genetic and life-history diversity (McElhany *et al.* 2000) . All four VSP parameters are deemed important in evaluating a population's ability to persist, especially when faced with catastrophic [*839] disturbances (Lindley *et al.* 2007) . Although the life cycle modeling approaches discussed above have the potential to provide information on all VSP parameters at some point in the future, it would require substantial data collection and model refinement. Any present attempt to complete such an exercise would only address one of those parameters (*i.e.*, abundance), and any results would include making many assumptions. Therefore, although a method for evaluating impacts during a specific life stage in terms of the overall loss in numbers of fish would be useful, there are other potential consequences resulting from project operations that need to be considered. For example, are mortalities at different life stages, or the loss of historical habitats, [**85] likely to have effects on the other VSP parameters? The analyses within this Opinion, in an attempt to encompass this broader range of effects, focused on determining whether or not appreciable reductions were expected from the proposed action, rather than trying to quantify the absolute magnitude of those reductions.

Id. at 67-68.

NMFS staff from the Seattle office collaborated with Dr. Nobel Hendrix, the author of the OBAN model, during the model's development. AR 00050578. Throughout 2008, NMFS communicated with Dr. Hendrix about the model, AR 00023869-70, and NMFS staff scheduled and attended meetings about the model, *see, e.g.*, AR 00050874. NMFS requested that its own Science Center review the OBAN model. AR 00046767-69.

Plaintiffs argue that Dr. Brian Wells, an NMFS fisheries biologist, described the OBAN model as "a great approach," AR 00050825, "a superior model design" and "well thought out," a model that "is the best approach laid out yet and deserves full attention," AR 00103798. Plaintiffs selectively quote Dr. Wells. For example, in a November 13, 2008 letter to Bruce Oppenheim, a NMFS biologist working on the BiOp, Dr. Wells did compliment the OBAN model:

> Statistically, this [**86] is a superior model design because it integrates each life-history phase transition appropriately

No comments

- n/a -

> through a string of Beverton-Holt recruitment models [citations]. The approach is well thought out and, with appropriate data, could result in an intriguing model that will allow the user to determine the potential impact of management decisions at any given life-history stage on the ultimate production of the stock...

AR 000103798. However, his next paragraph raises a concern about the available data set:

> The only criticism I have for this approach is in the capacity of the dat[a] to address these questions. At each stage the data is compromised. For instance, Chipp's Island data does not allow for stock-specific allocation of production and ocean data is reliant on notoriously poor effort data which is not stock specific. Such data will undoubtedly reduce the precision of these models to predict the effects of variability at each life-history phase on the cohort and it is possible that the process error could become cumulatively greater as additional life stages are strung together. Having said that, this is the best approach laid out yet and deserves full attention. The author is clearly [**87] aware of the data limitations and through his approach has done the best to accommodate.

Id.

The model's own developer agreed with the Science Center's concern that OBAN contains "a lot of factors that are hypothesized to affect winter run relative to the [*840] amount of data," and suggested that a "goal of the modeling effort is to identify some of the most important places to collect additional data." AR 00054082 (emphasis added). As of February 2009, NMFS still had not received a clear response about whether appropriate and sufficient data were available to reliably model population dynamics using OBAN. AR 00070672 (indicating it "is uncertain as to whether appropriate and sufficient data are available to reliably model the population dynamics of winter-run Chinook salmon and spring-run Chinook salmon. If appropriate data are not available, application of the OBAN and IOS models to inform risk analysis may lead to erroneous management decisions. Before utilizing the OBAN or IOS models, it is necessary for PRD to gain further confidence in the various results each model can produce.").

Plaintiffs also do not address the 2010 PI Decision's finding that the application of population or life [**88] cycle models is not feasible for any analyses applicable to the CV steelhead, for which no population indices are available. *Consol. Salmonid Cases, 713 F. Supp. 2d at 1164*.

Federal Defendants also remonstrate that even if sufficient data had been available, email communications in late 2008 and early 2009, while the BiOp was being prepared, describe the model as still under development. *See* AR 00060571 (January 21, 2009 email discussing need to develop temperature metrics). The software needed to run the model was not available until late April 2009. AR 00086362 (April 20, 2009 workshop demonstrating new software for OBAN model).

Plaintiffs rejoin that "Defendants' principal criticism of the OBAN model ... that the data were incomplete ... suggests a fundamental misunderstanding of life-cycle modeling generally." Doc. 48 at 15. Plaintiffs characterize Defendants' position as based on an erroneous premise that a life cycle model can never be used unless and until it is fully and finally perfected, peer reviewed, and populated with perfect data." *Id.* Plaintiffs complain that this is an impossible standard that ignores the reality that perfect data does not exist and that modeling is an [**89] iterative process. For example, Dr. Hilborn opines that life cycle models are "always evolving and many times being challenged by models that make alternative assumptions." Hilborn Reply Decl., Doc. 496 at ¶ 26.

> The standard scientific approach is a process of confronting competing models with data, not having a perfect and unchanging model. To suggest that a model is unavailable for use because it will require some adjustment or refinement ignores this reality.

Id. Dr. Hilborn pointed out that preliminary results from OBAN indicated that water temperature and harvest were the dominant factors affecting salmonid populations and that water exports was "not one of the most powerful explanatory factors." *Id.* at ¶ 25.

The record reflects that NMFS was working in late 2008 to integrate OBAN into the consultation process, *see* AR 00060572-73; AR 00052306-07, but that the agency elected not to make use of the model in the final BiOp approximately three months months before the BiOp was issued, AR 0065191-94. Plaintiffs assert that this was unreasonable because OBAN was "fully functional and ready to be integrated into the BiOp." Doc. 487 at 16. Agency experts concluded that there was not enough [**90] data to reliably apply OBAN. [12]

No comments

- n/a -

12 NMFS also claims it did not have the expertise to make use of such a model. Plaintiffs rejoin that any lack of modeling resources was manufactured by NMFS, "which could easily have made modeling resources available to the BiOp team," pointing to various individuals within NMFS who could have done the work. Doc. 487 at 17-18. This debate raises difficult issues. On the one hand, an agency cannot be permitted to ignore the best available science simply because it refuses to assign to the task personnel with the expertise to understand and apply that science. On the other hand, NMFS has limited resources, and a court cannot instruct an agency how to allocate those assets. While it may be reasonable to demand that NMFS assign to the BiOp team individuals who can correctly apply readily available statistical methodologies, at some point Plaintiffs' demands that NMFS assign specific experts on its staff to fine tune the application of OBAN to the purposes of the BiOp becomes a demand that NMFS develop new science. Where the line between these two extremes should be drawn is not clear. It is relevant that no outside expert (government, academic, or consultant) [**91] had applied OBAN in the manner Plaintiffs demand prior to the issuance of the BiOp. Plaintiffs were free to submit their own studies and results for NMFS's consideration. They did not.

[*841] This is more disassembling by NMFS. Having not devoted necessary attention to OBAN, it rationalizes its doubts about the reliability of application of OBAN in the BiOp as not clearly erroneous. NMFS remains in the position where it can raise doubt about all conflicting science and hide behind the rubric it cannot be compelled to collect data or develop a model. Plaintiffs' motion for summary judgment that NMFS violated the ESA by failing to apply the OBAN model in the BiOp is DENIED and Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED, but this is the last time NMFS will be permitted to avoid studying, analyzing, and applying a life cycle model. NMFS's chronic failure to do so now approaches bad faith in view of the undeniable importance of the information to resolve the perennial dispute over population dynamics. At some point, this diminishes the agency's credibility.

c. Ricker and/or Beverton-Holt Models.

Plaintiffs argue that, even if use of the IOS and/or OBAN models was not [**92] legally required, NMFS violated the ESA because it did not make use of certain "basic tools of fisheries management," such as the Ricker or Beverton-Holt models, two mathematical models developed in the mid-1900s. *See* Doc. 431 at 26. According to Plaintiffs' expert Dr. Burnham, these models make use of "simple mathematical expressions, based solely on past observations [that] combine all life history and environmental information into the period between parent spawners and the resultant returning spawners in the next generation." Burnham Decl., Doc. 439 at ¶ 18. According to another of Plaintiffs' experts, Dr. Ray Hilborn, these models are part of a "standard set of population dynamics models ... that form the core of the body of knowledge" among fisheries biologists. Hilborn Reply Decl., Doc. 493 at ¶ 6. Dr. Hilborn concludes:

> NMFS should have at the very minimum used simple multiple regression with Ricker or Beverton-Holt models (as discussed in the declaration submitted by Dr. Richard B. Deriso (Doc. 440-0)) to see if exports or OMR flows and other factors such as ocean harvest rates, ocean upwelling, and (for winter Chinook) water temperatures on the spawning grounds were related [**93] to the cohort replacement rates. Such an analysis can be done in a matter of hours, and NMFS has dozens of scientists at the Science Centers who could have done this analysis. I find no explanation in the BiOp or the administrative record why such an analysis was not performed. It is 1940s science, is available, and could have and should have been performed at the very outset of the BiOp.

Id. at ¶ 30.

NMFS's biologist Garwin Yip submitted a detailed response:

> [*842] 23. Dr. Hilborn suggests that NMFS should have performed a statistical regression analysis to identify whether or not various environmental factors were related to, for example, the cohort replacement rate. Hilborn Reply Decl. ¶7, ¶30. While it's true that building a multiple regression model can be relatively simple and straightforward using available programs such as Excel, it is also true that many data are not suited for analysis with a straightforward multiple regression model. For example, Newman and Rice (2002, NMFS 127363-73) note that:

No comments

- n/a -

"The work of Kjelson *et al.* (1989) was closely scrutinized by numerous interested parties, and their methodology was criticized on a number of grounds. The assumptions and methods for estimating [**94] the indices, the application of standard linear regression to dependent variables ranging between 0 and 1, and the selection of covariates were major criticisms. In light of these criticisms, the interested parties chose to bring in statisticians previously unaffiliated with this work (namely, the authors) in an attempt to develop an alternative approach for modeling the release-recovery data. This article describes the resulting model. Although the approach here was quite different from that of Kjelson *et al.*, some of our conclusions were quite similar-for example, the sizeable effect of water temperature."

NMFS 127364. Indicative of the sophistication of the Newman and Rice (2002) analysis is the fact that it was published not in a fisheries or ecological journal, but rather in the Journal of the American Statistical Association.

24. Further warning of the potential pitfalls of using a "basic procedure" comes from p. 285 of Hilborn and Walters (1992), on the page immediately following the excerpt quoted by Dr. Hilborn, Hilborn Reply Decl. ¶7. After providing general equations for including multiple environmental terms in the Ricker and Beverton-Holt models, Hilborn and Walters (1992) [**95] ask "Why is this dangerous?" and proceed to say that "as tempting as it is to add environmental variables to stock-recruitment data, this is a potentially dangerous practice." On the same page, an explicit "warning" message reads "Be very, very cautious in fitting environmental variables, as it is almost impossible to make sure the apparent correlation is not spurious." (see Exhibit 1).

25. The devil is in the details, of course. I do not disagree with Dr. Hilborn's view that a basic regression analysis, possibly including an assessment of environmental terms in a standard stock-recruitment relationship, can be useful in many situations. However, in the specific case of evaluating the effects of CVP/SWP operations on cohort replacement rates of ESA-listed fish in California's Central Valley, I note that the "basic procedure" he suggests grows rather quickly either into a more complicated procedure, or into a "basic procedure" that relies on a set of assumptions that make interpretation and application of the analysis result more complicated. Consider, for example, a simple regression of cohort replacement rate (CRR) for winter-run Chinook salmon, against a single environmental factor. [**96] Below, I discuss several issues that would either complicate the analysis, or require simplifying assumptions: the interaction of age structure with the environmental variable of interest, and the selection of specific environmental measures.

26. First, how would the age structure of the spawning population in a given year be handled? One could, as did NMFS in the CRR summary provided in the status section for winter-run Chinook [*843] salmon (BiOp at 83), assume that the spawning population was composed entirely of three year olds. Using this assumption, the CRR is calculated as the spawning population at time t divided by the spawning population at t-3. While this assumption keeps the life-history model simple, it introduces an inaccuracy into the estimate of cohort replacement rate (unless one makes yet additional assumptions), since the 2- and 4-year olds in the spawning population at time t have actually been produced by spawners at time t-2 and t-4, respectively. The assessment of potential environmental influences on CRR can also be affected by this assumption of no age structure in the spawning

No comments

- n/a -

population, depending on the environmental factor being considered. For example, an assessment [**97] of attraction flows in year t (the year of return) as a factor affecting CRR would still be very appropriate, since all returning fish, regardless of age, would have experienced the flows observed in year t. In contrast, an assessment of OMR flows (or Sacramento River flow, or exports) during the juvenile outmigration period in year t-3 (the brood year) as a factor affecting CRR would be less appropriate, since the 2- and 4-year olds would not have experienced those OMR flows (or Sacramento River flow, or exports). Even if 3-year olds do make up the majority of spawners in a given year, 2- and 4-year old fish may well introduce sufficient mismatch into the model as to mask any environmental effect. Adjusting the model to allow appropriate matching of environmental factor with each age class of spawner leads down a yet more complicated analysis path.

27. Second, what measure would one use to assess "simple" effects like exports or OMR? Looking at row 16e of the stressor table for winter-run Chinook salmon (Table 9-1, BiOp at 452-460), one might choose to assess the impacts of OMR flows during the juvenile emigration period on CRR. Row 16e notes that OMR flows are a potential stressor [**98] in the Delta for juvenile winter-run Chinook salmon from November through May, so that's one possible averaging period, though clearly winter-run are more prevalent in the Delta in some months within that period than in others. Dr. Deriso, in his basic analysis of winter-run population growth rate against OMR flows, used the average OMR flow from December through March. Mechanistically, the impacts of OMR are likely to occur on the scale of days to weeks - it is not clear how to capture the effects of OMR variability at this temporal resolution in a model that (unless it is made more complex) calls for an environmental time series with a single value per year.

28. As described in the previous paragraph, a single, "simple" effect could be modeled in many ways. If one wants to consider additional effects (e.g., temperature during the spawning period, exports), each of which also can be modeled in various ways (and for factors such as temperatures, may have watershed-specific values), the possible list of environmental time series grows large very quickly. With this abundance of possible environmental effects, one needs to be very cautious about the risks of overfitting the model (which [**99] is an increasing risk as one includes more and more environmental factors into a single regression analysis) or the risks of increasing the Type 1 error rate by performing a large number of simple, single-factor comparisons. While there are various stepwise model-fitting procedures and multiple comparison procedures available to address these two issues, respectively, I note yet again that even the seemingly simple analysis proposed [*844] by Dr. Hilborn requires a not insignificant set of assumptions.

29. NMFS did perform some basic analyses in evaluating effects of the projects, (e.g. for estimating reasonable OMR targets to manage entrainment), and has been roundly criticized by other plaintiffs' experts (e.g., Dr. Burnham, Dr. Deriso) for the statistical imperfections of those analyses. On the whole, NMFS used a mix of quantitative and qualitative analyses, including analyses provided in the BA and selected scientific literature, in order to come up with its assessment of project effects and the suite of actions necessary to avoid jeopardy.

Third Yip Decl., Doc. 518. The application of these "simple" models is not as straightforward as Plaintiffs claim. The law relegates their use and application [**100] to the discretion of the agency unless clearly erroneous. Plaintiffs have not demonstrated that NMFS's use or non-use of these models is more than scientific dispute, which is resolved in favor of the agency. A court cannot lawfully second-guess the agency, unless clear scientific error or bad faith is so manifest that the agency's judgments can no longer be trusted. Plaintiffs' motion for summary judgment that NMFS acted unlawfully by failing to use the Ricker and Beverton-Holt models is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED. [13]

No comments

- n/a -

13 In their opening brief, Plaintiffs also argued that the conceptual model applied in the BiOp was biologically implausible because it relied on a particular study, Naiman & Turner (2000), for the proposition that it is possible to drive population to extinction by only slight changes in survival at each life history stage. Doc. 431 at 27-31. Plaintiffs complained that NMFS was misusing a "thought experiment" from that study as though it were scientific fact. *Id.* Federal Defendants respond that "NMFS did not rely upon the Naiman and Turner conceptual model to conclude that any one project effect causing small reductions [**101] in one life stage would jeopardize the species. The Naiman and Turner model was used in evaluating how slight incremental changes in life history stages affect already-diminished populations, as such changes are difficult to quantify and may take years to resolve." Doc. 477 at 28. Plaintiffs appear to have abandoned this argument.

d. Does the Absence of a Quantitative Analysis Render the BiOp's Quantitative Limits Per Se Unjustified?

Plaintiffs argue that even if the BiOp's failure to apply quantitative life cycle modeling was not per se unlawful, the absence of such analyses "necessarily cripple[s] the specific quantitative limits imposed by the RPAs." Doc. 431 at 31. The Peer Review Panel addressed this issue:

> The preparation of the RPAs shifts the questions from jeopardy/no-jeopardy to questions like: Will proposed export and other modifications in the Delta provide the expected benefit for targeted species? Will water withdrawals through a new pumping facility at Red Bluff impose new mortality on downstream migrants that largely offsets the reduced mortality from lifting the dam gates at RBDD? Will remedial actions be effective or will they become expensive projects that show little [**102] improvement in species status? How will specific RPAs affect other listed species (e.g., delta smelt) and unlisted species (e.g., fall-run Chinook salmon)?
>
> Tier 1 comments, especially related to defining baseline and lack of quantitative integrative tools, become even more important in addressing these and similar RPA related questions. The long-term solution to this challenge is targeted research on the critical issues; careful monitoring of responses to implemented [*845] actions; and further development of models for generating baseline conditions, downscaling temporally and spatially coarse outputs, and simulating life cycle dynamics. The modeling and monitoring before and after implementation of actions is needed to highlight or test key uncertainties and to increase our understanding of the system in order to facilitate improved management in the future. We believe that lack of quantitative integrative tools will hinder the development of RPAs because NMFS cannot presently quantify the relative contributions of the different project effects to population status nor can NMFS quantitatively determine the potential benefits of specific remedial actions to population recovery. Without this [**103] information, it is difficult to rank the many possible remedial actions by their biological effectiveness relative to their fiscal and social costs in order to logically develop an optimal mix of actions.

AR 00089620-21 (emphasis added). Although the Peer Review certainly warned of the pitfalls of attempting to formulate RPA's without "quantitative integrative tools," it acknowledged that the "long-term solution" was further development of modeling tools. The Peer Review did not outright advise the abandonment of quantitative RPAs in the short term. It did caution that the benefits cannot be quantified, nor can the fiscal and social costs.

For the purposes of this challenge to the BiOp and its RPAs, it is not appropriate or justified to find all the RPA Actions unlawful simply because Plaintiffs were not satisfied with the quantitative analyses performed in the BiOp. Each challenged RPA must be analyzed in light of the record evidence.

B. Baseline Analysis Challenges.

1. Failure to Distinguish Between Discretionary and Nondiscretionary Actions.

Plaintiffs opening brief advances an elaborate argument based on *National Association of Home Builders v. Defenders of Wildlife, 551 U.S. 644, 127 S. Ct. 2518, 168 L. Ed. 2d 467 (2007)*, [**104] which held that the ESA's consultation requirement was not triggered when an agency undertook nondiscretionary actions, because the agency has no choice. Plaintiffs argue that NMFS erred by failing to distinguish between the discretionary and

No comments

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nondiscretionary aspects of CVP and SWP project operations. Doc. 431 at 48-55. Although it is undisputed that Reclamation operates the project to fulfill certain mandatory water delivery obligations, Plaintiffs' argument that *Home Builders* should be extended to require NMFS to segregate discretionary from non-discretionary operations, placing non-discretionary ones in the "baseline" for purposes of evaluating the action's effect on the Listed Species, was rejected in a December 14, 2010 Memorandum Decision issued in the related *Consolidated Delta Smelt Cases:*

> Plaintiffs complain that the BiOp's Project Effects analysis was "tainted" because it does not distinguish between discretionary and non-discretionary actions. [] *National Association of Home Builders v. Defenders of Wildlife, 551 U.S. 644, 127 S. Ct. 2518, 168 L. Ed. 2d 467 (2008)*, held that ESA § 7's consultation requirements do not apply to non-discretionary actions. Where an agency is required by law to perform an action, [**105] it lacks the power to insure that the action will not jeopardize the species. *Id. at 667*. Plaintiffs' cite the Coordinated Operations Agreement, the Central Valley Project Improvement Act's ("CVPIA") requirements [*846] to deliver water for Central Valley wildlife refuge areas, and D-1641 as examples of mandatory aspects of Project operations that, they claim, should have been segregated from other Project Operations in the Project Effects Analysis.
>
> However, *Home Builders* does not address whether, once section 7 consultation is triggered, the jeopardy analysis must separately identify and segregate discretionary from non-discretionary actions, relegating the non-discretionary actions to the environmental baseline. *Home Builders* addressed whether the section 7 consultation obligation attaches to a particular agency action at all. *See Home Builders, 551 U.S. at 669-70* (holding that consultation "duty does not attach to actions... that an agency is required by statute to undertake....") (emphasis added). Plaintiffs do not suggest that section 7 does not apply to the coordinated operations of the Projects. Rather, Plaintiffs contend that the section 7 consultation process requires distinguishing [**106] between discretionary and non-discretionary Project operations to identify the actions not subject to Section 7. Neither *Home Builders* nor the regulation interpreted in *Home Builders, 50 C.F.R. § 402.03*, includes any such requirement. Plaintiffs' motion for summary judgment that the BiOp unlawfully failed to distinguish between discretionary and non-discretionary actions is DENIED. This does not mean non-discretionary actions required by law must not be considered in the consultation process. Federal Defendants and Defendant-Intervenors' cross-motion on identification of non-discretionary actions is GRANTED.

San Luis v. Salazar, 760 F. Supp. 2d at 947-48. Any voluntary efforts by NMFS to segregate discretionary from non-discretionary actions in the BiOp does not alter the fact that *Home Builders* imposes no legal obligation to do so.

Plaintiffs advance a related argument that even if *Home Builders* does not require segregation of discretionary from non-discretionary project operations in the BiOp, the ESA otherwise requires NMFS to consider only discretionary operations when evaluating the "effects of the action" vis-à-vis the environmental baseline. Doc. 431 at 55-58. This is based in [**107] part on the Science Panel's recommendation that NMFS model a baseline that represents a "hypothetical situation in which physical project infrastructure exists, but no project operations are performed except those mandated by prior agreements or those that are not part of the proposed actions." AR 00108175. The Panel offered:

> For example, the decline of stream habitat because the dams block gravel recruitment from upstream would be part of baseline, as would providing water to fulfill senior water rights agreements. Modeling in the Delta seemed to use recent conditions rather than an estimate of baseline conditions (i.e., recent conditions minus effects of project-related actions). This definition of baseline was described in words (although too succinctly, in the opinion of the Panel) in the draft BO but never quantified with model results. This can be a serious omission because without a proper baseline, one struggles to make straightforward comparisons of scenarios that differ only by whether proposed project operations are included or not. Much of the draft BO involves comparing re-

No comments

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> sults of various simulations, but we had difficulty interpreting results without direct comparisons [**108] of the correct baseline to the correct baseline with project operations.... NMFS must clearly define the baseline used in analyses and explain why this baseline was used rather than [*847] the baseline quoted above and seemingly required by the ESA.

Id. (emphasis added).

NMFS addressed this recommendation in the BiOp:

> ESA regulations define the environmental baseline as "the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process" (*50 CFR 402.02*). The "effects of the action" include the direct and indirect effects of the proposed action and of interrelated or interdependent activities, "that will be added to the environmental baseline" (*50 CFR 402.02*). Implicit in both these definitions is a need to anticipate future effects, including the future component of the environmental baseline. Future effects of Federal projects that have undergone consultation and of contemporaneous State and private [**109] actions, as well as future changes due to natural processes, are part of the future baseline, to which effects of the proposed project are added.
>
> In consultations on continuing actions such as CVP/SWP operations, it is quite difficult to separate future baseline effects from the anticipated effects of the proposed action. Operations of existing structures, such as dams and gates, for water supply, flood control, and other purposes -- the proposed action -- are integrally related to the existence of the structures themselves, but effects of the mere existence of the structures are not effects of the proposed action. *See National Wildlife Federation v. National Marine Fisheries Service, 524 F.3d 917, 930-31 (9th Cir. 2008)*. Similarly, some activities that are part of the proposed project are nondiscretionary, and their effects are also not effects of the proposed action. *See id. at 928-29* (citing *National Ass'n of Home Builders v. Defenders of Wildlife, 551 U.S. 644, 127 S. Ct. 2518, 168 L. Ed. 2d 467 (2007)*[)].
>
> Consequently, it is not surprising that in its review of NMFS' December 11, 2008, draft OCAP Opinion, the CALFED Science Review Panel (Anderson *et al.* 2009) commented that a clearly defined baseline was lacking. Reclamation [**110] (2009) provided similar comments. NMFS acknowledges that it was not easy to discern a uniform approach to characterizing the environmental baseline in the draft Opinion. NMFS believes, however, that this is due to the nature of the action under consultation and available information, rather than a flawed approach to the analysis. NMFS clarifies its approach here and in relevant sections of the Opinion.
>
> In *National Wildlife Federation*, a case regarding consultation on the effects of operating hydropower dams on the Columbia River, the 9th Circuit Court of Appeals rejected NMFS' attempt to narrow the "effects of the action" by defining the baseline to include operations that NMFS deemed to be "nondiscretionary." The Court observed that many of the actions NMFS deemed "nondiscretionary" actually were subject to the action agencies' discretion, and it held that it was impermissible to create an imaginary "reference operation" excluding these actions, to which the effects of the action could be compared. Rather, the Court said that the regulatory requirement to consider the effects of the action added to the environmental baseline "simply requires NMFS to consider the effects of [the] actions [**111] 'within the context of other existing human activities that impact the [*848] listed species.' [citations omitted]" *Id. at 930*. In other words, the effects of a particular Federal action are intended to be evaluated not simply on their own, but as they affect the species in combination with other processes and activities.

No comments

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The question addressed in a consultation is whether the project jeopardizes the species' continued existence. As the court stated in *National Wildlife Federation*, even if the baseline itself causes jeopardy to the species, only if the project causes additional harm can the project be found to jeopardize the species' continued existence. *Id.* This determination requires an evaluation of the project's effects, separate from the conditions that would exist if the project were not carried out.

NMFS and Reclamation together attempted to isolate the effects of proposed project operations by segregating the activities that are within Reclamation's discretion to change in the future from those that are not. This effort was not fruitful. The CVP/SWP operations BA begins with a summary of legal and statutory authorities, water rights, and other obligations relevant to the action (Chapter [**112] 1), all of which are incorporated into the project description (Chapter 2). Neither chapter describes what Reclamation's nondiscretionary operations would be if discretionary aspects of the proposed action were not implemented. In addition, in all of the models and simulations that Reclamation used to prepare the CVP/SWP operations BA, a "no project" scenario was not run. For example, table 2-1 in the CVP/SWP operations BA identifies the major proposed operational actions for consultation, including implementation of the water quality control plan (WQCP), but it is not clear whether implementing the WQCP, or some portion of it, is a non-discretionary action.

Consequently, we determined that if NMFS were to propose a "no project operations" scenario to characterize the environmental baseline, it would be speculative and not supported by the model runs. Following the 9th Circuit's reasoning, with limited exceptions, NMFS assumed that all CVP and SWP operations are subject to the discretion of the project agencies and, thus, that all effects of future operations are effects of the proposed action. The only project effects considered to be within the future baseline (and thus not effects [**113] of the proposed action) are those caused by activities that are clearly outside the agencies' authority. For example, as in *National Wildlife Federation*, it is not within the agencies' discretion to remove dams, so the effects of their existence are part of the baseline. Figure 2-12 provides a conceptual diagram of how NMFS characterizes the past and future components of the environmental baseline for consultations on an ongoing action.

BiOp at 57-60.

NWF v. NMFS II, 524 F.3d 917, 929, applies to whether the BiOp's baseline rationale is reasonable for the proposed action. There, NMFS's 2004 biological opinion for the Federal Columbia River Power System ("FRCPS") "included in the environmental baseline for the proposed action the existing FCRPS, various supposedly nondiscretionary dam operations, and all past and present impacts from discretionary operations." *Id. at 926*. In addition, NMFS "adopted a novel 'reference operation' approach ... purportedly in order to account for the existence of the FCRPS dams." *Id.*

> The reference operation consisted of the dams and a hypothetical regime for operating them, which, according to NMFS, was the most beneficial to listed [*849] fishes of any possible [**114] operating regime. NMFS also found, though, that certain aspects of FCRPS operations-such as operations relating to irrigation, flood control, and power generation-were nondiscretionary, given the dams' existence, and that those aspects should not be considered part of the action under ESA review. The BiOp offers little detail on the nature and extent of the purportedly nondiscretionary obligations or NMFS's basis for finding them to be nondiscretionary.

Id. The Ninth Circuit evaluated this "reference operation" approach:

> The district court properly held that NMFS may not use a hypothetical "reference operation" in its jeopardy analysis to exclude from the proposed actions' impacts the effects of related operations NMFS deems "nondiscretionary." NMFS admits that it chose the reference operation approach in order to avoid "trying to precisely determine the extent of the Action Agencies' discretionary operation." However, neither the ESA nor *Home*

No comments

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Builders permits agencies to ignore potential jeopardy risks by labeling parts of an action nondiscretionary. We cannot approve NMFS's interpretation of this rule as excluding from the agency action under review discretionary agency actions taken [**115] pursuant to a broad congressional mandate.

***

...NMFS's contention that competing mandates for flood control, irrigation, and power production create any immutable obligations that fall outside of agency discretion is not persuasive. Indeed, NMFS's interpretation is neither mandated nor intimated by the Court's holding in *Home Builders*. The Court's concern in *Home Builders* was that "[a]n agency cannot simultaneously obey the differing mandates set forth in § 7(a)(2) of the ESA and § 402(b) of the CWA." *127 S.Ct. at 2534*. In this context, compliance with the CWA provision is problematic because the provision "affirmatively mandates that [a specific action which conflicts with the ESA] 'shall' be [taken] if the specified criteria are met. The provision operates as a ceiling as well as a floor." *Id. at 2533*. Here, in contrast, Congress has imposed broad mandates which do not direct agencies to perform any specific nondiscretionary actions, but rather, are better characterized as directing the agencies to achieve particular goals.

The 2004 BiOp itself recognizes that Congress has not quantified any of those broad goals, or otherwise specified the manner in which the agencies must fulfill [**116] them. NMFS found, for instance, that Congress has mandated that dam operations include flood control, though "Congress has not prescribed precisely how the Corps must achieve its flood control responsibilities." 2004 BiOp at 5-5. Similarly, Congress has mandated that the BPA market and transmit "some level of power, although the precise level is not defined." *Id.* Thus, the 2004 BiOp recognizes that Congress has not specified the manner in which the agencies must fulfill their various obligations. In other words, while the goals themselves may be mandatory, the agencies retain considerable discretion in choosing what specific actions to take in order to implement them. The agencies are therefore obligated to satisfy the ESA's requirements. *See Pac. Coast Fed'n, 426 F.3d at 1084-85* ("The ESA obligates federal agencies 'to afford first priority to the declared national policy of saving endangered species.' ") (quoting *TVA v. Hill, 437 U.S. 153, 185, 98 S. Ct. 2279, 57 L. Ed. 2d 117 (1978)*).[FN8]

[*850] FN8. Moreover, at least some of the competing statutory mandates clearly acknowledge that implementing agencies must accommodate wildlife needs. *See* Northwest Power Act, *16 U.S.C. § 839* (providing for purposes of 1980 Pacific Northwest [**117] Electric Power Planning and Conservation Act "to be construed in a manner consistent with applicable environmental laws"); *ALCOA, 175 F.3d at 1163* ("The Northwest Power Act's goal of providing economical power, however, does not supplant the BPS's obligation to comply with environmental mandates."); Confederated Tribes & Bands of the *Yakima Indian Nation v. FERC, 746 F.2d 466, 473 (9th Cir.1984)* (finding Northwest Power Act places "fish and wildlife concerns on an equal footing with power production").

NMFS may not avoid determining the limits of the action agencies' discretion by using a reference operation to sweep so-called "nondiscretionary" operations into the environmental baseline, thereby excluding them from the requisite ESA jeopardy analysis. And *Home Builders* cannot be read, as the State of Idaho would have us do, to immunize discre-

No comments

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tionary agency actions simply because they are taken in pursuit of a non-discretionary goal. The concern that an agency cannot "simultaneously obey" with both the ESA and the broad mandates relevant to this case is simply not at issue here.

ESA compliance is not optional. "[A]n agency cannot escape its obligation to comply with the ESA merely because [**118] it is bound to comply with another statute that has consistent, complementary objectives." *Washington Toxics Coal. v. EPA, 413 F.3d 1024, 1032 (9th Cir. 2005).* As the Court emphasized in *Home Builders*, "ESA's no-jeopardy mandate applies to every discretionary agency action-regardless of the expense or burden its application might impose." *127 S. Ct. at 2537*. When an agency, acting in furtherance of a broad Congressional mandate, chooses a course of action which is not specifically mandated by Congress and which is not specifically necessitated by the broad mandate, that action is, by definition, discretionary and is thus subject to Section 7 consultation. Because NMFS's approach in the 2004 BiOp produces the opposite result, it is inconsistent with the ESA and its accompanying regulations, and cannot stand.

Id. at 928-29.

NWF v. NMFS found it inappropriate for NMFS to treat as "non-discretionary" activities undertaken to achieve "broad mandates which do not direct agencies to perform any specific nondiscretionary actions, but rather, are better characterized as directing the agencies to achieve particular goals." The opinion does not address the converse situation, present here, where [**119] it is alleged that NMFS included non-discretionary aspects of Project operations in the effects of the action, rather than in the environmental baseline.

Whether or not a particular aspect of project operations is "non-discretionary" is a complex legal inquiry that may take years of litigation to resolve. *See, e.g., Natural Resources Defense Council v. Kempthorne, 627 F. Supp. 2d 1212 (E.D. Cal. 2009)* (resolving lengthy cross motions for summary judgment on the issue of whether Sacramento River Settlement Contracts constituted non-discretionary water delivery obligation). Practically speaking, in all but the most obvious of situations or for obligations that have previously been determined to be "mandatory," it is not feasible for the action agency to finely parse the legal determinations required to distinguish discretionary aspects of the action from non-discretionary ones in the preparation [*851] of a biological opinoin, especially in a system as complex as the joint Project operations. This is reflected in the 2009 Salmonid BiOp's explanation that NMFS could not reliably propose a "no project operations" scenario to characterize the environmental baseline.

Plaintiffs' ultimate argument [**120] is that if non-discretionary project operations are backed out of the "effects of the action" and instead are included in the "baseline" the effects of the action will no longer be "appreciable." This identical argument was explicitly rejected by *NWF v. NMFS II's* holding that comparison of the effects of the action against a hypothetical "reference operation" is not appropriate because the jeopardy analysis must focus on "whether the actionps] effects, when added to the underlying baseline conditions, would tip the species into jeopardy." *524 F.3d at 930*. The Ninth Circuit reasoned:

To "jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." *50 CFR § 402.02*; *16 U.S.C. § 1536(a)(2)*. NMFS argues that, under this definition, it may satisfy the ESA by comparing the effects of proposed FCRPS operations on listed species to the risk posed by baseline conditions. Only if those effects are "appreciably" worse than baseline conditions must a full jeopardy [**121] analysis be made. Under this approach, a listed species could be gradually destroyed, so long as each step on the path to destruction is sufficiently modest. This type of slow slide into oblivion is one of the very ills the ESA seeks to prevent.

Requiring NMFS to consider the proposed FCRPS operations in their actual context does not, as NMFS argues, effectively expand the "agency action" at issue to include all independent or baseline harms to listed species. Nor does it have the effect of preventing any federal action once background conditions place a species in jeopardy. To "jeopardize"-the action ESA prohibits-means to "expose to

No comments

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loss or injury" or to "imperil." Either of these implies causation, and thus some new risk of harm. Likewise, the suffix "-ize" in "jeopardize" indicates some active change of status: an agency may not "cause [a species] to be or to become" in a state of jeopardy or "subject [a species] to" jeopardy. American Heritage Dictionary of the English Language (4th ed.). Agency action can only "jeopardize" a species' existence if that agency action causes some deterioration in the species' pre-action condition.

Even under the so-called aggregation approach NMFS [**122] challenges, then, an agency only "jeopardize[s]" a species if it causes some new jeopardy. An agency may still take action that removes a species from jeopardy entirely, or that lessens the degree of jeopardy. However, an agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm.

Our approach does not require NMFS to include the entire environmental baseline in the "agency action" subject to review.[FN9] It simply requires that NMFS appropriately consider the effects of its actions "within the context of other existing human activities that impact the listed species." *ALCOA, 175 F.3d at 1162 n. 6* (citing *50 C.F.R. § 402.02*'s definition of the environmental baseline). This approach is consistent with our instruction (which NMFS [*852] does not challenge) that "[t]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and [**123] future human and natural contexts." *Pac. Coast Fed'n, 426 F.3d at 1093* (emphasis added).

> FN9. We note that under NMFS's jeopardy approach, the environmental baseline serves only as a point of reference to determine the net effects of a narrowly-defined action. Thus, whether an action is included in the baseline determines whether its impacts are considered at all in the agency's basic jeopardy analysis.

> The current existence of the FCRPS dams constitutes an "existing human activity" which is already endangering the fishes' survival and recovery. *See ALCOA, 175 F.3d at 1162 n. 6* (citing *50 C.F.R. § 402.02*). Although we acknowledge that the existence of the dams must be included in the environmental baseline, the operation of the dams is within the federal agencies' discretion under both the ESA and the Northwest Power Act, *16 U.S.C. § 839*. Any proposed agency action must be evaluated in the contest of this baseline in order to properly determine whether the proposed actions will jeopardize the listed fishes.

Id. at 929-31 (emphasis added).

Nothing in the law requires NMFS to segregate discretionary aspects of coordinated Project operations from non-discretionary ones in the manner Export [**124] Plaintiffs demand. If feasible, it could have made sense for NMFS to do this to better document the relationship between the requirements of the species and the action agency's statutory authority to implement the RPA. But, NMFS disclaims the capacity to undertake appropriate modeling and related analysis. Export Plaintiffs have not demonstrated that NMFS's disclaimer is unreasonable.

Plaintiffs' motion for summary judgment that NMFS acted unlawfully by failing to segregate discretionary aspects of Project operations from non-discretionary ones is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

2. Treatment of Available Data on Ocean Harvest and Ocean Conditions.

Plaintiffs next argue that NMFS acted unlawfully by failing to quantitatively analyze available data on ocean conditions and ocean harvest. Plaintiffs assert that these failures resulted in an "improper jeopardy finding and invalid RPA." Doc. 431 at 34.

a. Consideration of Ocean Conditions Data.

No comments

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Plaintiffs argue that the BiOp should have used available data to quantitatively analyze the impact of ocean conditions on the Listed Species. Doc. 43 at 40-45. Specifically, Plaintiffs assert that NMFS [**125] should have performed quantitative analyses using data measuring the Pacific Decadal Oscillation ("PDO"), a recognized index of ocean conditions, so that the "major role ocean conditions play in determining abundance levels of salmonids ... could be compared with other stressors, such as the effects caused by water exports." Deriso Decl., Doc. 440 at ¶ 41. Record evidence suggests ocean conditions play a substantial role in salmon abundance. *See id.* (citing Hare & Mantua (1997), AR 00120076-84); *see also* AR 00084001 (Reclamation arguing to NMFS that "[o]cean conditions likely amount to 99.999% of the cause of the status of Central Valley species" and complaining that NMFS "isn't acknowledging this overwhelming stressor").

[*853] In a four and a half page section, the BiOp discusses the importance of natural environmental cycles, including those affecting ocean productivity:

> 4.2.4.11.1 Natural Environmental Cycles
> Natural changes in the freshwater and marine environments play a major role in salmonid abundance. Recent evidence suggests that marine survival among salmonids fluctuates in response to 20- to 30-year cycles of climatic conditions and ocean productivity (Hare *et al.* 1999, Mantua and [**126] Hare 2002). This phenomenon has been referred to as the Pacific Decadal Oscillation. In addition, large-scale climatic regime shifts, such as the El Niño condition, appear to change productivity levels over large expanses of the Pacific Ocean. A further confounding effect is the fluctuation between drought and wet conditions in the basins of the American west. During the first part of the 1990s, much of the Pacific Coast was subject to a series of very dry years, which reduced inflows to watersheds up and down the west coast.
>
> "El Niño" is an environmental condition often cited as a cause for the decline of West Coast salmonids (NMFS 1996b). El Niño is an unusual warming of the Pacific Ocean off South America and is caused by atmospheric changes in the tropical Pacific Ocean [El Niño Southern Oscillation (ENSO)] resulting in reductions or reversals of the normal trade wind circulation patterns. El Niño ocean conditions are characterized by anomalous warm sea surface temperatures and changes to coastal currents and upwelling patterns. Principal ecosystem alterations include decreased primary and secondary productivity in affected regions and changes in prey and predator species distributions. [**127] Cold-water species are displaced towards higher latitudes or move into deeper, cooler water, and their habitat niches are occupied by species tolerant of warmer water that move upwards from the lower latitudes with the warm water tongue.
>
> A key factor affecting many West Coast stocks has been a general 30-year decline in ocean productivity. The mechanism whereby stocks are affected is not well understood, partially because the pattern of response to these changing ocean conditions has differed among stocks, presumably due to differences in their ocean timing and distribution. It is presumed that survival in the ocean is driven largely by events occurring between ocean entry and recruitment to a sub-adult life stage.
>
> The freshwater life history traits and habitat requirements of juvenile winter-run and fall-run are similar. Therefore, the unusual and poor ocean conditions that caused the drastic decline in returning fall-run populations coast wide in 2007 (Varanasi and Bartoo 2008) are suspected to have also caused the observed decrease in the winter-run spawning population in 2007 (Oppenheim 2008). Lindley *et al.* (2009) reviewed the possible causes for the decline in Sacramento River [**128] fall-run in 2007 and 2008 for which reliable data were available. They concluded that a broad body of evidence suggested that anomalous conditions in the coastal ocean in 2005 and 2006 resulted in unusually poor survival of the 2004 and 2005 broods of fall-run. However, Lindley *et al.* (2009) recognize that the rapid and likely temporary deterioration in ocean conditions acted on top of a long-term, steady degradation of the freshwater and estuarine environment.
>
> 4.2.4.11.2 Ocean Productivity

No comments

- n/a -

The time at which juvenile salmonids enter the marine environment marks a critical period in their life history. Studies have shown the greatest rates of [*854] growth and energy accumulation for Chinook salmon occur during the first 1 to 3 months after they enter the ocean (Francis and Mantua 2003, MacFarlane *et al.* 2008)....Therefore, the conditions that juvenile salmonids encounter when they enter the ocean can play an important role in their early marine survival and eventual development into adults.

It is widely understood that variations in marine survival of salmon correspond with periods of cold and warm ocean conditions, with cold regimes being generally favorable for salmon survival and warm ones [**129] unfavorable....

***

The generally warmer ocean conditions in the California Current that began to prevail in late 2002 have resulted in coastal ocean temperatures remaining 1-2 °C above normal through 2005. A review of the previously mentioned indicators for 2005 revealed that almost all ecosystem indices were characteristic of poor ocean conditions and reduced salmon survival....

Updated information provided by Peterson *et al.* (2006) on the NWFSC Climate Change and Ocean Productivity website shows the transition to colder ocean conditions, which began in 2007, has persisted throughout 2008. All ocean indicators point toward a highly favorable marine environment for those juvenile salmon that entered the ocean in 2008.... Therefore, ocean conditions in the broader California Current appear to have been favorable for salmon survival in 2007 and to a greater extent in 2008, which bodes well for Chinook salmon populations returning in 2009 and 2010. These ecosystem indicators can be used to provide an understanding of ocean conditions, and their relative impact on marine survival of juvenile salmon, throughout the broader, northern portion of the California Current. However, they may not [**130] provide an accurate assessment of the conditions observed on a more local scale off the California coast.

Wells *et al.* (2008a) developed a multivariate environmental index that can be used to assess ocean productivity on a finer scale for the central California region. This index (also referred to as the Wells Ocean Productivity Index) has also tracked the Northern Oscillation Index, which can be used to understand ocean conditions in the North Pacific Ocean in general. The divergence of these two indices in 2005 and 2006 provided evidence that ocean conditions were worse off the California coast than they were in the broader North Pacific region. The Wells *et al.* (2008a) index incorporates 13 oceanographic variables and indices and has correlated well with the productivity of zooplankton, juvenile shortbelly rockfish, and common murre production along the California coast (MacFarlane *et al.* 2008). In addition to its use as an indicator of ocean productivity in general, the index may also relate to salmon dynamics due to their heavy reliance on krill and rockfish as prey items during early and later life stages. For instance, not only did the extremely low index values in 2005 and 2006 [**131] correlate well with the extremely low productivity of salmon off the central California coast in those years, but the index also appears to have correlated well with maturation and mortality rates of adult salmon from 1990-2006 in that region (Wells and Mohr 2008). Although not all of the data are currently available to determine the Wells *et al.* (2008a) index values for 2007 and 2008, there is sufficient information to provide an indication of the likely ocean conditions for those 2 years, which can then be compared to 2005 and 2006.

[*855] A review of the available information suggests ocean conditions in 2007 and 2008 have improved substantially over those observed in 2005 and 2006. For instance, the spring transition, which marks the beginning of the upwelling season and typically occurs between March and June, was earlier in 2007 and 2008 compared to 2005 and 2006. An early spring transition is often indicative of greater productivity throughout the spring and summer seasons (Wells and Mohr 2008, Peterson *et al.* 2006). Coastal upwelling, the process by which cool, nu-

No comments

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trient rich waters are brought to the surface (perhaps the most important parameter with respect to plankton productivity), [**132] was also above average in 2007 and 2008. Moreover, coastal sea surface temperature and sea level height (representative of the strength of the California current and southern transport) values were also characteristic of improved ocean productivity (Wells and Mohr 2008). Thus, contrary to the poor ocean conditions observed in the spring of 2005 and 2006, the Wells *et al.* (2008a) index parameters available at this time indicate spring ocean conditions have been generally favorable for salmon survival off California in 2007 and 2008.

In contrast to the relatively "good" ocean conditions that occurred in the spring, the Wells *et al.* (2008a) index values for the summer of 2007 and 2008 were poor in general, and similar to those observed in 2005 and 2006. Summer sea surface temperature followed a similar pattern in both 2007 and 2008, starting out cool in June, and then rising to well above average in July before dropping back down to average in August (Wells and Mohr 2008). The strong upwelling values observed in the spring of 2007 and 2008 were not maintained throughout the summer, and instead dropped to either at or below those observed in 2005 and 2006. Finally, sea level height and [**133] spring curl values (a mathematical representation of the vertical component of wind shear which represents the rotation of the vector field), which are negatively correlated with ocean productivity, were both poor (Wells and Mohr 2008). Therefore, during the spring of 2007 and 2008, ocean conditions off California were indicative of a productive marine environment favorable for ocean salmon survival (and much improved over 2005 and 2006). However, those conditions did not persist throughout the year, as Wells *et al.* (2008a) index values observed in the summer of 2007 and 2008 were similar to those experienced in the summer of 2005 and 2006, 2 years marked by extremely low productivity of salmon off the central California coast.

> Evidence exists that suggests early marine survival for juvenile salmon is a critical phase in their survival and development into adults. The correlation between various environmental indices that track ocean conditions and salmon productivity in the Pacific Ocean, both on a broad and local scale, provides an indication of the role they play in salmon survival in the ocean. Moreover, when discussing the potential extinctions of salmon populations, Francis and [**134] Mantua (2003) point out that climate patterns would not likely be the sole cause but could certainly increase the risk of extinction when combined with other factors, especially in ecosystems under stress from humans. Thus, the efforts to try and gain a greater understanding of the role ocean conditions play in salmon productivity will continue to provide valuable information that can be incorporated into the management of these species and should continue to be pursued. However, the highly variable nature of these environmental factors makes it very difficult, [*856] if not impossible, to accurately predict what they will be like in the future. Because the potential for poor ocean conditions exists in any given year, and there is no way for salmon managers to control these factors, any deleterious effects endured by salmonids in the freshwater environment can only exacerbate the problem of an inhospitable marine environment. Therefore, in order to ensure viable populations, it is important that any impacts that can be avoided prior to the period when salmonids enter the ocean must be carefully considered and reduced to the greatest extent possible.

BiOp at 149-53.

Plaintiffs do not argue that [**135] the BiOp entirely failed to consider ocean conditions and/or the PDO. [14] Rather, they argue that NMFS should have evaluated the impact ocean conditions have on salmon populations quantitatively, so that the effect of ocean conditions can be compared to the effects of project operations. In support of this argument, Plaintiffs quote the Peer Review: "[T]he possibility exists that we may be analyzing effects that occur within the system that ultimately are overshadowed by dynamics and effects in the marine phase." Doc. 487 at 36 (citing AR 0089603).

No comments

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Plaintiffs' quotation is incomplete; the whole paragraph provides:

> The ocean phase remains a major knowledge gap for all of the species. Some information is available for salmon and adult green sturgeon, but little is known for steelhead and sub-adult green sturgeon. Growth and mortality after leaving the system can be affected by a variety of sources including climate patterns and effects on productivity and species community, harvest, trawl by catch, and predation by marine mammals and other predators. The draft BO does not directly address growth and survival during the ocean phase for any of the species. While we understand the logic, [**136] and time and knowledge limitations, the possibility exists that we may be analyzing effects that occur within the system that ultimately are overshadowed by dynamics and effects in the marine phase.

AR 0089603. Although the Peer Review expressly recognizes a need to consider "the dynamics and effects in the marine phase," as possibly significant to the species, this is not a pronouncement that standard scientific practice demands a quantitative analysis of ocean conditions. Plaintiffs cite no legal requirement that NMFS perform a quantitative analysis to determine the relative impact of ocean conditions on salmon populations. The ESA does not require such an analysis. The caselaw affirmatively decries such a relativistic approach. *See NWF v. NMFS II, 524 F.3d at 930* ("even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm"). The relevant question is whether or not the record supports NMFS's conclusion that Project operations appreciably diminish those species' likelihood of survival and recovery in light of all pre-existing natural and manmade conditions. The appropriate focus, under *NWF v. NMFS* [**137] *II*, is not on the Projects' relative [*857] contribution to harm compared to ocean conditions, but rather, whether Project operations cause separate harm, including by making the species more vulnerable to adverse ocean conditions.

> 14 The BiOp explains why the PDO is not necessarily the ideal measurement of ocean conditions off the California coast. While general ecosystem indicators, like the PDO, "can be used to provide an understanding of ocean conditions, and their relative impact on marine survival of juvenile salmon, throughout the broader, northern portion of the California Current... they may not provide an accurate assessment of the conditions observed on a more local scale off the California coast." BiOp at 151. Instead, the BiOp examined available data using the Wells index, which does provide specific information about conditions off the California coast. *Id.*

The BiOp concludes that because the natural cycles that drive ocean conditions are "highly variable," it makes it "very difficult, if not impossible, to accurately predict what they will be like in the future," and because "the potential for poor ocean conditions exists in any given year, and there is no way for salmon managers [**138] to control these factors, any deleterious effects endured by salmonids in the freshwater environment can only exacerbate the problem of an inhospitable marine environment." BiOp at 152-53.

The BiOp cites Lindley (2009) for the proposition that deterioration in ocean conditions has "acted on top of a long-term, steady degradation of the freshwater and estuarine environment." *Id.* at 149 (citing Lindley (2009), AR 00123514-631). Plaintiffs are correct that Lindley (2009) found that ocean conditions and fishery management played roles in the low escapement of 2007. AR 00123517-18. Plaintiffs quote Lindley (2009)'s conclusion that "unfavorable ocean conditions were the proximate cause" of declines to the 2004 and 2005 broods. Doc. 487 at 38. Plaintiffs take these statements out of context. Before discussing impacts to salmon populations caused by human effects on the freshwater environment, Lindley (2009) emphasized the difference between "proximate" and "ultimate" causation:

> So far, we have restricted our analysis to the question of whether there were unusual conditions affecting Sacramento River fall-run Chinook from the 2004 and 2005 broods that could explain their poor performance, reaching [**139] the conclusion that unfavorable ocean conditions were the proximate cause. But what about the ultimate causes?

AR 00012355. The paper concluded that human manipulation of the freshwater environment likely "played a significant role in making this stock susceptible to collapse during periods of unfavorable ocean conditions." AR 00123551.

The law does not require a quantitative, comparative fault type analysis. If the species is in decline and one of the causes is Project operations, the agency has discretion to address and mitigate the resulting harm. The ex-

No comments

- n/a -

tent to which the record affirmatively demonstrates that Project operations cause separate harm is examined below in connection with Plaintiffs' challenges to the effects analysis.

Plaintiffs' motion for summary judgment that NMFS violated the ESA by failing to quantitatively analyze ocean conditions is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

b. Consideration of Ocean Harvest Impacts.

Plaintiffs also argue that NMFS acted unlawfully by failing to quantify the effect of ocean harvest on the Listed Salmonids. Their argument is that: (1) NMFS has sufficient quantitative data to analyze the effects [**140] of ocean harvest on the Listed Salmonids because it manages the ocean harvest; (2) that data, if it had been quantitatively analyzed in the BiOp, would have revealed that the losses caused by Project operations are miniscule in comparison to losses caused by ocean harvest. Doc. 431 at 37-40.

The ESA requires NMFS to evaluate to what extent the losses are caused by the proposed action, here the operation of the CVP and SWP. The action in question does not include ocean harvest, which in part is the result of separate government activity. NMFS quantitatively evaluated the impacts of ocean harvest on the Listed Species in a separate biological opinion. [*858] The Salmonid BiOp acknowledges that ocean harvest is a part of the environmental baseline affecting species viability, *see* BiOp at 144-46 (discussing ocean commercial and ocean and inland sport harvest as "factors responsible for the current status" of the Listed Species), but does not quantitatively integrate the impact of ocean harvest into the analysis of Project-related impacts on the species.

NMFS's obligation under the ESA is to evaluate how Project operations affect the Listed Species, in light of a depleted population impacted by [**141] ocean harvest and other conditions. It is inexplicable that these species are being managed in a piecemeal fashion, without considering all aspects of their life cycle in the same analysis, which would facilitate description of the true effect Project operations have on the species in light of other conditions. What population is available to be affected by Project operations is entirely relevant, as all Defendants have sought to attribute the species' decline to Project operations. Nonetheless, under *NWF v. NMFS*, the analytical focus is not on the relative contribution of the Projects to the species' condition, but whether the Projects cause additional, independent harm. Plaintiffs' motion for summary judgment that NMFS acted unlawfully by failing to quantitatively analyze ocean harvest impacts to determine whether, relatively speaking, they overwhelm Project impacts is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

C. Effects Analysis Challenges.

1. Use of a 100-Year Timeframe.

The BiOp evaluated how the proposed action would impact the species' risk of extinction over a 100-year time period. BiOp at 51. The BiOp explains that the jeopardy standard [**142] has been interpreted in the Joint Consultation Regulations as "a requirement that Federal agencies ensure that their actions are not likely to result in appreciable reductions in the likelihood of both the survival and recovery of the species in the wild by reducing its numbers, reproduction, or distribution." *Id.* at 42 (citing *50 C.F.R. § 402.02*). This means:

> .... NMFS equates a listed species' probability (or risk) of extinction with the likelihood of both the survival and recovery of the species in the wild for purposes of conducting jeopardy analyses under section 7(a)(2) of the ESA. In the case of listed salmonids, we use the Viable Salmonid Populations (VSP) framework (McElhany *et al.* 2000) as a bridge to the jeopardy standard. A designation of "a high risk of extinction" or "low likelihood of becoming viable" indicates that the species faces significant risks from internal and external processes that can drive it to extinction. The status assessment considers and diagnoses both the internal and external processes affecting a species' extinction risk.

BiOp at 42. The VSP framework estimates the viability of salmonid populations by defining a viable salmonid population as one that [**143] "has a negligible probability of extinction over a 100-year time frame." *Id.* at 51. More specifically, the BiOp sets the threshold for jeopardy as the point at which the effects of the action, in the context of the baseline, result in a risk of extinction of greater than five percent over 100 years. The threshold combines two types of information: a probability of extinction expressed as the percentage likelihood of extinction and a timeframe within which that probability may come to pass, expressed in years. NMFS utilizes a NMFS technical memorandum by McElhany *et al.* (2000), AR 00124576, and a 2007 article by Lindley *et al.*, AR 00123475, as "a bridge to [this] jeopardy standard." BiOp at 42-43, 51-53.

No comments

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[*859] The five percent probability of extinction component of the BiOp's standard is derived Lindley (2007), which opines: "We assume a 5% risk of extinction in 100 years is an acceptably low extinction risk for populations (Thompson, 1991)." AR 00123477 (emphasis added). Lindley (2007) describes specific criteria for assessing the risk of extinction, and "assume[s] that a 5% risk of extinction in 100 years is [] acceptably low...." AR 00123477. Lindley (2007) characterizes a risk of extinction [**144] of less than five percent within 100 years as "low," greater than five percent within 100 years as "moderate," and greater than 20% within 20 years as "high." AR 00123478.

The BiOp appears to derive the 100-year timeframe from McElhany (2000). *See* BiOp at 51. McElhany (2000) describes a viable salmonid population as "an independent population of any Pacific salmonid [ ] that has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame." AR 00124594. Regarding the selection of the 100-year time frame, McElhany (2000) states: "While it is ultimately an arbitrary decision, the 100-year time scale was chosen to represent a 'long' time horizon for evaluating extinction risk." Plaintiffs claim that neither the BiOp nor McElhany provide a reasoned basis for the decision to choose a time frame of 100 years, as opposed to any other, shorter, timeframe. When the McElhany (2000) sentence is read in context, an explanation is provided for the 100-year time scale emerges:

> While it is ultimately an arbitrary decision, the 100-year time scale was [**145] chosen to represent a "long" time horizon for evaluating extinction risk. It is necessary to evaluate extinction risk at a long time scale for several reasons. First, many recovery actions (such as habitat restoration) are likely to affect population status over the long term. Second, many genetic processes important to population function (such as the loss of genetic diversity or accumulation of deleterious mutations) occur over decades or centuries and current actions can affect these processes for a long time to come. Third, at least some environmental cycles occur over decadal (or longer) time scales (e.g., oceanic cycles-Beamish and Bouillon 1993, Mantua *et al.* 1997, Hare *et al.* 1999). Thus, in order to evaluate a population's status it is important to look far enough into the future to be able to accommodate large-scale environmental oscillations and trends.

AR 00124595. Plaintiffs identify no record evidence suggesting that this explanation is irrational.

Plaintiffs also argue that the 100-year timeframe is arbitrary in light of the fact that NMFS used a 24-year time frame just a year earlier in the biological opinion for the Federal Columbia River Power System ("FCRPS BiOp"). [**146] AR 00130923. The FCRPS BiOp addressed critiques suggesting that it use a 100-year extinction risk period as follows:

> Some suggested that NOAA Fisheries evaluate a 100-year extinction risk time horizon, rather than a 24-year period, or else set standards for both periods. The rationale was that the 24-year extinction risk is lower than the 100-year extinction risk (i.e., it "inflates" survival probability compared to the 100-year time horizon). It has been well-documented that extinction risk increases with longer time horizons, with the probability of extinction "approaching 100% for all species if the period is long enough" (NRC 1995). For example, Oregon's comments (page 5) include a Figure 2 that shows a low likelihood of extinction over 24 and 48 years and a high likelihood [*860] of extinction over 100 years for Upper John Day spring Chinook. This population is not listed under ESA, and is considered by the state of Oregon to be healthy (ODFW 2006a). While NOAA Fisheries is not familiar with the data or assessment methodology used in Oregon's 100-year extinction risk estimates for this population, their result suggests that even healthy salmon stocks may appear to have a high likelihood [**147] of extinction under this assumption. It has been equally well-documented that the precision of the risk estimate decreases with longer time horizons. For example, Fieberg and Ellner (2000) estimated that reliable estimates of extinction risk may only be possible when the number of base period observations is 5-10 times greater than the number of years in the time horizon.
>
> NOAA Fisheries continues to rely primarily on the 24-year time horizon for this analysis because the main purpose of

No comments

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> the metric is to inform our judgment regarding the ability of the species to survive while actions to promote recovery are implemented under the Prospective Actions and through other processes. The 24-year period is more than twice that of most of the Prospective Actions and is identical to the short-term period considered in the 2000 FCRPS Biological Opinion (NMFS 2000b). However, NOAA Fisheries did calculate extinction risk over the 100-year time horizon to allow comparison of the 24-year extinction risk results with the 100-year extinction risk results of interest to some parties in the region. The 100-year extinction risk estimates and associated confidence intervals are reported in the Aggregate [**148] Analysis Appendix.

AR 00130937.

Plaintiffs maintain that these paragraphs from the FRCPS BiOp demonstrate that NMFS adopted a "prior practice" of using a 24-year extinction period and that NMFS failed to supply a reasoned basis for departing from that prior practice. *See River Runners for Wilderness v. Martin, 593 F.3d 1064, 1075-76 (9th Cir. 2010)* ("Part of the discretion granted to federal agencies is the freedom to change positions.... [A]n agency's view of what is in the public interest may change, either with or without a change in circumstances. But an agency changing its course must supply a reasoned analysis.") (internal citations and quotations omitted).

Plaintiffs suggest there is conflict between these two biological opinions. The FRCPS BiOp utilizes a 24-year timeframe to quantitatively evaluate short-term extinction risk where sufficient data was available to do so. AR 00131546. That was only possible for six of the 13 species covered by that biological opinion. NMFS did not have sufficient data to perform a 24-year analysis for the remaining seven species, so NMFS used a qualitative analysis of the VSP factors that considers a 100-year timeframe. *See* FCRPS BiOp, Chapter [**149] 8. [15] Plaintiffs have not established that the 2009 Salmonid BiOp is a marked departure from prior and/or contemporaneous practice for the risk of extinction assessment. No evidence shows the shorter time span represents the best available science. This is another dispute that ends by default, with NMFS claiming the absence of data to permit it to engage in its preferred analysis. What has not been explained is whether or not a 100-year [*861] period introduces bias toward an extinction finding.

> 15 The AR contains a portion of the FCRPS BiOp. The complete BiOp is available at http://www.nwr.noaa.gov/Salmon-Hydropower/Columbia-Snake-Basin/final-BOs.cfm.

Based on limited precedent, the agency's partial justification, and the lack of any evidence demonstrating the agency's approach was irrational, the law defers to the agency. Plaintiffs' motion for summary judgment that NMFS acted unlawfully by failing employing a 100-year timeframe is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

2. Winter-Run Viability Analysis.

Plaintiffs contend that the BiOp's determination that winter-run are at a "high risk of extinction" is not based on the best available science because [**150] that determination is an unexplained departure from a "nearly contemporaneous classification" to the contrary by Lindley (2007). AR 00123478. In addition, Lindley (2007) incorporates assessments of spatial distribution, as well as genetic and life history diversity. Plaintiffs maintain that Lindley classified the winter-run as "low risk" in 2007 and that the BiOp's reclassifying the species as being at "high risk" of extinction is unexplained. Doc. 431 at 64-66.

This argument is unconvincing for two reasons. First, Lindley (2007) did not unequivocally classify the winter-run as "low risk." Lindley (2007) assesses a population's viability by examining criteria relating to: (1) population size, (2) population growth rate, (3) the occurrence of catastrophic declines, and (4) the degree of hatchery influence. AR 000123478. In Table 1 of Lindley (2007) the thresholds for finding "high," "moderate," or "low" risk as to each of these four criteria are defined.

> **Table 1.** Criteria for assessing the level of risk of extinction for populations of Pacific salmonids. Overall risk is determined by the highest risk score for any category. (Modified from Allendorf et al. 1977)

	Risk of Extinction		
Criterion	High	Moderate	Low

No comments

- n/a -

	Risk of Extinction		
Criterion	High	Moderate	Low
Extinction risk	> 20% within	> 5% within	< 5% within
from PVA	20 years	100 years	100 years
	- or any ONE	- or any ONE	- or ALL of -
	of -	of -	
Population size[a]	N_e 50	50 < N_e 500	N_e > 500
	-or-	-or-	-or-
	N 250	250 < N	N > 2500
		2500	
Population decline	Precipitous	Chronic decline	No decline
	decline[b]	or depression[c]	apparent or
			probable
Catastrophe, rate	Order of	Smaller but	not apparent
and effect[d]	magnitude	significant	
	decline within	decline [e]	
	one generation		
Hatchery unfluence[f]	High	Moderate	LOW

[a] Census size N can be used if direct estimates of effective size N_e are not available, assuming $N_e/N = 0.2$.
[b] Decline within last two generations to annual run size 500 spawners, or run size > 500 but declining at 10% per year. Historically small but stable population not included.
[c] Run size has declined LO 500, but new stable.
[d] Catastrophes occuring within the last 10 years.
[e] Decline < 90% but biologically significant.
[f] See Kigure 1 for assessing hatchery impacts.

[*862] AR [**151] 00123478.

Lindley (2007) concluded that, at the time the paper was published, winter run "easily satisfie[d] the low-risk criteria for population size, population decline, and catastrophe, but hatchery influence [was] a looming concern." AR 000123486. Lindley (2007) also factors in spatial distribution, as well as genetic and life-history diversity as part of an overall assessment of viability. AR 00123481. Applying these additional criteria to winter-run, Lindley (2007) concluded:

> The Sacramento River winter-run Chinook salmon ESU does not currently satisfy the representation and redundancy rule because it has only one population, and that population spawns outside of the ecoregion where it evolved. For the Sacramento River winter-run Chinook salmon ESU to satisfy the representation and redundancy rule, at least two populations would need to be re-established in the basalt-and-porous-lava region. This may require passage past Shasta and Keswick dams.

Obviously, an ESU represented by a single population at moderate risk of extinction is at high risk of extinction over the long run. A single catastrophe could extirpate the entire Sacramento River winter-run Chinook salmon ESU, if its effects [**152] persisted for four or more years. The entire stretch of the Sacramento River used by winter run Chinook salmon is within the zone of influence of Mt. Lassen. Some other possible catastrophes include a prolonged drought that depletes the cold water storage of Lake Shasta or some related failure to manage cold water storage, a spill of toxic materials with effects that persist for four years, or a disease outbreak.

No comments

- n/a -

AR 00123487.

Lindley (2007) advocated that an alternative assessment, population viability analysis ("PVA"), be applied where possible and that the results of the PVA be compared to the "simpler" criteria described in Lindley (2007). The authors opined that, at the time the paper was published, winter run were at a "moderate extinction risk" according to the PVA. AR 00123486.

Federal Defendants accurately described the Lindley (2007) findings and identified more recent information, including the 2007 population crash, that render Lindley (2007)'s specific conclusions outdated. NMFS first focused on the catastrophe criteria:

> At the time of publication, Lindley *et al.* (2007) indicated that winter-run satisfies the low-risk criteria for population size, population decline, and catastrophe. [**153] However, they also acknowledged that the previous precipitous decline to a few hundred spawners per year in the early 1990s would have qualified it as high risk at that time, and the 1976-77 drought would have qualified as a high-risk catastrophe. In consideration of the almost 7-fold decrease in population in 2007, coupled with the dry water year type in 2007, followed by the critically dry water year type in 2008 (which could be qualified as a high-risk catastrophe) and likely a similar forecast for 2009, NMFS concludes that winter-run are at a high risk of extinction based on population size.

BiOp at 86.

Plaintiffs argue that the BiOp's conclusion that the almost seven-fold decrease in population in 2007, and resulting conclusion that winter run were at "high risk" of extinction based on population size is without support in the record, because, according to Lindley, even the 2007 population decline does not meet the "high risk" criteria (*see* Table 1 above). The population never fell to or below 500 spawners, nor [*863] did the 2007 decline meet or exceed the 90% "order of magnitude" decline definition. Cramer Decl., Doc. 448 at ¶¶ 42, 44. [16] Federal Defendants do not attempt to refute this [**154] criticism, and it appears that the record does not support a high risk finding in light of Lindley (2007)'s definition of a "high risk" designation based on population. [17]

16 Plaintiffs invoke Lindley (2009) to argue that the impacts to the species in the freshwater phase during recent years were inconsequential in comparison to the impacts resulting from poor ocean conditions. This argument fails for the reasons discussed above. Lindley recognized that the period of deteriorated ocean conditions, which were a major short-term cause of population decline, acted in conjunction with a long-term steady degradation of the freshwater environment leaving Chinook vulnerable to other stressors. *See* BiOp at 149; AR 00123517.

17 Federal Defendants attempt to defend this analysis by asserting that the winter-run "population trend has been consistently negative for several decades." Doc. 477-1 at 50. Plaintiffs point out that Federal Defendants rely on a comparison of 2008 figures to 1969 figures to reach this conclusion. Doc. 487 at 47. Lindley (2007) states that "[p]opulation growth (or decline) [] is estimated from the slope of the natural logarithm of spawners versus time for the most recent 10 [**155] years of spawner count data." AR 00123481. In fact, when Lindley applied this standard to the most recent 10 years of data available at the time of publication, the population showed growth not decline. AR 00123486. Defendants do not explain this inconsistency.

Plaintiffs also challenge this determination on the ground that Lindley (2000) defines a "catastrophe," as an event occurring within the last 10 years that caused "an order of magnitude decline within one generation," which "is created by a 90% decline in population size" over that generation. AR 00123478. Plaintiffs point out, and Federal Defendants do not dispute, that the 2007 population decline of 76% in one generation, while significant, did not meet this standard. Doc. 487 at 46. A 76% decline arguably meets the standard for "moderate" catastrophe, which is described as one that is "smaller" than a high-risk catastrophe, but "still [a] significant decline." NMFS's conclusion that the three subsequent years of drought caused a "high-risk" catastrophe is not supported by the record. It is at most a "moderate-risk" catastrophe.

Federal Defendants point out that in order for a population to be considered viable, it "must meet [**156] all the low-risk thresholds." Doc. 477-1 (citing BiOp at 84). Whether the drought was a "high" or "moderate" risk catastrophe or whether the population should actually have been classified as "low-risk" based on population size, does not change the fact that the winter-run are "not viable," because a classification of "moderate" is justified as to at least one criteria: catastrophe.

In addition, the BiOp found that winter-run are at a high-risk of extinction based on spatial structure. BiOp at 86-87. Although "spatial structure" was not one of Lind-

No comments

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ley (2007)'s primary criteria for population viability, it was considered. AR 00123481, 00123487. Lindley (2007) concluded that the winter-run "does not currently satisfy the representation and redundancy rule because it has only one population and that population spawns outside of the ecoregion where it evolved." AR 00123487. To satisfy this rule at least two populations would need to be re-established. *Id.* Plaintiffs emphasize that this situation is "entirely attributable to baseline conditions (i.e., dams)." Doc. 487 at 48. Lindley acknowledges this, noting that establishment of additional winter-run populations "may require passage past [**157] Shasta and Keswick dams." AR 00123487. But, this does not render spatial structure irrelevant to the BiOp's analysis. "[A]n agency may not take action that will tip a [*864] species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm." *NWF v. NMFS II, 524 F.3d at 930.*

Is there a practical implication in the BiOp of NMFS's unsupported description that the winter-run are at "high-risk," as opposed to the less serious classification of "not viable"? Plaintiffs cite Steven Cramer's Reply Declaration to support their argument that the BiOp used the "high-risk" designation to "justify its failure to do a careful, scientific analysis of the RPA because immediate radical action supposedly is necessary." Doc. 487 at 44 (citing Cramer Reply Decl., Doc. 487 at ¶¶ "20-17[sic]"). Cramer opines:

> ...Although "high-risk" of extinction is not a necessary criteria for determination of jeopardy, NMFS uses the "high risk" rating that stems from its misapplication of Lindley *et al.* (2007) to indicate that immediate additional constraints on [**158] water operations are needed to avoid extinction. In other words, from its initial, scientifically incorrect premise, NMFS implies that substantial new restrictions are necessary because the population is supposedly at high risk of extinction, so any careful analysis of the RPAs is inconsequential compared to a claimed urgent need to take radical action. (*See* Fed. Def. Br. at 8-9.)

Id. at ¶ 20. Cramer's accusations are troubling, but are not reflected in the record. Mr. Cramer cites pages 8-9 of Federal Defendants' memorandum in support of their cross motion for summary judgment. Nowhere on those pages do Federal Defendants even mention the "high-risk" rating, let alone rely upon it to justify the RPAs in any way.

Plaintiffs have identified areas of NMFS's analysis that are completely unsupported by the record, constituting "clear error." The extent to which they undermine the viability determination is properly addressed on remand. This aspect of the BiOp must be remanded for correction.

3. Orca Analysis.

The BiOp concluded that the Southern Resident population was so diminished that "the loss of a single individual, or the decrease in reproductive capacity of a single individual, is likely [**159] to reduce the likelihood of survival and recovery of the DPS." BiOp at 573. The BiOp also concluded that any reduction in the Southern Resident's prey base may have adverse physiological effects on Southern Residents. *Id.*

Plaintiffs point to yet another separate biological opinion issued May 5, 2009, evaluating the effects of the Pacific Coast Salmon Plan, which governs management of commercial and recreational salmon fishing off the west coast of the United States, on the Southern Residents ("Orca Salmon Harvest BiOp"). *See* AR 00131721 - 802. According to Plaintiffs, the Orca Salmon Harvest BiOp "produced an extraordinarily detailed quantitative analysis of the effect of decreases in the adult [C]hinook population on Southern Residents ... that incorporated data on factors such as orca abundance, size, and kilocalorie requirements, which NMFS used to project the percent changes in prey availability at different locations in the orcas' range, different times of the year, and different levels of quality in yearly [C]hinook salmon production." Doc. 431 at 35. The Orca Salmon Harvest BiOp concluded that planned ocean harvest of salmon would not jeopardize the Southern Resident Killer Whales. [**160] AR 00131781.

[*865] The crux of Plaintiffs' complaint is that both the conclusions reached and the methodologies used in the 2009 Salmonid BiOp are inconsistent with those of the earlier-issued, more comprehensive and focused Orca Salmon Harvest Biop. Plaintiffs argue:

> One would think that the Orca BiOp's analysis-which found that percent reductions in available chinook ranging up to 11.8% would not jeopardize the Southern Residents-would represent the best available science, and would provide extensive guidance to NMFS in its analysis of the effect of the projects' take of juvenile salmonids. And yet, NMFS relied instead on an earlier quantitative analysis, produced

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February 4, 2009, which it never updated or revised to reflect the new state of the agency's own science represented by the Orca BiOp. (BiOp, App. 3, AR 00107119-136.) The earlier study contained in Appendix 3 did not include any of the analysis of Southern Resident metabolic needs, location, or seasonal migration-all of which were described as "necessary" in the NMFS Orca BiOp study issued a full month before the final publication of the Salmonid BiOp. In fact, Appendix 3 of the BiOp does not even mention the Orca BiOp, despite [**161] its obvious relevance and its status as the best available science on the effect of the take of adult salmon on Southern Residents. This, on its own, was a failure to use the best available science in violation of the ESA.

What Appendix 3 did instead was to quantitatively analyze the effect of the projects on adult salmon abundance under the various Reclamation Study scenarios. It compared these analyses with a scenario representing salmon production without the water projects ("No Project"), which it defined as the highest salmon production year on record. (BiOp, App. 3 at 1, AR 00107119.).... What does this study show? It shows that in the worst case scenario-which is a comparison of the best possible outcome and the worst possible outcome-the reduction in total number of adults would be 13.9% (see highlighted figures above).

It is useful to look at this very worst case scenario in terms of numbers: the total projected population reduction caused by that 13.9% reduction is 120,945 adult salmon. To put that in perspective, that hypothetical worst case scenario is smaller than the actual reported total loss in the lowest ocean harvest on record (161,845 adult salmon). RJN, Ex. 2, Ocean Harvest BiOp at 31. [**162] Looking at the average projected reduction in Study 7.1 and Study 8.0 (the column labeled "Mean") compared with the "No Project" scenario, the result of the projects is a much more modest take of about 20,150 fish, which is eight times less than the lowest salmon ocean harvest ever recorded.

Doc. 431 at 35-36.

Federal Defendants maintain that the two biological opinions are not inconsistent because they address impacts over different time frames and from different actions. The Orca Salmon Harvest BiOp describes short-term impacts to prey availability in specific months during high abundance Chinook years. The 2009 Salmonid BiOp considered impacts to Southern Residents caused by long-term increase in the risk of extinction for winter-run and spring-run Chinook, in addition to long-term impacts to fall-run. BiOp at 573. The Orca Salmon Harvest BiOp concluded the long-term impact of ocean harvest is not likely to appreciably reduce the survival and recovery of the listed Chinook and other salmon affected by harvest, in part because the fishery is managed to adjust harvest levels annually according to the actual salmon population available for harvest, thereby [*866] avoiding harm to the species. [**163] AR 00131776-81. The 2009 Salmonid BiOp concluded that Project operations would increase the risk of extinction of winter-run and spring-run, which "increases the risk of a permanent reduction in prey available to Southern Residents, and increases the likelihood for local depletions of prey in particular locations and times." *Id.* at 574.

Although these biological opinions facially consider different time frames and different actions, it is undeniable that they are temporally and factually interrelated. The Salmonid BiOp specifically concludes that Project operations will reduce the abundance of naturally produced CV fall run Chinook salmon, a source of prey to the Southern Residents. BiOp at 574. As a result, the Salmonid BiOp concludes "Southern Residents would likely experience nutritional, reproductive, or other health effects from reduced prey as a result of the proposed action." *Id.* In contrast, the Orca Salmon Harvest BiOp concludes that, even in the long run, implementation of the Pacific Coast Salmon Plan will not have long-term deleterious effects on Chinook salmon. AR 00131776-77. It is true that the Pacific Coast Salmon Plan is designed to manage commercial and recreational [**164] salmon harvest to meet salmon recovery goals and requires conservation measures, including suspension of all harvest if necessary, when Chinook stocks are doing poorly. AR 00131777. This amounts to a "do no harm" approach to managing the fishery. However, under such a management approach, it is plausible that any impact to fall-run Chinook, and any related impact to orca, caused by Project operations could be automatically mitigated by reduced harvest in the ocean. How these two sets of human actions (Project operations and harvest restrictions) interplay, and how this interplay might impact the likelihood that Project operations

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would harm the Southern Residents, is not discussed in the Salmonid BiOp, which post-dates the Orca Salmon Harvest BiOp, albeit by only one month. NMFS's own findings in the Orca Salmon Harvest BiOp are certainly "relevant factors" NMFS should have taken into consideration before issuing the Salmonid BiOp. Federal Defendants, through counsel, provide a partial, but insufficient, post hoc explanation.

Plaintiffs' motion for summary judgment that the Orca jeopardy analysis is unlawful is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are [**165] DENIED. On remand, NMFS must explain how the findings of these two biological opinions can be reconciled.

4. Interior Delta Mortality as an Indirect Effect.

Plaintiffs assert that the BiOp unlawfully classifies mortality from predators, pollution, and other adverse conditions in the interior delta, as "indirect effects" caused by Project operations. Doc. 431 at 66-72.

a. Applicable Legal Standard.

The Joint Consultation Regulations promulgated by FWS and NMFS explain that "effects of the action" refers to "the direct and indirect effects of an action on the species or critical habitat... that will be added to the environmental baseline...." *50 C.F.R. § 402.02*. "Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." *Id.* (emphasis added). The ESA's definition differs from NEPA's [*867] definition of indirect effects of an action: "[i]ndirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." *40 C.F.R. § 1508.8(b)* (emphasis added). In the preamble of the Final Rule adopting the ESA regulations, NMFS and FWS explained that it intended a narrower [**166] regulatory definition of indirect effects under the ESA than applied in the NEPA context (i.e., compare "reasonably certain to occur" with "reasonably foreseeable"). *51 Fed. Reg. 19,926 (June 3, 1986)*. NMFS and FWS distinguished the ESA from NEPA and expressly explained the intent and rationale for adopting the more narrow "reasonably certain to occur" standard for indirect and cumulative effects under the ESA:

> If the jeopardy standard is exceeded, the proposed Federal action cannot proceed without an exemption. This is a substantive prohibition that applies to the Federal action involved in consultation. In contrast, NEPA is procedural in nature, rather than substantive, which would warrant a more expanded review of cumulative effects. Otherwise, in a particular situation, the jeopardy prohibition could operate to block "nonjeopardy" actions because future, speculative effects occurring after the Federal action is over might, on a cumulative basis, jeopardize a listed species. Congress did not intend that Federal actions be precluded by such speculative actions.

51 Fed. Reg. at 19,933.

Shortly after adoption of the ESA regulations, the Ninth Circuit confirmed "[t]he reasonably certain [**167] to occur' standard applies to 'indirect effects ... caused by the proposed action." *Sierra Club v. Marsh, 816 F.2d 1376, 1388 (9th Cir. 1987)*; *Ctr. for Biological Diversity v. U.S. Dept. of Hous. & Urban Dev., 541 F. Supp. 2d 1091, 1100-01 (D. Ariz. 2008)* (dismissing a suit alleging federal agencies had violated the ESA by failing to analyze the indirect effects of providing federal funding to local development projects, concluding that the link between such financial assistance and groundwater depletion that could harm listed species was "too attenuated" to meet the standards of *50 C.F.R. § 402.02*).

The December 14, 2010 summary judgment Decision in the *Consolidated Delta Smelt Cases* found that the "reasonably certain to occur" standard controlled the asserted causes of indirect mortality to the smelt in the interior Delta. *San Luis v. Salazar*, 760 F. Supp. At 146-47. Here, NMFS resists such a finding, arguing that Plaintiffs (and by implication the December 14, 2010 MSJ Decision in the *Consolidated Delta Smelt Cases)* confuse the BiOp's discussion of "indirect mortality" with the regulatory term "indirect effect." Doc. 477-1 at 55. Federal Defendants argue that the "reasonably certain [**168] to occur" standard does not refer to the certainty of the effect on the species, but rather to the certainty of whether a future activity (i.e. the activity that may have an effect on the species) will occur. The federal register notice promulgating the relevant regulations explains that NMFS considers "effects to listed species from such future activities that are reasonably certain to occur under the analysis of 'indirect effects.'" *51 Fed. Reg. 19,926, 19,932 (June 3, 1986)*(emphasis added). Indirect effects are further defined as "those that are caused by the action and are later in time but are still reasonably certain to occur." *Id.* (emphasis added). Federal Defendants point out that the kinds of "indirect mortality" discussed in the BiOp are not "future activities." Rather, they are a category of effects that are purportedly occurring all the time.

Plaintiffs rejoin by citing a single sentence from the Final ESA Section 7 Consultation Handbook, jointly

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prepared by FWS and NMFS, which explains that "[i]ndirect effects may include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration." AR 00217743 ("Consultation [**169] Handbook") at 4-29 (emphasis added). [18] Plaintiffs argue that th [*868] e use of the word "include" suggests "that NMFS considers effects from future activities to be only a subset of possible indirect effects, and that indirect effects are not limited to future activities." Doc. 487 at 57. Plaintiffs do not mention the very next sentence of the Consultation Handbook. The entire paragraph reads:

> Indirect effects may include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration. In order to treat these actions as indirect effects in the biological opinion, they must be reasonably certain to occur, as evidenced by appropriations, work plans, permits issued, or budgeting; they follow a pattern of activity undertaken by the agency in the action area; or they are a logical extension of the proposed action.

Id. (emphasis added). Here, the indirect mortality findings challenged by Plaintiffs do not constitute "indirect effects." The indirect mortality discussed in the BiOp is caused by the action subject to consultation, not by some other action that is the subject of work plans, permits, or budgeting. The emphasized language specifies [**170] actions "reasonably certain to occur," not those that have occurred. This suggests but does not explicitly reference actions other than the action under consultation.

18 NMFS's and FWS's joint Consultation Handbook "provides internal guidance and establishes national policy for conducting consultation and conferences pursuant to Section 7 of the Endangered Species Act of 1973, as amended." AR 00217635.

The "reasonably certain to occur" standard does not apply to the indirect mortality analysis in the BiOp. [19] However, this does not immunize the indirect mortality findings from review. "Jeopardize" means to "engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild but reducing the reproduction, numbers and distribution of that species." *50 C.F.R. § 402.02*. The BiOp finds project operations cause indirect mortality. Whether such findings are reasonable must be addressed. [20]

19 This finding applies with equal force to the analysis of the causes of indirect mortality discussed in the *Consolidated Delta Smelt Cases'* December 14, 2010 Summary Judgment Decision, namely the [**171] negative influence of Project operations on delta smelt food supply and the exacerbation of the impacts of pollution and contaminants by Project operations. Although the reasonably certain to occur standard was applied in that case, the link between Project operations and these purported sources of indirect mortality were not clearly articulated in the BiOp or justified by record evidence, so the application of the incorrect standard did not make a material difference.

20 Plaintiffs also argue that NMFS must affirmatively acknowledge its own regulatory standard in the BiOp, presumably by making direct reference to the relevant regulatory language. Doc. 431 at 67. Although a court "cannot infer an agency's reasoning from mere silence," *PCFFA v. U.S. Bureau of Reclamation, 426 F.3d 1082, 1091 (9th Cir. 2005)*, so long as the record, as evidenced by the agency's reasoning in the BiOp, supports a finding that Project operations reasonably would be expected to cause indirect mortality, the ESA does not require NMFS to use "magic words" in a biological opinion. An agency's rationale must be upheld if it can "reasonably be discerned." *See Modesto Irr. Dist. v. Gutierrez, 619 F.3d 1024, 1035 (9th Cir. 2010)*.

a. [**172] Does the Record Support a Finding that ProjectC Operations Can Reasonably Be Expected to Cause More Salmonids to Enter the Interior Delta?

Plaintiffs concede that the mortality rate of migrating salmonids is generally higher for fish traveling through the interior Delta than for fish that remain in the mainstem Sacramento River. Doc. 431 at 68. [*869] Plaintiffs argue, however, that the record does not support the BiOp's conclusion that project operations cause more salmonids to take the more dangerous routes through the interior Delta. *Id.* at 67-70. Plaintiffs fault the BiOp for not providing any "analysis or articulation whatsoever of [what] additional fraction of emigrating salmonids -- above the baseline number that will enter the Delta irrespective of the projects -- will be induced to enter the interior Delta solely as a result of proposed project operations." Doc. 431 at 68. Plaintiffs incorporate by reference the arguments made by DWR in its challenge to Action IV.2.1. *Id.* at 69-70. As Plaintiffs' challenge turns on the merits of DWR's challenge, which is thoroughly discussed below in the context of Action IV.2.1, there is no need to separately discuss them here.

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b. Does the Record Support [**173] a Finding that Project Operations Can Reasonably Be Expected to Cause Indirect Mortality from Exotic Species, Pollution, and/or Food Limitations in the Interior Delta?

Plaintiffs also contend that there is no record evidence to support the BiOp's implied conclusion that project operations cause indirect mortality from exotic species, pollution, and other adverse environmental conditions in the interior Delta. Doc. 431 at 70-71.

(1) Exotic Species.

Among other things, the BiOp concludes that Project operations create conditions that favor exotic over native species:

> In addition to the "direct" effects of the CVP and SWP operations manifested by flows and exports, the modification of the Delta hydraulics for the conveyance of water has altered the suitability of the Delta for native species of fish, such as Chinook salmon, steelhead, and green sturgeon. Since the inception of the CVP and later the SWP, the natural variability in the hydrology of the Delta has been altered. As previously explained, the amount and timing of runoff from the Sacramento and San Joaquin Rivers has been altered and shifted to accommodate human needs. When large-scale exports of water were initiated in the South [**174] Delta, it became necessary to "freshen up" the Delta to guarantee high quality fresh water was available to export from the facilities on a reliable basis (e.g., construction of the DCC). This necessitated an increase in the stability of the Delta's hydrology and the formation of a large freshwater "lake" for the reliable conveyance of water from the river sources to the export facilities. The enhanced stability of the freshwater pool in the Delta enabled non-native species, such as centrarchids and catfish, as well as invasive plants, such as *Egeria densa* and water hyacinth, to thrive in this "new" Delta hydrology (Brown and Michniuk 2007). In addition, the altered ecological characteristics of the Delta have been proposed as a contributing factor in the recent Pelagic Organism Decline (POD) observed in the Delta. The combination of these exotic species and altered ecological characteristics of the Delta interact to decrease the suitability of the Delta for native species of fish and have increased the potential for predation and loss (see 2008 CVP/SWP operations BA, Delta smelt sections for a more detailed explanation).

BiOp at 382 (emphasis added). Elsewhere, the BiOp concludes:

> As [**175] described earlier in the Delta effects analysis, many of the sources of loss associated with moving fish through the Delta, such as predator populations and the increased prevalence of non-native aquatic weeds such as *Egeria densa*, have their own interconnections with the operations of the CVP and SWP, and [*870] their continued presence is linked to maintaining an artificially stable Delta environment conducive to moving freshwater towards the pumps.

Id. at 433.

Plaintiffs do not directly contest the conclusion that the altered hydrologic conditions are favorable for invasive species. Nor do Plaintiffs challenge the BiOp's conclusion that CVP and SWP operations contribute to this ecosystem alteration. Rather, they argue that the operators of the CVP and SWP did not release the exotic predators or introduce the exotic weeds, nor can the operators of the projects control these alien species. Doc. 431 at 71.

This is not disputed. The BiOp does not assert, as it cannot, that the Projects were the original cause of these problems. The BiOp concludes that the hydrologic conditions created by the projects favor the continued presence of these exotics and that proposed project operations are likely [**176] to make this situation worse. *See* BiOp at 382 ("Continued operations of the CVP and SWP are unlikely to benefit the health of the Delta, and increases of the facility operations are likely to degrade the system beyond their current conditions, rather than return the Delta to a more natural condition, with more functional hydraulics conducive to a healthy ecosystem."). The BiOp cites recent studies, including Brown and Michniuk (2007), *see* BiOp at 382, to support its conclusion that this "new" Delta hydrology favors exotic species over native ones. Plaintiffs do not challenge the BiOp's reliance on these studies.

However, assuming the BiOp properly found a Project-exotics connection, NMFS failed to adequately consider this factor in its jeopardy analysis. What effect do these exotics have on the Listed Species? To what extent

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does the contribution of the Projects to the continued presence of these exotics contribute to the jeopardy finding? Could altered project operations reduce the presence of exotics? NMFS's logic taken to the extreme means the Projects cannot operate, as no analysis has been done to evaluate the impact on the Listed Species from this indirect effect at varying pumping [**177] levels. It may be that there is insufficient information to answer these questions, but this is pure speculation, as the sufficiency of information is not discussed. This is another example of the need for a realistic analysis of relative effect from Project operations on conditions that are not related to pumping.

The BiOp's analysis of the influence of Project operations on the continued presence of exotic species, and how this relates to indirect mortality to the Listed Species, must be explained. Plaintiffs' motion for summary judgment on this issue is GRANTED. Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

(2) Pollution and Food Limitation.

Plaintiffs also argue that the BiOp unlawfully "blames the project for pollution and food limitation by labeling them effects of the action." Doc. 431 at 72. This is the logical inference drawn from the focus on predators and contaminants, which are mentioned throughout the BiOp. The agency does not explain how the projects influence contaminants or cause food limitations. Plaintiffs point to a statement in the biological assessment that "there is no direct evidence of food limitation for salmon in the delta or lower [**178] estuary," AR 00143672. It is not clear that the BiOp actually asserts that there is a food limitation in the lower estuary. This imprecision contributes to the inadequacy of the BiOp. There is no way to understand the BiOp's attribution of adverse indirect effects to the Projects.

Plaintiffs' motion for summary judgment that the record does not support the BiOp's conclusions about the connection [*871] between Project operations and pollution and food limitation, causing indirect mortality to the Listed Species is GRANTED. Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

D. Critical Habitat Analysis.

1. There Is No Requirement that NMFS Identify a Numerical Threshold for Adverse Modification.

Destruction or adverse modification is defined by regulation to mean "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species." *50 C.F.R. § 402.02*. Previous rulings in related cases have held "that NMFS and FWS have interpreted the term 'appreciably diminish' to mean 'considerably reduce.'" Findings of Fact and Conclusions of Law Re the Existence of Irreparable Harm, *PCFFA v. Gutierrez*, 1:06-cv-245 [**179] OWW GSA, Doc. 367 at 24:6-9 (citing Consultation Handbook at 4-34).

Plaintiffs demand that NMFS set a threshold for adverse modification and directly analyze whether the action "appreciably diminishes" the capability of habitat to support survival or recovery vis-à-vis this threshold. *Id.* at 75. This demand was rejected in the December 14, 2010 MSJ Decision in the *Consolidated Delta Smelt Cases:*

> Plaintiffs cite *Gifford Pinchot, 378 F.3d at 1074*, and *NWF v. NMFS II, 524 F.3d at 932* & n.10, for the principle that FWS must identify a threshold for adverse modification and assess and explain whether the magnitude and extent of any claimed effects to critical habitat reach that threshold. These cases do not support Plaintiff's argument. *Gifford Pinchot* rejected FWS's interpretation of "adverse modification" in a manner that only triggered an adverse modification finding where there is "an appreciable diminishment of the value of critical habitat for both survival and recovery." *Id. at 1069*. After rejecting FWS's rationale for applying the regulation, the Ninth Circuit reasoned that the various biological opinions at issue could nevertheless be found valid if they actually evaluated the impact [**180] to recovery. The *Gifford Pinchot* plaintiffs raised concerns about FWS's complete failure to address the issue of recovery in that biological opinion's critical habitat analysis. The Appeals Court specifically found that FWS detailed the percentage loss of critical habitat but did not discuss the specific impact of that loss on recovery, rendering the BiOp insufficient. *378 F.3d at 1074*.
>
> Following *Gifford Pinchot, NWF v. NMFS II* held that NMFS acted arbitrarily and capriciously by failing to analyze the impacts of dam operations on the recovery value of critical habitat. *524 F.3d at 932*. NMFS' argument "that it 'implicitly' analyzed recovery in its survival analysis" was rejected as a "post hoc justification," because a court cannot consider "an analysis that is not shown in the record."

No comments

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> *Id. at 932 n.10* (internal citations and quotations omitted). Plaintiffs do not directly challenge the BiOp's recovery analysis; rather, they argue that the BiOp should have set a "threshold" for adverse modification. Nothing in *Gifford Pinchot* or *NWF v. NMFS II* requires FWS to set a "threshold" for adverse modification.
>
> *Butte Envtl. Council v. United States Army Corps of Eng'rs, 607 F.3d 570, 582-83 (9th Cir. 2010)*, [**181] suggests exactly the opposite. *Butte* upheld FWS's determination that destruction of a very small percentage (less than 1%) of designated critical habitat would not adversely modify the species' critical habitat. Relevant here is the Ninth Circuit's rejection of a demand that FWS address [*872] the rate of loss of critical habitat, finding that nothing in the statute or regulations requires FWS to perform such a calculation. *Id.*

San Luis v. Salazar, 760 F. Supp. 2d at 945. NMFS is not required to set a numeric threshold for adverse modification.

2. Significance of Impacts to Critical Habitat.

Plaintiffs argue that the adverse modification findings are unlawful because the BiOp explicitly declines to apply the regulatory definition of adverse modification found in *50 C.F.R. 402.02*. Doc. 431 at 75. The BiOp states:

> For critical habitat, NMFS did not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at *50 CFR 402.02*. Instead, we have relied upon the statutory provisions of the ESA to complete the analysis with respect to critical habitat. NMFS will evaluate "destruction or adverse modification" of critical habitat by determining if the action reduces the [**182] value of critical habitat for the conservation of the species.

BiOp at 43. Plaintiffs maintain that this reads the word "appreciably" out of the regulatory definition of adverse modification. Doc. 431 at 75-76. The record provides a reasoned basis for this statement in the BiOp and demonstrates that NMFS has not read the term "appreciably diminish" out of the definition.

In 2005, after *Gifford Pinchot* invalidated FWS's application of the regulatory definition in *50 C.F.R. § 402.02* because FWS had not evaluated whether the amount of habitat anticipated to be lost would impact recovery, NMFS issued a guidance memo on how to conduct "destruction or adverse modification" determination. *See* AR 00005204-209. That memo explicitly directs NMFS to identify the current condition of the Primary Constituent Elements ("PCE") [21] of each critical habitat designation before examining how the proposed action will affect the function and conservation role of each PCE. *Id.* Federal Defendants do not assert that this guidance has invalidated the "appreciably diminishes" aspect of the critical habitat regulation. Doc. 515 at 29. Rather, the guidance memo, which instructs NMFS to "discuss the significance [**183] of anticipated effects to critical habitat," is sufficient to implement an "appreciably diminish" standard. AR 00005208 [22] (emphasis added). The guidance memo's requirement of "significant" impacts to critical habitat is consistent with the regulatory definition of adverse modification to include only those alterations that "appreciably diminish[] the value of critical habitat."

> 21 PCEs are those elements of a critical habitat designation deemed essential for the conservation of the listed species and are described as the sites and habitat components that support one or more life stages or requirements of the species. PCEs are made up of essential features, which are needed to support that specific life-stage requirement. An example is the PCE of spawning habitat, which includes such essential features as clean spawning gravel, clean water, and appropriate water temperatures. *See* BiOp at 56.
>
> 22 The pages in this document appear to be out of order in the AR. What appears to be page 3, AR 00005208, is before what appears to be page 2, AR 00005209.

Because an agency's rationale must be upheld if it can "reasonably be discerned," *see Modesto Irr. Dist. v. Gutierrez, 619 F.3d 1024, 1035 (9th Cir. 2010)*, [**184] there is no requirement that the agency use "magic words" in its analysis. The key question is whether the record supports the adverse modification findings in the BiOp. In other words, does the record demonstrate that Project operations will have a significant [*873] (i.e., appreciable or considerable) impact on the critical habitat of each of the listed species for which adverse modification was found.

The BiOp examines impacts to critical habitat at length. For each species, the BiOp describes the PCEs of

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that species' critical habitat, examines the current status of the critical habitat and describes factors responsible for the current status, evaluates the impacts of current and future non-project (i.e., baseline) impacts, and describes the anticipated impacts of proposed project operations on that habitat.

a. Winter-Run Habitat Analysis.

The evaluation of winter-run critical habitat provides a representative example. There are seven PCEs of Chinook critical habitat: (1) access from the Pacific Ocean to appropriate spawning areas in the Upper Sacramento River; (2) clean gravel for spawning; (3) adequate river flows for spawning, egg incubation, fry emergency, and juvenile downstream migration; [**185] (4) appropriate water temperatures for spawning, egg incubation, and fry development; (5) uncontaminated habitat and food sources; (6) riparian habitat for juvenile development and survival; and (7) downstream migration access to the Pacific Ocean. BiOp at 90. The BiOp evaluates the current status of each of these PCEs. *Id.* at 90-92. In addition, the BiOp contains a lengthy section describing the factors responsible for the current status of the species, many of which also affect the species' habitat. *See id.* at 134-142. The BiOp concludes that the current condition of critical habitat is degraded and has low value for the conservation of the species. *Id.* at 93.

> Critical habitat for winter-run is composed of physical and biological features that are essential for the conservation of winter-run, including up and downstream access, and the availability of certain habitat conditions necessary to meet the biological requirements of the species. Currently, many of these physical and biological features are impaired, and provide limited conservation value. For example, when the gates are in, RBDD reduces the value of the migratory corridor for upstream and downstream migration. Unscreened [**186] diversions throughout the mainstem Sacramento River, and the DCC when the gates are open during winter-run outmigration, do not provide a safe migratory corridor to San Francisco Bay and the Pacific Ocean.
>
> In addition, the annual change in TCP has degraded the conservation value of spawning habitat (based on water temperature). The current condition of riparian habitat for winter-run rearing is degraded by the channelized, leveed, and riprapped river reaches and sloughs that are common in the Sacramento River system. However, some complex, productive habitats with floodplains remain in the system (e.g., Sacramento River reaches with setback levees (i.e., primarily located upstream of the City of Colusa) and flood bypasses (i.e., Yolo and Sutter bypasses).
>
> Based on the impediments caused by RBDD when the gates are in, unscreened diversions, annual changes to the TCP, the time when the DCC gates are open during the winter-run outmigration period, and the degraded condition of spawning habitat and riparian habitat, the current condition of winter-run critical habitat is degraded, and has low value for the conservation of the species.

Id. (emphasis added).

In the environmental baseline analysis, [**187] NMFS concluded climate change will negatively affect all of the Central Valley critical habitat designations at issue. *Id.* at [*874] 173. With respect to upstream habitat, NMFS evaluated the current and future environmental baseline of winter-run Chinook critical habitat in the Shasta and Sacramento Divisions of the CVP, and concluded that the current baseline is "degraded, and has low value for the conservation of the species," and future baseline habitat impacts will "affect the fitness... of the critical habitat...." *Id.* at 181-83, 187-91. For the Delta Division, NMFS concluded that the migratory function of this critical habitat is degraded, *id.* at 203-05, and that the future environmental baseline included continued "ongoing habitat modifications" and adverse habitat impacts from levees, predation, non-native species, contaminants, entrainment, dredging, recreational boating, and temporary irrigation barriers, *id.* at 215-16.

(1) Project Impacts to Winter-Run Spawning Habitat.

In addition to these past, current, and future non-project adversities, NMFS found that proposed project operations in the Sacramento River constrain spawning habitat by providing relatively less cool water temperatures [**188] below Keswick Dam and by stranding or dewatering redds and juveniles. *See id.* at 273. The BiOp's section on the "Effects of the Action on Critical Habitat in the Sacramento River" in particular on "Spawning Habitat" provides:

> For winter-run and spring-run, potential spawning habitat is constrained by temperature control to smaller and smaller areas below Keswick Dam. The impacts of

No comments

- n/a -

operations on cold water have already been described above. However, the changes to the habitat downstream are far more widespread and difficult to detect. The volume of water stored in Shasta reservoir tends to dampen the seasonal variation in water temperatures. This moderation of water temperatures, combined with a loss in spawning habitat above Shasta and Keswick dams, may have profound effects on life history patterns. Warmer water temperatures during the spring-run and CV steelhead egg incubation have resulted in earlier emergence time. Spawning habitat, which is now located 60 to 240 miles downstream from historical sites above Shasta Dam, truncates the juvenile emigration timing by 2-3 months. Therefore, juveniles leave the spawning area at much smaller size and are less likely to survive downstream. [**189] For steelhead the cold summer-time flow regime favors residency over anadromy, which reduces the variability in life history that distinguished runs. In addition, with more spatial and temporal overlap between the listed anadromous salmonid species, competition for space reduces the value of the spawning habitat for the conservation of any one species.

The value of spawning habitat for the conservation of the species is also reduced by flow fluctuations twice a year every year to install and remove the ACID diversion dam. These sudden drops in flow strand and/or isolate juveniles rearing along 5 miles of habitat above the diversion dam, and likely for miles downstream. Flow fluctuations can also dewater winter-run and fall-run redds. Since the majority of winter-run have shifted to spawning above the ACID diversion dam (e.g., 62 percent in 2006), flow fluctuations are likely to have greater impacts in future years.

Climate change, as a modeled future baseline stressor, is likely to reduce the conservation value of the spawning habitat PCE of critical habitat by increasing water temperatures, which will reduce the availability of suitable spawning habitat. Cold water in Shasta Reservoir [**190] will run out sooner in the summer, impacting winter-run and spring-run spawning habitat. This reduction in an [*875] essential feature of the spawning habitat PCE will reduce the spatial structure, abundance, and productivity of salmonids.

Id. at 273. Spawning habitat has been impacted by baseline conditions (such as the presence of Shasta and Keswick Dams) and climate change. The BiOp provides explanation for its conclusion that additional Project operations will add to those baseline impacts. As to winter-run spawning habitat, the section references an earlier discussion of "the impacts of operations on cold water;" addressing CALSIM II modeling runs, comparing temperature conditions (and resulting egg mortality) between baseline operations and operations under the proposed action. Figure 6-14, which depicts winter-run egg mortality by water year type, permits comparison of the baseline (Study 7.0), near future project operations (Study 7.1) and future project operations (Study 8.0).

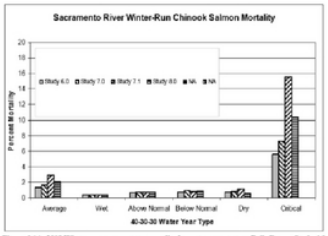

Figure 6-14. 2005 Winter run average egg mortality by water year type at Bells Ferry. Study 6.0 represents 2004 operations, study 7.0 represents current operations, 7.1 represents near future operations, and 8.0 represents future operations (CVP/SWP operations BA figure 11-30).

Id. at 259. These results show that in critical years, which are 15 percent (15%) of the years modeled, egg mortality more than doubles between Study 7.0 and Study 7.1, and increases by 50 percent between Study [**191] 7.0 and Study 8.0, under past and future operations. (No explanation is given for why study 7.1 shows higher mortality than Study 8.0.) Because egg mortality is a direct result of temperature conditions in winter-run spawning habitat, this demonstrates that Project operations will significantly reduce spawning habitat in critical years.

(2) Project Impacts to Rearing and Migratory Habitat.

Information to support NMFS's finding of significance for winter-run rearing and migratory habitat is less apparent. In Section 6.3.8 ("Effects of the Action on Critical Habitat in the Sacramento River"), the BiOp reviews impacts to rearing and migratory habitat very generically:

No comments

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6.3.8.2 Rearing Habitat [*876] Stream flows within the Sacramento River have been altered by the operations of Shasta and Keswick dams. Generally, the changes have increased flows during the summer and fall, and decreased flows in the winter and spring compared to historical conditions (figure 5-13). The result of the change in historical flow patterns has been a decrease in the hydrologic variability and a loss of complexity in the freshwater aquatic habitat. Specific areas of rearing habitat loss due to changes in the flow pattern [**192] include fewer oxbows, side channels, braided channels, less LWD, and less shaded aquatic riparian habitat. The Nature Conservancy (2007) model shows that these are necessary for proper functions of riverine ecosystems. A more natural flow regime with higher spring flows and lower summer flows would support riverine functions like the creation of oxbows, side channels and more varied riparian communities. In turn, this would increase cottonwood regeneration, shaded aquatic habitat, food supply, rearing areas, and LWD recruitment, all important components that are being degraded under continued project operations.

The decrease in the biological value of the rearing habitat is due to the simplification of the processes that create these important areas. The CVP and SWP have for years used the river as a conveyance system, neglecting the natural processes that are necessary to support river dependent species. This altered stream flow pattern has indirectly led to an increase in bank stabilization, levees, riprap, and armoring to keep the river in place. The reduction in rearing habitat quality has decreased the survival of juvenile salmonids and favored the proliferation of introduced non-native [**193] species that prey or compete with juvenile salmonids. Due to the stream flow changes, introduced warm water predators are much more numerous today than historically. Therefore, the conservation value of rearing habitat along the entire 300 miles has been degraded by project operations.

Rearing habitat for CV steelhead has been modified in the Sacramento River to cooler summer time releases for winter-run spawning. This change in summer temperature regime has increased the resident rainbow trout population. The change in summer temperatures may reduce the number of steelhead that choose to migrate to the ocean because conditions are too favorable. If the resident trout population is as large as the trout population above Shasta dam (i.e., estimated at 10,300 trout per mile), then competition for food and space could reduce the value of the rearing habitat PCE.

Climate change, as modeled future baseline stressor, is likely to reduce availability of rearing habitat, and in turn, the value of the rearing habitat PCE of critical habitat, by increasing water temperatures. As the juveniles migrate downstream, they will emigrate earlier, encounter thermal barriers sooner, and be subjected to [**194] predators for longer periods of time. This reduction in the essential elements of critical habitat will reduce the spatial structure, abundance, and productivity of salmonids. Juveniles would be expected to concentrate in areas of cold water refugia, like in the few miles below Keswick Dam, where competition for food, space, and cover would be intense. Those individuals that stayed to over summer would be forced into one life history pattern consistent with project operations (i.e., yearling life history and emigration during the following spring). Those juveniles that did emigrate early would be exposed to greater stress regimes as they encounter higher water temperatures [*877] and greater concentrations of predators downstream.

6.3.8.3 Migratory Corridors

The conservation value of the migratory corridor along the mainstem Sacramento River for all 4 listed species is degraded by the presence of barriers to upstream and downstream migrations.

An essential feature of the migratory corridor PCE is unobstructed passage of emigrating fish through the upper Sacramento River to the spawning areas. This characteristic of the PCE will continue to

No comments

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be degraded by the continued operation of the RBDD and [**195] ACID diversion dam. Adult salmonids are blocked and/or delayed in passing these obstructions. Juveniles are subjected to higher concentrations of predators at these locations. Entrainment losses will continue into the future from operation of fish screens at these diversions.

RBDD backs up water on the Sacramento River to form Lake Red Bluff during the summer months, when juvenile winter-run are migrating downstream. This action reduces the conservation value of the critical habitat within the 6-mile lake (or 15 miles of shoreline) for winter-run, spring-run and CV steelhead (TCCA 2008). The inundation of the Sacramento River slows down flows, covers riparian areas, warm water predators become more numerous, and the value of the habitat is reduced. Juvenile salmon and steelhead are disoriented and confused as they migrate downstream through the lake, similar to what happens on the Columbia River above its dams. Stranding and isolation occur in sloughs adjacent to the lake when the gates come out in September (USFWS 1998). The rising waters in the spring kill any vegetation along the sides by submerging it underwater and covering it with silt. Water temperatures increase in the lake [**196] as flows are slowed and surface water is heated by the sun. Large shade trees and riparian areas are prevented from becoming established leaving the near shore areas devoid of vegetation. Food supply, shelter and cover are reduced by this action and will continue to be reduced under future operations until a new pumping plant is built and operational.

Approximately, 8 miles of river habitat is modified (or 13.3 percent of the available habitat above RBDD) to less suitable lake habitat for 4 to 6 months of every year when the diversions are in place (i.e., 6 miles above RBDD, and 2 miles above ACID). This seasonal loss of habitat reduces food availability, shelter, and cover, and causes permanent changes that reduce the value of that habitat for the rest of the year (i.e., from sedimentation, loss of shaded aquatic habitat, loss of riffle areas that produce food). The loss of habitat value leads to a reduction in the abundance of juvenile winter-run and spring-run that enter the Delta. Productivity and growth are also reduced from modified habitat and reduced complexity. Juvenile salmonids reach the Delta sooner and at a smaller size, making them more vulnerable to predation. Larger [**197] fish are more likely to survive the stressful transition into the marine environment than smaller fish, which have less energy reserves stored in their bodies. Therefore, salmonids with life history stages (representing a year in freshwater) like spring-run yearlings and CV steelhead smolts are less likely to be affected by these habitat changes in the migratory corridor, since they move through mainstem quickly prior to entering the ocean.

BiOp at 273-74.

The BiOp's "Synthesis of Effects" provides the following additional discussion of rearing habitat:

[*878] 9.2.2 Project Effects on Sacramento River Winter-Run Chinook Salmon Critical Habitat Critical habitat for winter-run is comprised of physical and biological features that are essential for the conservation of winter-run, including freshwater spawning sites, rearing sites, and migration corridors to support one or more life stages of winter-run. As summarized below, the conservation value of critical habitat throughout the Sacramento River from Keswick Dam to the Delta (302 miles) will be degraded by the proposed action.

***

9.2.2.2 Rearing Habitat

The value of rearing habitat will continue to be degraded as hydrologic conditions resulting [**198] from operations favor the proliferation of introduced non-native warm water predators of juvenile salmonids.

Reclamation will continue to operate RBDD (modification of 6 miles of free-flowing riverine habitat to lake-like habi-

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tat) and the ACID diversion dam (modification of 3 miles of free-flowing riverine habitat to lake-like habitat) for 4 to 6 months of every year. Food supply, shelter, and cover will continue to be reduced during the 4 months that the gates are in. In the future full build out scenario, the value of rearing habitat will improve when the gates are out for up to 10 months of each year. However, stranding and isolation in sloughs adjacent to the lake would still occur, and riparian habitat will not likely establish.

9.2.2.3 Migratory Corridors

The value of upstream and downstream migratory corridors will continue to be degraded as a result of the continued operation of RBDD and the ACID diversion dam, which preclude unobstructed passage. The creation of Lake Red Bluff results in the reduction in value of rearing habitat and degradation of 15 miles of shoreline that slows down flows, inundates riparian areas, and increases habitat for warm water predators. The value of [**199] the migratory corridor will also continue to be degraded when the RBDD gates come out in September and cause stranding and isolation in sloughs adjacent to the lake. In the future full build out scenario (2030, which we assume the effects will be realized starting in year 2019), the 10-month gates out and 2-month (which is really 2 1/2 months) gates in scenario will improve the value of the migratory corridor by providing unobstructed passage.

During outmigration, the DCC, when the gates are open, continues to degrade the value of the mainstem Sacramento River as a migratory corridor by entraining a portion of the outmigrating juveniles into the Central Delta, where survival and successful outmigration to the Pacific Ocean is lower than if the juveniles remained in the main migratory corridor of the Sacramento River. The proposed action exacerbates this problem by altering water movement through the Sacramento River and Delta such that water in the north part of the Delta (e.g., immediately upstream of the DCC) is pulled southward towards the Federal and State pumping plants through the DCC and/or Georgiana Slough.

Id. at 469-70. The next sub-section assesses risk to winter-run critical [**200] habitat.

9.2.3 Assess Risk to the Winter-Run Chinook Salmon Critical Habitat Many of the physical and biological features that are essential for the conservation of winter-run are currently degraded. As a result of implementing the proposed action, some of those physical and biological features will likely remain the same, which will keep their conservation [*879] value low. However, the conservation value of many of the physical and biological features will likely be further degraded. For example, the proposed action will further degrade the value of spawning, rearing, and migratory habitat. Reoperation of RBDD in the future full build out scenario, so that the gates are down for 2 1/2 months instead of the 4-month near-future (i.e., 2009-2019) scenario, will slightly improve the value of rearing and migratory habitat. However, the conservation value of these habitats will remain degraded by other stressors related to both the proposed action and the baseline (see figure 9-4).

The effects of the proposed action under climate change scenarios would likely further degrade the value of spawning and rearing habitat by increasing water temperatures. Cold water in Shasta Reservoir will run out sooner [**201] in the summer, degrading winter-run spawning habitat, and the value of rearing habitat would likely be further degraded by juveniles emigrating earlier, encountering thermal barriers sooner, and be subjected to predators for longer periods of time. Juveniles that do not emigrate earlier will likely congregate in areas of cold water refugia, like in the few miles below dams where competition for food, space, and cover would be intense.

Based on the analysis of available evidence, NMFS concludes that the proposed action is likely to reduce the conservation value of the critical habitat, as designated, for the conservation of Sac-

No comments

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> ramento River winter-run Chinook salmon (table 9-3).

Id. at 470.

All of these discussions of impacts to rearing and migratory habitat on the Sacramento River focus on the operation of Red Bluff Diversion Dam ("RBDD") and Anderson Cottonwood Irrigation District ("ACID") diversion dam, which obstruct passage and alter large areas of habitat. For example:

> Reclamation will continue to operate RBDD (modification of 6 miles of free-flowing riverine habitat to lake-like habitat) and the ACID diversion dam (modification of 3 miles of free-flowing riverine habitat to lake-like [**202] habitat) for 4 to 6 months of every year. Food supply, shelter, and cover will continue to be reduced during the 4 months that the gates are in. In the future full build out scenario, the value of rearing habitat will improve when the gates are out for up to 10 months of each year. However, stranding and isolation in sloughs adjacent to the lake would still occur, and riparian habitat will not likely establish.

Id. at 469. Although the BiOp does not offer a numerical analysis of what percentage of the designated rearing and/or migratory habitat is disturbed by these operations, at least for those fish that must pass these structures (the entire winter and spring-run populations) the significance of such barriers is obvious.

Similar evidence of significant impacts for other aspects of critical habitat exists for each of the species. *E.g.*, *id.* at 260 (demonstrating significant impacts to the spring-run spawning habitat); *id.* at 501-503, 504 (summarizing project impacts to spring-run habitat), *id.* at 549-53 (same as to steelhead); *id.* at 570-71 (same as to green sturgeon proposed critical habitat, noting that "[w]hen the gates are down, RBDD precludes access to 53 miles of spawning habitat [**203] for 35-40 percent of the spawning population of green sturgeon").

Plaintiffs' argument is simply that Federal Defendants acted unlawfully by failing to directly articulate that project operations have "appreciable" or "significant" impacts on critical habitat. The test is that the agency's reasoning should reasonably be discerned from the BiOp. A number [*880] of evident causes are identified, which adversely impact the Listed Species. NMFS provided no quantification other than year-to-year population fluctuations. Data for CV Steelhead and green sturgeon are sparse. The record reflects a number of adverse modifications of the species' critical habitat. Although the BiOp does not show what proportion of the population will be affected, this is not required. The explanation of the adverse effects on habitat and how these changes have the ability to effect harm to the species is sufficient.

Plaintiffs' motion for summary judgment that the critical habitat analysis is unlawful because NMFS did not apply the proper standard for adverse modification is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

E. Use of Surrogates.

In the effects analysis, the BiOp utilized [**204] fall-run Chinook salmon as a surrogate for steelhead, and hatchery Chinook salmon as a surrogate for wild Chinook salmon. Plaintiffs argue that NMFS violated the best available science standard by failing to "validate" its use of surrogate species. Doc. 431 at 81.

Plaintiffs' expert Kenneth Cummins opines that there is a consensus in the scientific community that, whenever possible the use of surrogates should be avoided. Cummins Decl., Doc. 445 at ¶ 8. Surrogates should be a "tool of last resort." *Id.* This is undisputed.

Dr. Cummins further opines that "for a surrogate to be appropriate, it should share the same key ecological or behavioral traits that make the target ... sensitive to environmental disturbance and the relationship between population vital rates (for example, survival) and level of disturbance should match that of the target." *Id.* at ¶ 11 (citing Caro *et al.* (2005)). Dr. Cummins maintains that because "all species are different to some degree in regards to their life history strategies, ecological relationships with other species, and selection and use of habitat, substituting data from one species to draw inferences about another for purposes of conservation planning [**205] without validating that decision a priori is not justified." *Id.* at ¶ 14. He continues: "since no two co-occurring species are biologically identical, that would seem to rule out management planning for one species that is informed using biological information that is available for another unless use of a surrogate species for the target species is validated." *Id.* Dr. Cummins cites a study by Favreau, *et al.* (2006), which found that "in less than 2 percent of the cases examined did a surrogate represent the target species better than a random selection of potential surrogates. Further, in less than 4 percent of the cases could the surrogate be considered as effective in representing the target species." *Id.* From this, Dr. Cummins concludes:

No comments

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> This makes it clear that without detailed data supporting very similar responses of juvenile Chinook salmon and juvenile steelhead to specific stressors, such as a given set of flow conditions, there is no scientific justification to choose Chinook as a surrogate over any other co-occurring species.

Id. Dr. Cummins describes "various approaches to validation that scientists may employ before relying on surrogate data."

> One approach to validation sets [**206] forth three criteria that must be met in order to use a surrogate confidently: (1) establish the relationship between levels of environmental disturbance and demographic vital rates for the surrogate species; (2) identify the key traits that affect demographic viability in both the surrogate and target species with regard to the environmental disturbance; and [*881] (3) establish the relationship between the key trait and the disturbance threshold Caro *et al.* (2005). Under this approach NMFS should have identified the key traits for both Chinook and steelhead that affect their survival as they migrate through the Delta. NMFS failed to do this.

Id. at ¶ 15. The problem with Plaintiffs validation argument, and Dr. Cummins' related opinions, is that they require that NMFS conduct new experiments to justify reliance on existing experimental data. For this reason, those portions of Dr. Cummins' declarations that opine NMFS should have conducted validation experiments were stricken from the record. *See* Doc. 536 at ¶ 15; *see also S.W. Ctr. for Biological Diversity v. Babbitt, 215 F.3d 58, 60, 342 U.S. App. D.C. 58 (D.C. Cir. 2000)* (best available science standard does not impose an obligation to conduct independent studies). [**207] The record does not support Plaintiffs' validation requirement argument. [23]

> 23 It is unclear whether Dr. Cummins is correct to assert that validation is standard practice in the field. Garwin Yip opines that his review of tagging studies in the Pacific Northwest reveals that the surrogate validation process is not typically used due to increased time and funding required to complete the validation process. Third Yip Decl., Doc. 518 at ¶ 16.

To the extent Plaintiffs advance a more generic challenge to NMFS's use of surrogates, NMFS explained its use of surrogates and addressed the limitations of surrogate data:

> NMFS understands that the use of surrogates in the form of hatchery releases (e.g., late fall-run to determine spring-run behavior), different species (e.g., Chinook salmon to determine steelhead behavior; Atlantic or shovelnose sturgeon to determine effects of contaminant exposures on green sturgeon), and even the same run and species (e.g., hatchery fish and laboratory studies to determine wild/natural fish behavior) may not accurately predict or emulate the exact behavior of the species under analysis in its natural environment in order to determine exact fish routing, timing, [**208] duration of migration, and export pumping entrainment patterns. However, when direct evidence or similar evaluations are not available for the species under analysis, NMFS has utilized data and results from the use of surrogates that exhibit strong similarities in physiological needs, in life history stages, and in general behaviors. In the absence of data on salmonids and green sturgeon in the wild, NMFS considers these studies one of the best available sources of information used to determine the potential effects of CVP/SWP operations.

BiOp at 62. NMFS maintains that the use of surrogates "minimizes the amount and extent of take associated with tagging or capturing listed species to monitor take." *Id.* at 62-63. Appendix 3 of the BiOp contains a comparison of delta survival rates between hatchery and wild Chinook. BiOp App. 3, at 10-11.

One of the draft BiOp peer reviewers considering the BiOp's analyses of winter- and spring-run Chinook noted: "where information was lacking, reasonable surrogates are used." AR 00061498. Plaintiffs' own experts, *e.g.*, Mr. Cramer, Dr. Hanson, and Mr. Cavallo, used data from experiments utilizing surrogates without independently validating the surrogates. [**209] *See* Second Yip Decl., Doc. 481 at ¶ 33; Third Yip Decl., Doc. 518 at ¶ 16. It is undisputed that in many circumstances unverified surrogate data was the only data available for use by NMFS to evaluate the impact of project operations on the Listed Species. Eliminating the surrogate data would

No comments

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have "considerably limit[ed] the utility [*882] of any biological analyses undertaken" in the BiOp. *Id.* at ¶ 14.

Plaintiffs' motion for summary judgment that the BiOp's use of surrogates violated the ESA's best available science standard is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED. The agency recognized there were shortcomings in using surrogates. This is a dispute among scientists.

F. Challenges to the Reasonable and Prudent Alternative.

1. RPA Action IV.2.1.

Action IV.2.1 limits export pumping from April 1 through May 31 and has two requirements. First, the Action requires a minimum flow, as measured at Vernalis, based on an index of storage at New Melones Reservoir ("New Melondes Index"). BiOp at 642; BiOp App. 5 at 71. The Vernalis flow requirement is not challenged.

The second requirement of Action IV.2.1 restricts combined CVP and SWP export pumping based on the [**210] flows at Vernalis, with the permissible level of exports rising in relation to increased flows at Vernalis. BiOp at 642; BiOp App. at 71-72. The action is phased. Phase I governs operations during 2010 and 2011, when combined CVP and SWP exports were restricted as follows:

Flows at Vernalis (cfs)	Combined CVP and SWP Export
0-6000	1,500 cfs
6,000-21,750	4:1 (Vernalis flow:export ratio)
21,750 or greater	Unrestricted until flood recedes below 21,750

BiOp at 642. Under Phase I, the baseline export rate is set at 1,500 cfs, deemed an operational minimum required to address health and human safety needs. *Id.* at 74. Flood warning stage at Vernalis is 21,750 cfs. *Id.* at 71 n.2.

During Phase II, which operates from 2012 on, combined exports are governed by the following table from April 1 through May 31:

San Joaquin Valley Classification	Vernalis flow (cfs): CVP/SWP combined export ratio
Critically dry	1:1
Dry	2:1
Below normal	3:1
Above normal	4:1
Wet	4:1
Vernalis flow equal to or greater than 21,750 cfs	Unrestricted exports until flood recedes below 21,750.

Id. at 643-44. Action IV.2.1 includes an exception for multiple dry years and a health and safety exception. *Id.* at 644.

Action IV.2.1 is designed primarily to [**211] "reduce the vulnerability of emigrating CV steelhead within the lower San Joaquin River to entrainment into the channels of the South Delta and at the pumps caused by the diversion of water by the export facilities in the South Delta, by increasing the inflow to export ratio." BiOp at 641. A secondary purpose of Action IV.2.1 is to more generally "enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the main stem of the San Joaquin River for emigrating fish, including greater net downstream flows." *Id.*

Both the Export Plaintiffs and DWR have twice previously sought injunctive relief against the imposition of Action IV.2.1. On May 18, 2010, Action IV.2.1 was addressed in Findings of Fact and Conclusions of Law, granting in part and denying in part Plaintiffs' motion for preliminary injunction:

> The evidence supports NMFS's general finding that some form of restriction on the Vernalis flow/export ratio is needed to prevent jeopardy to the SSNDG of CV

No comments

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Steelhead. Enjoining any flow/export ratio restriction will appreciably diminish the likelihood of the SSNDG's survival or recovery and/or adversely modify its [**212] critical habitat.

> [*883] a. Mr. Stuart testified that enjoining Action IV.2.1 would "jeopardize" the SSNDG of CV steelhead, 3/31/10 Tr. 122:9, 121:3-5, which in turn would "further decrease the viability of the Central Valley" steelhead DPS, *id.* at 104:2-3. Plaintiffs' expert, Mr. Cramer, did not provide an opinion on the impact of enjoining Action IV.2.1 on the SSNDG of CV steelhead. *Id.* at 24:23-25:1.
>
> b. For critical habitat, Mr. Stuart opined that Action IV.2.1 provides benefits by enhancing migratory corridors, increasing riparian zones and rearing areas which can be used by migrating juveniles, and shortening migration time and increasing turbidity, both of which can decrease vulnerability to predation. *Id.* at 110:24-111:14. Mr. Stuart testified that enjoining Action IV.2.1 would remove these beneficial effects. *Id.* at 111:1-2, 121:13-19; *see also* Gov't Salmon Ex., ¶4 (enjoining Action IV.2.1 would "negate" the benefits provided by Action IV.2.1). Mr. Cramer did not opine what effect enjoining Action IV.2.1 would have on CV steelhead critical habitat. 3/31/10 Tr. 25:7-11, 110:24-25, 111:1-2 (Stuart testimony that Mr. Cramer "didn't look at the effects of the flow on enhancing critical [**213] habitat in migratory corridors in the Delta").
>
> ***
>
> Action IV.2.1 also helps spring-run Chinook salmon, because "the reduced export rates [caused by Action IV.2.1] create a more positive OMR flow within the southern central Delta," resulting in less fish entrained when entering the San Joaquin River at Mokelumne. 3/31/10 Tr. 124:9-15.
>
> However, the record does not support a finding that the specific Vernalis flow to export ratios imposed by Action IV.2.1 (as opposed to lesser or greater ratios) are necessary to avoid jeopardy and/or adverse modification to any of the Listed Species. The total absence of explanation for the exact flow limits chosen makes Action IV.2.1 arbitrary and capricious.

Doc. 347 ¶¶ 99-102 (internal paragraph numbers omitted from quotation to avoid confusion). The injunction decision found likely success on the merits, but requested additional information on the status of the species before ordering injunctive relief:

> Injunctive relief is also warranted under the ESA, because, although the general premises underlying Actions IV.2.1 ... find marginal support in the record, the precise flow prescriptions imposed on coordinated project operations as part of Action IV.2.1's [**214] Vernalis flow/export ratio ... are not supported by the best available science and are not explained as the law requires.
>
> Injunctive relief cannot be imposed without up-to-date evidence of the status of the species to assure that altered operations will not deepen jeopardy to the affected species or otherwise violate other laws. The evidence has not sufficiently focused on remedies to provide a confidence level that completely removing the Vernalis flow to export ratio prescriptions of Action IV.2.1 ... to increase water supply will not jeopardize the continued existence of the species and/or adversely modify their critical habitats.

No comments

- n/a -

Id. at 133-34.

After receiving additional evidence about the status of the species, Action IV.2.1 was enjoined for a limited period of time (from May 26 through May 31, 2010), in part because only a small percentage of the population of concern, the SSNDG of CV Steelhead, remained in the area that [*884] would be impacted by the injunction. Doc. 380.

A second motion for injunctive relief was filed against Action IV.2.1 in February 2011, Doc. 538, and then withdrawn in light of wet hydrologic conditions that obviated the need to implement the challenged aspects of [**215] the Action in this water year. Doc. 625, filed March 30, 2011.

Export Plaintiffs and DWR again challenge the scientific basis for Action IV.2.1. Export Plaintiffs' and DWR's briefs on the issue substantially overlap.

a. Does the Record Support NMFS's Imposition of an Flow:Export Ratio Requirement?

(1) Studies Cited by DWR.

DWR's principle argument is that the last twenty years of San Joaquin River fisheries studies have not produced any statistically significant evidence of a negative relationship between salmonid survival and project pumping. Doc. 446-1 at 11. DWR's expert, Bradley Cavallo, refers to various statistical analyses of San Joaquin River salmonid experiments that reveal either no statistically significant relationship, or a positive one. His citation to a study by Kjelson, Loudermilk, Hood, and Brandes, "The Influence of San Joaquin River Inflow, Central Valley and State Water Project Exports and Migration Route on Fall-Run Chinook Smolt Survival in the Southern Delta During the Spring of 1989," published in 1990, is representative of these critiques. Kjelson, *et al.* (1990) concluded:

> Survival of tagged smolts released under low export conditions was not greater than for those [**216] released under high export conditions (Table 4). This was an unexpected result as we believed conditions for survival should have improved when exports were lowered, since direct losses at the Project facilities were decreased, flow in the mainstem San Joaquin was increased and reverse flows in the Delta were eliminated.

AR 00122358-59 (cited in Cavallo Decl., Doc. 452 at ¶8a).

Mr. Stuart, the lead author of the Delta section of the BiOp, asserts that Mr. Cavallo has selectively quoted from the relevant studies. For example, as to the Kjelson, *et al.* study:

> ...Mr. Cavallo selectively cites a paragraph from the Kjelson *et al.* (1990) study without including the discussion concerning the results of the study. Kjelson *et al.* reached a different conclusion as to the potential role of exports than would be arrived at by reading Mr. Cavallo's excerpt from his declaration. Starting on page 11 of the Kjelson *et al.* study, the authors discuss the potential reasons for the lower survival during lower export levels. NMFS 122357. These included: (1) the duration of the low export period in May 1989 under the low San Joaquin River flow conditions was too short, thereby not allowing the tagged smolts [**217] sufficient time to successfully exit the Delta before high export conditions were resumed, (2) a short curtailment period may be sufficient if San Joaquin River flows are high compared to the export rates at the time of smolt migration, (3) the relatively low number of tagged fish released under each export period that would make recovery at Chipps Island difficult if survival was low, and (4) elevated temperatures and poor trucking survival for the Stanislaus River releases that potentially lowered initial survival rates, thus biasing the export relationship. Kjelson *et al.* finishes with recommendations for future studies, including: (1) a wider range of inflow to export ratios assessed, particularly between 1 and 5 when river flows are above 5,000 cfs in the San Joaquin River, and (2) document the proportion of fish that enter upper Old River under various flow, export, and [*885] tidal conditions. The fact that Mr. Cavallo did not offer these additional points in his declaration limits the utility of his opinion.

Fourth Stuart Decl., Doc. 485 at ¶ 13. The BiOp specifically discussed Kjelson, *et al.* (1990)'s conclusions in Appendix 5:

> In a study assessing the influence of San Joaquin River [**218] inflows, state and

No comments

- n/a -

> federal exports and migration routes, Kjelson *et al.* (1990) released experimental fish (coded wire tagged hatchery Chinook salmon) during the spring of 1989 at Dos Reis on the San Joaquin River below the head of Old River, and in Old River itself downstream of the head under conditions with low San Joaquin River flow (? 2,000 cfs) and high/low export conditions (10,000 cfs and 1,800 cfs). The results of the study were unexpected as the rate of survival was not greater for the low export conditions compared to the higher export conditions. Upon further examination of the data, Kjelson *et al.* found that survival was comparatively lower for all upstream release groups that year compared to other studies conducted in previous years. In addition, Kjelson *et al.* surmised that the short period of reduced exports (7 days) was not long enough to allow fish to exit the system and move beyond the influence of the exports when higher pumping resumed. Based on the times to recovery at Chipps Island, it was concluded that a sizeable proportion of the released fish were still in the Delta when the higher export levels resumed. This conclusion is further reinforced by the salvage [**219] of fish released at Jersey Point, indicating that fish were drawn upstream into the interior of the Delta and towards the pumps. The study, although having several significant flaws, did conclude that survival was higher in the main stem San Joaquin River compared to Old River and that survival in the Delta interior was lower compared to the western Delta (i.e., Jersey Point releases). The authors cautioned about drawing conclusions about export rates and survival from the data due to its obvious flaws.

BiOp App. 5 at 5-6.

DWR correctly rejoins that Mr. Stuart does not contest that Kjelson, *et al.* (1990) concluded that survival was lower during low exports than high exports. DWR is also correct that Mr. Stuart does not explain how the study "affirmatively supports the United States' claim that a relationship exists between project exports and smolt survival sufficient to justify the Inflow/Export ratio." Doc. 495 at 16. Mr. Stuart never opined that Kjelson's study provides such affirmative support. The BiOp considered the study, its caveats, and acknowledged the study's "surprising" conclusion that survival was not higher during low export conditions.

Mr. Cavallo quotes from five more [**220] studies, Cavallo Decl., Doc. Doc. 452 at ¶ 8:

> o Brandes and McLain, "Juvenile Chinook Salmon Abundance, Distribution, and Survival in the San Sacramento-San Joaquin Estuary," Fish Bulletin 179, Vol. 2 (2001):
>
> > To determine if exports influenced the survival of smolts in the San Joaquin Delta, experiments were conducted in 1989, 1990 and 1991 at medium/high and low export levels. Results were mixed showing in 1989 and 1990 that survival estimates between Dos Reis and Jersey Point were higher with higher exports whereas in 1991 between Stockton and the mouth of the Mokelumne River (Tables 11 and 12) survival was shown to be lower (0.008 compared to 0.15) when exports were higher.... In addition, results in 1989 and 1990 also showed that survival indices of the upper Old River groups relative to the Jersey Point groups were also higher during the higher [*886] export period, but overall still about half that of the survival of smolts released at Dos Reis (Table 11).
>
> AR 00109602-604.
>
> o San Joaquin River Group Authority, "2005 Annual Technical Report":
>
> > Regression of exports to smolt survival without the HORB were weakly or not statistically significant (Figure 5-17) using both the Chipps Island and

No comments

- n/a -

[**221] Antioch and ocean recoveries, but both relationships indicated survival increased as exports increased."

AR 00134289-90.

o California Department of Fish and Game, "Final Draft 11-28-05 San Joaquin River Fallrun Chinook Salmon Population Model"

There is no correlation between exports and adult salmon escapement in the Tuolumne River two and one-half years later (Figure 24).

AR 00212424, 00212477.

o Mesick, McLain, Marston and Heyne, "Draft Limiting Factor Analyses & Recommended Studies for Fall-run Chinook Salmon and Rainbow Trout in the Tuolumne River" (February 27, 2007)

[Preliminary correlation analyses suggest that the combined State and Federal export rates during the smolt outmigration period (April 1 to June 15) have relatively little effect on the production of adult recruits in the Tuolumne River compared to the effect of winter and spring flows. Furthermore, reducing export rates from an average of 264% of Vernalis flows between 1980 and 1995 to an average of 43% of Vernalis flows and installing the head of Old River Barrier between 1996 and 2002 during the mid-April to mid-May VAMP period did not result in an increase in Tuolumne River adult recruitment (Figures 3 and 17).

AR [**222] 00125522.

o Ken B. Newman, "An Evaluation of Four Sacramento-San Joaquin River Delta Juvenile Salmon Survival Studies" (March 31, 2008) (AR 00127144.)

The Bayesian hierarchical model analyzed the multiple release and recovery data, including Antioch, Chipps Island, and ocean recoveries, simultaneously.... There was little evidence for any association between exports and survival, and what evidence there was pointed towards a somewhat surprising positive association with exports.

AR 00127219-00127220.

Mr. Stuart now submits alternative explanations to support his opinion why each of these studies does not definitively rule out a relationship between exports and survival:

o Brandes and Maclain (2001) elsewhere concludes that direct mortality at the pumps is higher when exports are higher. Fourth Stuart Decl., Doc. 485 at ¶ 14 (citingAR 000109605-07).

o While the San Joaquin River Group Authority ("SJRGA") 2005 VAMP Technical Report did not find a statistically significant relationship between exports and smolt survival without HORB in place, the report does explain that there are apparent relationships between survival and the flow to export ratio. *See* AR 00134293 (suggesting survival through [**223] the Delta can be improved with increased flow/export ratios when HORB is not installed).

o The Mesick study concerned only the Tuolumne River, which Mr. Stuart admits is "extremely flow limited" making it unlikely that non-flow factors would affect escapement into that watershed. *See* Stuart Decl., Doc. 485 at ¶ 11.

No comments

- n/a -

o Mr. Stuart does not dispute that Newman (2008)'s analysis of VAMP data [*887] concluded "[t]here was little evidence for any association between exports and survival, and what evidence there was pointed toward a somewhat surprising positive association with exports." AR 00127220. This statement has been extensively discussed. Mr. Stuart argues out that Newman (2008) also explained that these analyses "are not the ultimate definitive explanations for what affects juvenile salmon survival through the Delta, particularly for outmigrants from the San Joaquin River," citing data limitaions, low re-capture probabilities, high environmental variation, and "lack of balance" in the release strategy as affecting the accuracy of estimates of effects on survival. AR 00127148.

The best that can be said from all these studies is that they do not affirmatively support the purported relationship [**224] between exports and survival NMFS uses to justify Action IV.2.1's flow:export ratio. However, without more, DWR has not established that these studies were not properly evaluated. NMFS relies on additional record evidence to support imposition of Action IV.2.1's flow:export ratio limitation.

(2) Studies Cited by NMFS in Support of a Flow:Export Ratio.

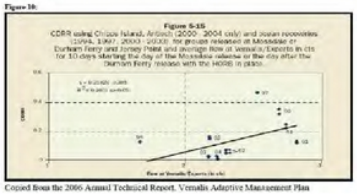
(a) VAMP Data.

The BiOp concedes that analyses of the evidence gathered during the Vernalis Adaptive Management Program ("VAMP") [24] are equivocal regarding the impact of exports on survival. BiOp at 373. The BiOp also recognizes that the VAMP experiments may have resulted "in weak to negligible" associations because of the "correlation between flow and export rates during VAMP." *Id.* Mr. Stuart explains the VAMP experimental design was not implemented in full, in that not all of the planned relationships have been tested, with overrepresentation at certain combinations of flow and exports. Fifth Stuart Decl., Doc. 516 at ¶ 6. Mr. Stuart opined: "Newman (2008) concluded that the testing of the extremes of combinations is necessary to increase the precision of the experiments and allow discrimination of differences between the parameters." *Id.* [**225] at ¶ 50. The 2010 PI Decision found that the BiOp considered the VAMP evidence and its limitations and did not disregard any important conclusions generated from the VAMP data. *Consol. Salmonid Cases, 713 F. Supp. 2d at 1132-34.*

24 VAMP is a multi-agency collaborative effort that is part of the San Joaquin River Agreement ("SJRA"). "SJRA is a negotiated settlement agreement between SJR water suppliers, water purveyors, and both State and Federal Fishery Agencies that calls for specific spring South Delta (e.g. SJR at Vernalis) river flows and Delta export pumping rates. The San Joaquin River Group Authority provides the flows necessary to attain the Vernalis flow objectives. State and Federal agencies ensure that Delta exports rates are met. [VAMP] is a scientific study that evaluates the effects of Delta inflow, and outflow, upon fall-run Chinook salmon smolt survival." AR 00212419.

Notwithstanding the lack of statistical significance, the BiOp relied on the following Figure copied from the 2006 VAMP Technical Report to demonstrate that, during times when the Head of Old River Barrier ("HORB") was in place, as the ratio between Vernalis flow and exports increased, survival increased. [**226] BiOp App. 5 at 20.

[*888]



Copied from the 2006 Annual Technical Report, Vernalis Adaptive Management Plan

BiOp App. 5 at 20. The relationship was not statistically significant, but the BiOp states that this may have been due to the narrow range of export rates tested. *Id.* The 2010 PI Decision found NMFS's reliance on this data was not arbitrary. *Consol. Salmonid Cases, 713 F. Supp. 2d at 1133-34.*

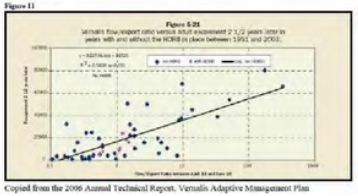
(b) Escapement Data.

NMFS includes the following chart from the 2006 VAMP annual report that showed [*889] a positive relationship between the spring Vernalis flow/export ratio and adult escapement (i.e. return from the ocean to freshwater) two and a half years later, based on data from 1951 through 2003. BiOp App. 5 at 21.

No comments

- n/a -

Figure 11

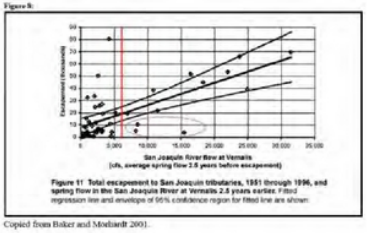


Copied from the 2006 Annual Technical Report, Vernalis Adaptive Management Plan

The 2010 PI Decision found it not unreasonable for NMFS to consider the analysis depicted in Figure 11. *Consol. Salmonid Cases, 713 F. Supp. 2d at 1134*.

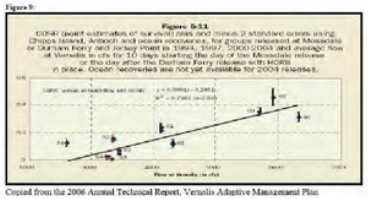
DWR argues that NMFS's reliance on Figures 10 and 11 to support the conclusion that there is a correlation between exports and survival is unfounded. Doc. 446-1 at 14. DWR's expert, Bradley Cavallo, compares Figures 10 and 11 to Figures 8 and 9, which plot the impact of San Joaquin River ("SJR") flow against exports:

Figure 8:



Copied from Baker and Morhardt 2001.

Figure 9:



Copied from the 2006 Annual Technical Report, Vernalis Adaptive Management Plan

BiOp App. 5 at 19. Mr. Cavallo opines that "inspection of the degree of scatter in [Figures 10 and 11] [**227] relative to [Figures 8 and 9] suggests SJR inflow to export ratio [*890] provides a poorer fit to observed data than does SJR inflow alone." Cavallo Decl., Doc. 452 at ¶ 12. For example, "the model describing smolt survival in relation to SJR flows alone (Exhibit 1, bottom) has an r^2 value of 0.73 while the comparable model with the ratio of SJR flows to exports has an r^2value of only 0.26 (Exhibit 2, bottom). [¶] An r^2 value closer to 1 signifies that salmon survival is better explained by SJR flows ($r^2 = 0.73$) than by the ratio of SJR flows to exports ($r^2 = 0.26$)." *Id.* at ¶¶ 12-13. Although SJR flows better explain salmon survival than the ratio of SJR flows to exports, Mr. Cavallo does not opine that there is no relationship between salmon survival and the ratio of SJR flows to exports depicted in Figures 10 and 11. Although NMFS overstates and over-relies on questioned data, this is a scientific dispute among experts that does not involve error of the magnitude that rises to unlawfulness.

(c) CDFG (2005).

DWR also criticizes NMFS's treatment of a 2005 Department of Fish and Game ("CDFG") study, which provides a "description of the process [CDFG] used to develop, and apply, its Model in [**228] the formulation of spring Vernalis flow objectives that were submitted to the [State Water Resources Control Board]." AR 00212414. Mr. Stuart opined that the report "clearly shows that while flows are the primary driver, exports play a role, albeit less than that attributable to flows." Fourth Stuart Decl., Doc. 485 at 14. DWR responds that NMFS "misrepresents the [report's] flow and export conclusions." DWR focuses on several statements from the report, including the conclusion that "Delta export level, relative to Delta inflow level, does not influence juvenile salmon survival on a regular, normal, or repetitive pattern." AR 000212423. CDFG determined that non-flow parameters, such as exports, ocean conditions, "have little, or no, relationship to fall-run Chinook salmon population abundance in the SJR and that spring flow magnitude, duration, and frequency all had significant influence upon SJR fall-run Chinook salmon abundance in the SJR." AR 00212413. CDFG excluded consideration of project exports, ocean conditions, and/or density dependence from its model because of "the lack of substantial cause and effect relationships" [**229] between these non-flow factors and abundance. AR 00212426.

DWR's contextual approach requires examination of the entire section:

> Delta Exports It has long been surmised, due to salvage of many juvenile salmon at both the State and Federal Delta export facilities in the spring months, that entrainment of juvenile salmon at the export facilities in the spring months has impacted fall-run Chinook salmon populations in the SJR. A statistically significant regression correlation relationship exists between the ratio of Delta exports and Delta inflow, from the SJR in April-June,

No comments

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and in-river escapement of fall-run salmon two and one-half years later (Figure 17). If the measurement metric of production cohort is used, instead of escapement 2.5 years later, the curvilinear regression correlation relationship improves (r-square value rises from 0.44 to 0.58) (Figure 18). This seems to suggest that both flow and exports are influencing salmon production in the SJR basin. However, in every instance where salmon production was high, Vernalis flows are in excess of 10,000 cfs. Conversely when salmon production was low, Vernalis flow levels are less than 2,000 cfs (Figure 18). The question becomes [**230] is it the flow, or the exports?

In an attempt to answer this question, the Department took a closer look at smolt survival data that has been collected [*891] in recent years (data from P. Brandes USFWS). Smolt survival data collected during VAMP shows that juvenile survival increases as exports increase (Figure 19). In addition smolt survival as a function of the export to Vernalis flow ratio has a low correlation (Figure 20), indicating that Delta export level, relative to Delta inflow level, does not influence juvenile salmon survival on a regular, normal, or repetitive pattern. When exports are combined with Vernalis flow in a multiple regression against juvenile survival (both with the Head of Old River Barrier in or out), a strong positive regression occurs (as both exports and Vernalis flow increase, juvenile salmon survival increases (Figures 21 and 22)). For [**231] both cases, with either the HORB in or out, export level has a slightly stronger positive influence upon survival than does inflow level. What is surprising about this occurrence is not that export level influences survival, but that there is a positive, rather than a negative, response in juvenile survival as export level increases. It is noted that due to VAMP, when exports are up, Vernalis flows are increased with export level tied to Vernalis Flow level. This is a noteworthy Delta system operational change, as prior to VAMP there was no correlation between South Delta spring inflow level (e.g. Vernalis flow) and spring Delta export level (unpublished data). Here again, the variable that seems to be controlling salmon production (e.g. survival) is spring Delta inflow not spring Delta export.

When Delta exports are subtracted from Vernalis flow levels (Figure 23) and escapement is regressed against this difference, a statistically significant regression correlation results. There is no correlation between exports and adult salmon escapement in the Tuolumne River two and one-half years later (Figure 24). When spring Vernalis flow and spring Delta exports are regressed against salmon [**232] escapement two and one-half years later, no improvement in the flow to salmon escapement correlation occurs (VAMP 2005), suggesting that spring flow level, not exports, is the variable limiting salmon production in the South Delta.

To summarize the relationship between exports, flow, and SJR salmon production the primary relationship suggesting that exports influence SJR salmon production is that when the ratio of exports to Vernalis flow decreases both escapement and cohort production increases. The relationships that suggest that flow, not export, is the primary factor influencing SJR salmon production are: 1) when the ratio of spring exports to spring Vernalis flow decreases, Vernalis flow greatly increases and SJR salmon production greatly increases; 2) when the ratio of spring exports to spring Vernalis flow increases, Vernalis flow greatly decreases and SJR salmon production substantially decreases; 3) juvenile salmon survival increases when spring Vernalis flow increases; 4) spring export to spring Vernalis flow ratio has little influence upon juvenile salmon survival; and 5) as the difference between spring Vernalis flow level and spring export flow level increases, escapement [**233] increases.

In conclusion, while the influence of Delta export upon SJR salmon production is not totally clear, overall it appears that Delta exports are not having the negative influence upon SJR salmon production they were once thought to have. Rather it appears that Delta inflow (e.g. Vernalis flow level) is the variable influencing SJR salmon production, and that increasing

No comments

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flow level into the Delta during the spring months results in substantially increased salmon production.

[*892] AR 00212423-24 (footnotes omitted)(emphasis added). [25] Although the CDFG report supports Mr. Cavallo's assessment that flows are the primary driver of salmon abundance in the SJR, the report acknowledges that as the export:flow ratio "decreases" (i.e., as the flow:export ratio increases) escapement and cohort production increases. This supports NMFS's use of a flow:export ratio. NMFS's minimization of the CDFG study was scientifically undesireable, but the law does not prevent it, by extending discretion to be mistaken. A candid appraisal of the true effect of flows, without masking the lack of significance in a flow:export ratio, would be welcome.

25 Contrary to Export Plaintiffs' assertion that ocean conditions [**234] are the primary driver of salmonid abundance, the CDFG report concludes ocean conditions are far less influential than spring flows:

Ocean Harvest It has also long been postulated that ocean harvest is a controlling influence upon long-term in-river salmon escapement population trends in the SJR. However, comparing the Central Valley Harvest Index to Sacramento and San Joaquin River salmon escapements (Figures 25) suggests that ocean harvest is not a variable influencing the long-term trend in SJR salmon escapement. Unlike in the Sacramento River basin, no noticeable increase in SJR salmon escapement occurred when substantial changes in ocean sport and commercial fish regulations restricted ocean harvest in recent years. Additionally, regressing the Central Valley Harvest Index against annual SJR escapement produces a weak, but statistically significant, regression correlation (Figure 26). The relationships depicted in Figure 25 and 26 suggest that factors other than ocean harvest, such as in-Delta or in-river conditions, are controlling the long-term SJR salmon escapement trend. With Delta condition influence upon long term SJR escapement trend being determined by Delta inflow, which [**235] in turn is largely controlled by east-side SJR tributary flow21, the focus shifts to in-river, specifically in east-side SJR tributary, conditions.

AR 00212424-25 (footnotes omitted).

(d) Delta Action 8 Studies.

The BiOp considered data from the so-called "Delta Action 8 studies," which compared the relative survival rates of coded-wire tagged salmon released at (a) Ryde on the Sacramento River and (b) Georgiana Slough, a channel that splits off of the Sacramento River at Walnut Grove and leads to the interior Delta, joining the South Fork of the Mokelumne River just before it meets the San Joaquin River. The 2010 PI Decision discussed NMFS's treatment and critiques of these studies in detail:

Evaluating the data from the Delta Action 8 studies, Newman (2008) first explained that there was a high level of environmental variation in the data. [3/30/10 Tr.] at 78:18-23. Dr. Newman performed further analysis to reduce the amount of environmental variation and subsequently found a 98% probability that a negative relationship between exports and survival is present. *Id.* at 79:5-7. Mr. Stuart stated the significance of Newman's finding is that as exports increased, survival decreases for those [**236] salmonid smolts that are moving down into the San Joaquin River, where they would be exposed to the influences of the export pumps. 4/2/10 Tr. 32:8-34:12. For those fish released into Georgiana Slough, survival was better when exports were lower.

This study is relevant to assessing the impacts of export pumping on fish migrating through the San Joaquin River, because fish released into Georgiana Slough must exit into the San Joaquin River, where they are subject to the influence of the pumps. 3/31/10 Tr. 76:20-23. The Georgiana Slough fish share a common migratory pathway with fish that exit the San Joaquin River basin. *Id.* at 76:24-77:6. Regardless [*893] of their origin,

No comments

- n/a -

once the fish are in this common migratory pathway, they are subject to the same hydraulic conditions. *Id.* at 78:1-17.

Mr. Cavallo stated that his interpretation of the Newman (2008) study is that there is a weak relationship between exports and survival in the interior Delta, but conceded that there was some relationship. 4/1/10 Tr. 98:24-99:4. Mr. Stuart testified that Newman's studies are the best available and the fact that Newman could find a relationship given the considerable amount of "environmental noise" and the [**237] very low signal to noise ratio "shows that the relationship is probably very real." *Id.* at 159:6-10. Whether this opinion is entitled to weight is disputed by Plaintiffs.

A September 26, 2008 paper prepared by Dr. Newman with Patricia L. Brandes entitled "Hierarchical Modeling of Juvenile Chinook Salmon Survival as A Function of Sacramento-San Joaquin Delta Water Exports" ("Newman and Brandes 2008") examined the Delta Action 8 data concerning the relative survival rates for Ryde and Georgiana Slough releases and declared: what "we cannot conclude is that exports are the cause of this lower relative survival." 4/1/10 Tr. 67:20-23 (emphasis added); DWR Ex. 507 at 22. Newman and Brandes 2008 reached this conclusion because "the evidence for an association between exports and survival is somewhat weak" and because of the study's inability to randomize export levels within a given outmigration season. 4/1/10 Tr. 68:1-12; DWR Ex. 507 at 22-23. A later version of this study, dated 2009, omitted this language from the conclusion. 4/2/10 Tr. 28:2-13.[FN 6]

> [FN6] Mr. Stuart explained that although the BiOp cited the 2008 version of the Newman and Brandes study, he actually used the 2009 version [**238] to prepare the BiOp and the 2009 paper was in his reference list. He does not know why the BiOp used the 2008 citation. 4/2/10 Tr. 28:2-13

> The Delta Action 8 studies seek to relate to exports survival of juvenile salmonids and steelhead passing through the interior Delta from the San Joaquin River basin. These studies show a negative relationship, although admittedly weak, between export levels and survival for fish passing through this area of the Delta.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1134-35 (emphasis added).

DWR again challenges NMFS's reliance on Newman's review of the Delta Action 8 studies to demonstrate that increasing exports will negatively affect salmonids migrating to the ocean through the San Joaquin River and its tributaries. Mr. Cavallo opines that it is inappropriate to rely on the Delta Action 8 studies to reach conclusions about San Joaquin basin salmonids. Cavallo Decl., Doc. 452 at ¶¶ 19-25. He also opines that the overall effect even on migrating salmon smolts in the Sacramento River is relatively small. *Id.* at ¶ 23. NMFS acknowledged the limitations of these studies in the BiOp, yet relies on them to support Action IV.2.1.

The Delta Action 8 studies marginally [**239] support Action IV.2.1. Newman's analysis of the Delta Action 8 studies revealed that for those fish passing through Georgiana slough and the interior Delta, survival was negatively impacted by exports. Those fish share a common migratory pathway with all of the fish exiting the San Joaquin Basin. Fourth Stuart Decl., Doc. 485 at ¶¶ 28-29. It continues to be marginal logic to apply the admittedly weak correlative results of Newman's analysis to San Joaquin salmonids. Mr. Cavallo's criticism that Georgiana Slough, which is not a tidally influenced watercourse and which never [*894] experiences reverse flows, is distinct from the SJR, which is tidally influenced and regularly experiences reverse flows, Cavallo Reply Decl., Doc. 497 at ¶ 55, does not abrogate the use of Delta 8 studies. Once fish exit Georgiana Slough, they must travel into the Mokelumne River system and the lower SJR, where they are influenced by tidal movements and exports. Fourth Stuart Decl., Doc. 485 at ¶ 28. Mr. Cavallo's criticisms represent another dispute among experts, to which the agency is due deference, even recognizing that DWR and Mr. Cavallo have no apparent incentive to reach objective opinions contrary to NMFS, [**240] while Mr. Stuart makes every call in favor of the species, no matter how questionable the basis.

(3) Treatment of Data Related to the Use of Bubble Curtains at HORB.

No comments

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Export Plaintiffs argue that NMFS ignored record evidence demonstrating the effectiveness of non-physical barriers, such as bubble curtains, which use sound, lights, and air bubbles, to guide fish. Doc. 431 at 91. A May 18, 2009 transmittal of "preliminary data" from Reclamation Biologist Dr. Mark Bowen showed that a bubble curtain kept a substantial percentage of fish in the San Joaquin River, rather than allowing them to move into the Old River toward the pumps. AR 00093348. Export Plaintiffs' contention that NMFS did not consider this data in developing Action IV.2.1 is incorrect. NMFS considered Dr. Bowen's preliminary data, Fourth Stuart Decl., Doc. 485 at ¶ 91, and recognized Dr. Bowen's warning that the results were preliminary and was "NOT to be cited!" AR 00093348 (emphasis and punctuation in original). Export Plaintiffs' objection on this ground is not valid.

b. Does the Record Support the Specific Flow/Export Ratios Imposed?

The 2010 PI Decision discussed NMFS's rationale for the 4:1 Ratio:

> NMFS looked at the VAMP [**241] data to develop the ratio.
>
> > Current VAMP studies have ratios of flow to exports clustered around 2:1, which have provided low survival indices for upstream releases compared to downstream releases, particularly in recent years. Studies which would have had higher flows (i.e., 7,000 cfs) to export (1,500 cfs) ratios were not conducted, since the necessary environmental conditions to implement this part of the study protocol never occurred. Recent conditions in which high flows did occur in the San Joaquin River basin and which would have given flow to export ratios greater than 3:1 in 2005 and 10:1 in 2006 were confounded by poor ocean conditions during the smolts entry into the marine environment, and returning adult fall-run Chinook salmon escapement numbers from these brood years were very low (brood years 2004, 2005 which returned in 2007 and 2008). From the available data, including the information contained in figures 10 and 11, flow to export ratios should be at least 2:1 and preferably higher to increase survival and abundance. In light of these factors, NMFS initially developed flow to export ratios of 4:1 for wet, above normal, below normal, and dry years, based on the minimum [**242] export level of 1,500 cfs and a targeted minimum Vernalis flow of 6,000 cfs. Flows in critically dry years were targeted to be a minimum 3,000 cfs, which gives a flow to export ratio of 2:1 when exports are targeted to be 1,500 cfs.
>
> BiOp App. 5 at 22-23 (emphasis added). The feasibility and water supply implications of implementing such flow versus export ratios were then examined through computer modeling. *Id.* at 24-68. The BiOp reasoned that a 2:1 ratio was insufficient because the VAMP [*895] studies demonstrated low survival rates at that ratio, and that higher ratios would be "prefera[ble]" to increase survival and abundance. Yet, without any biological explanation, the BiOp chose to impose a 1,500 cfs limit when flows at Vernalis are lower than 6,000 cfs, and a ratio of 4:1 (as opposed to 2.5:1, or 3:1, or even 5:1 or higher) when Vernalis flows are between 6,000 cfs and 21,750 cfs. *Id.* at 71-72.

No comments

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> The absence of explanation and analysis for adoption of these limits uses no science, let alone the best available and is simply indefensible.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1135-36 (emphasis added) (footnote omitted).

The PI Decision addressed the Phase I flow:export ratio, which operated [**243] through May 31, 2011. Phase II, which will control operations starting next spring (from April 1 through May 31), imposes the following flow:export ratios:

San Joaquin Valley Classification	Vernalis flow (cfs): CVP/SWP combined export ratio
Critically dry	1:1
Dry	2:1
Below normal	3:1
Above normal	4:1
Wet	4:1
Vernalis flow equal to or greater than 21,750 cfs	Unrestricted exports until flood recedes below 21,750.

BiOp at 643-44.

Defendant-Intervenors offer the following record-based justification for these ratios:

> NMFS explained the rationale for the 2:1 flow/export ratio in dry years as follows:
>
> > Studies identify increased flows as a factor that increases survival of tagged Chinook salmon smolts. To date, most VAMP experiments have utilized San Joaquin River flows to export pumping ratios of approximately 2:1. Survival to Chipps Island of smolts released upstream has been relatively low under these conditions. Historical data indicates that high San Joaquin River flows in the spring result in higher survival of outmigrating Chinook salmon smolts and greater adult returns 2.5 year later (Kjelson *et al.* 1981, Kjelson and Brandes 1989, USFWS 1995) and that when the ratio between spring flows and exports [**244] increase, Chinook salmon production increases (CDFG 2005, SJRGA 2007).

NMFS 00106725 (BO at 645) (emphasis added); *see also* NMFS 00107220-21 (BO, App. 5, at 74-75). Figure 11 in Appendix 5 of the BiOp depicts data of flow/export ratios over a 50 year period (1951 to 2003) and reveals that increasing the flow/export ratio was positively correlated with increased escapement of fall-run Chinook salmon 2 1/2 years later. *See* NMFS 00107166-67 (BO, App. 5, at 21-22).

The BiOp's rationale for the 4:1 flow/export ratio is likewise clearly set forth and logical:

> The data from the ongoing VAMP experiments provided useful information in developing the ratio. Current VAMP studies have ratios of flow to exports clustered around 2:1, which have provided low survival indices for upstream releases compared to downstream releases, particularly in recent years. Studies which would have

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> had higher flow (i.e., 7,000 cfs) to export (1,500 cfs) ratios were not conducted, since the necessary environmental conditions to implement this part of the study protocol never occurred.

NMFS 00107168 (BO, App. 5, at 22). NMFS went on to explain that:

> From the available data, ... flow to export ratios should be at least [**245] 2:1 and preferably higher to increase survival and abundance. In light of these factors, NMFS initially developed flow to export ratios of 4:1 for wet, above normal, below normal, and dry years, based on the minimum export level of 1,500 cfs and a targeted minimum Vernalis flow of 6,000 cfs. Flows in critically dry years were targeted to be a minimum 3,000 cfs which gives a flow to export ratio of [*896] 2:1 when exports are targeted to be 1,500 cfs.

Id. (emphasis added). These flow and export levels were then assessed through computer modeling. *Id. See* NMFS 00107169-00107214 (BO, App. 5, at 23-68).

NMFS acknowledged and responded to DWR's objections to Action IV.2.1: "Both the Bureau of Reclamation and DWR have strong initial opposition to the proposed RPA. DWR has indicated that the RPA is unfeasible as it [is] currently written. They have proposed alternative actions that NMFS has investigated." NMFS 00107214 (App. 5 at 68). Among the alternative proposals made by DWR was "real time monitoring at Mossdale utilizing additional Kodiak trawling." NMFS responded, reasonably, by stating that:

> [Recoveries of steelhead in the Mossdale trawl are a rare event and in many years only a handful of fish [**246] are recovered. Given these rare recoveries of fish, an appropriate trigger to initiate flow increase or export reductions in a timely manner to protect outmigrating fish would be difficult to determine.... Therefore, what parameters would DWR suggest to indicate when the pulse of steelhead is exiting the system?

NMFS 00107214 (BO, App. 5, at 68).

The analysis discussed above amply demonstrates that, rather than base Action IV.2.1 solely on feasibility concerns, as Export Plaintiffs incorrectly argue, see Export Br. at 94-96, NMFS used the VAMP fish experiments as a starting point for the agency's analysis of a flow/export ratio. *See* NMFS 00107168 (BO, App. 5, at 22). The results of those VAMP studies established that a 2:1 ratio (involving a 1,500 cfs export limit) resulted in "low survival indices," and that a larger ratio was preferable when possible to "increase survival" and adequately protect the species. Id. After modeling results showed that it would be difficult to increase this ratio in dry years, NMFS reasonably set the Phase II ratios at 1:1 for critically dry years and 2:1 for dry years. NMFS 00107219 (BO, App. 5, at 73). In below normal and above normal years, however, NMFS [**247] reasonably concluded that more water would be available to meet the more protective ratios, thus allowing a 3:1 ratio in below normal years and a 4:1 ratio in above normal years. *Id.*

In its PI ruling, this Court questioned whether Action IV.2.1 was "protective enough" or whether a "5:1 or higher" ratio was necessary. PI Findings, CoL ¶ 51; id. FoF ¶ 97. As NMFS explained in Appen-

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dix 5 of the BiOp, there are no conclusive studies of flow/export ratios greater than 2:1, but the best available data supports a minimum feasible flow of 6,000 cfs in most years, along with a ratio somewhat higher than the historically tested 2:1 ratio, which had proved insufficiently protective as discussed above. See NMFS 00107164-68 (BO, App. 5, at 18-22). Specifically, the 6,000 cfs target minimum flow was determined based on (1) water reasonably available based on historical flow patterns since 1922; and (2) flow-to-escapement relationships indicating that flows over 5,000 to 6,000 cfs "were required to move into the linear phase of increasing fish escapement." NMFS 00107167-68 (BO, App. 5, at 21-22). Unless NMFS reduced exports to even less than 1,500 cfs - the minimum believed necessary to protect human [**248] health and safety - simple math reveals that it would be impossible to achieve a 5:1 or higher ratio, assuming 6,000 cfs as the target minimum flow.

[*897] As to whether a less restrictive ratio (e.g., 3:1) was biologically appropriate, NMFS did adopt a 3:1 ratio for below normal years. Only in "above normal" or "wet" years is a 4:1 ratio required. Given the parameters for a flow/export ratio that could feasibly be implemented using a 6,000 cfs target for flows - somewhere between 2:1 and 4:1 - and the lack of data on any of the ratios in between, NMFS reasonably adopted a sliding scale that allows the absolute minimum ratio during drought conditions but increases protections for species when it is feasible to do so, as determined by hydrological conditions.

Of course, NMFS cannot prove with absolute certainty that the 4:1 ratio is protective enough for the species. The existing data simply does allow it. But, given the record evidence of harm to salmon and the need to modify the flow/export ratio, the best available science standard does not require that NMFS stand by and do nothing, paralyzed by a lack of perfect data. To the contrary, NMFS had to act and reasonably exercised its expertise [**249] by adopting a flow/export ratio that is both feasible and more protective of the species than the status quo. *See Greenpeace Action, 14 F.3d at 1337* (upholding biological opinion even though FWS admitted that it was "uncertain about the effectiveness of its management measures" because it "premised these measures on a reasonable evaluation of available data, not on pure speculation").

Thus, rather than base its decision on "no evidence," as was the case in Pacific Coast I, here NMFS's conclusions are explicitly based on scientific evidence, although some of that data may be "less than conclusive." *426 F.3d at 1094*. As acknowledged in Pacific Coast I, this is reasonable and consistent with the ESA. Accordingly, Defendant-Intervenors respectfully urge the Court to reconsider and reverse its preliminary finding that NMFS failed to articulate a reasonable basis for RPA Action IV.2.1. *See* PI Findings, FoF ¶¶ 97, 98; CoL ¶¶ 50, 51.

Doc. 484 at 68-71.

This explanation for the basis for the ratios imposed by Action IV.2.1 is supported by record references, which now explain in part NMFS's choice of ratios, aided by hindsight and judicial review. This is another close call. DWR opposes the flow [**250] ratings as infeasible and arguably unnecessary. NMFS uses VAMP flow data to corroborate its position that a 2:1 ratio is insufficiently protective. It justifies the use of a 3:1 ratio when possible (e.g., in below normal years) as necessarily more protective than a 2:1 ratio. The consequences of imposing a 4:1 ratio in above normal and wet years demand a clearer explanation of NMFS's rationale for imposing a 4:1 ratio, rather than a 3:1 ratio in above normal and wet years. The ESA Handbook requires "a thorough explanation of how each component of the [RPA] is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43 (emphasis added). [26] This is not to be [*898] done by attorneys, post hoc, in litigation. The importance of this requirement is heightened in light of the weak (arguably equivocal) evidence supporting the imposition of any ratios at all. [27]

26 Plaintiffs repeatedly assert that NMFS was required to articulate in the BiOp how and provide supporting evidence demonstrating that each RPA action "will avoid jeopardy to the continued existence of a listed species." Doc. 431 at 92, 101. This suggests a requirement that each individual RPA action must be designed to [**251]

No comments

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avoid jeopardy. The requirement is more subtle. The Handbook requires each aspect be an "essential" component of an overall RPA designed to avoid jeopardy and adverse modification. Although each element need not achieve avoidance on its own, Federal Defendants incorrectly assert that "the Court's task here is not to dissect and reanalyze this RPA bit by bit, but analyze the overall management scheme proposed by the RPA and determine whether NMFS acted arbitrarily and capriciously in concluding that the RPA, in its entirety, was necessary to avoid the likelihood of jeopardizing the continued existence of the multiple species at issue." Doc. 477-1 at 71. In fact, the Handbook requires an action-by-action analysis. NMFS must thoroughly explain how "each" component of the RPA is "essential." While the Handbook is not deserving of Chevron deference, *N. Cal. River Watch v. Wilcox, 633 F.3d 766, 778-79 (9th Cir. 2011)*, as its purpose is to provide "information and guidance," its text is routinely cited as NMFS's and FWS's interpretation of the ESA, entitled to at least *Skidmore* deference, *Az. Cattle Growers Ass'n v. Salazar, 606 F.3d 1160, 1165 (9th Cir. 2010)*. In at least one case, the Secretary [**252] of the Interior argued that the Handbook was not binding on the consulting agencies. *Nat'l Wildlife Fed'n v. Babbitt, 128 F. Supp. 2d 1274, 1292 (E.D. Cal. 2000)*. But no such suggestion has been made here, nor is the agency's alternative interpretation that it may omit specific justification of each RPA action reasonable. "Although interpretations contained in agency manuals and comments are not entitled to the highest level of deference, a court may nevertheless defer to an agency's interpretation of its own regulation, depending upon 'the thoroughness evident in its consideration, the validity of its reasoning, its consistency with earlier and later pronouncements, and all those factors which give it power to persuade, if lacking power to control.'" *Medina County Envtl. Action Ass'n v. Surface Transp. Bd., 602 F.3d 687, 700-701 (5th Cir. 2010)* (quoting *United States v. Mead Corp., 533 U.S. 218, 227-30, 121 S. Ct. 2164, 150 L. Ed. 2d 292 (2001))*. Applying this standard, the Fifth Circuit concluded that an interpretation contained in the Handbook was entitled to deference. *Id. at 701*.

27 NMFS is entitled to deference in its interpretation and application of the body of relevant science, most of which is equivocal on the [**253] issue, and had some basis to reach the conclusion that some form of flow:export ratio limitation should be imposed. It is as apparent that the record contains no strong evidence that a flow:export ratio limitation will improve salmonid survival.

Plaintiffs' and DWR's challenge to Action IV.2.1 is valid and their MSJ is GRANTED IN PART AND DENIED IN PART, as are Federal Defendants' and Defendant-Intervenors' cross motions. Although there is marginal record support for the imposition of some form of flow:export ratio, the Action must be remanded for further explanation of the necessity of a 4:1 ratios in above normal and wet years.

2. RPA Action IV.2.3.

Action IV.2.3 operates from January 1 through June 15 or until the average daily water temperature at Mossdale is greater than 72° F, and limits OMR flows to no more negative than -2,500 to -5,000 cfs, depending on juvenile entrainment levels. BiOp at 648-52. At the first level of increased juvenile loss, exports must be reduced to achieve an average net flow of -3,500 cfs for a minimum of five days, and at the second level, a more positive OMR average of -2,500 cfs must be achieved for at least five days. *Id.* For each trigger, OMR averages [**254] can return to -5,000 cfs only after three consecutive days of not meeting the higher-density juvenile loss trigger. *Id.*

Action IV.2.3 is meant to:

> [r]educe the vulnerability of emigrating juvenile winter-run, yearling spring-run, and CV steelhead within the lower Sacramento and San Joaquin rivers to entrainment into the channels of the South Delta and at the pumps due to the diversion of water by the export facilities in the South Delta. Enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the mainstem of the San Joaquin River for [*899] emigrating fish, including greater net downstream flows.

Id. at 648.

NMFS utilized several sources of data to determine that export flow limitations would achieve the objectives of RPA Action IV.2.3, including the relationship between OMR flows and salvage, particle tracking model simulations, and other studies evaluating survival of fish within the central and southern Delta. Export Plaintiffs and DWR challenge the scientific basis for NMFS's determination that an export limitation should be part of the

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RPA. Export Plaintiffs' general arguments largely overlap with and incorporate [**255] the specific arguments presented in DWR's briefs, this discussion focuses on DWR's briefs.

a. Challenge to the Use of the Particle Tracking Method.

DWR argues that the record does not support NMFS's use of the Particle Tracking Model ("PTM"). A similar argument was addressed in the 2010 PI Decision, which provides the starting point:

> Plaintiffs' seminal challenge to Action IV.2.3 is that NMFS improperly based its rationale for the Action on outputs from computer model runs utilizing the so-called Particle Tracking Model ("PTM"), which models the flow of inert particles as they move within a flowing body of water.
>
> PTM is a hydrodynamic simulation used to assess the fate of particles, as a function of flow, tides, exports, and other factors. 4/1/10 Tr. 18:12-15; *see also id.* at 143:9-25. NMFS used PTM to assess the effects of different OMR flows on the movement of neutrally buoyant particles injected at nine different locations in the Delta. Gov't Salmon Ex. 23 at 2; BiOp at 364-66. The 2009 Salmonid BiOp states that "NMFS uses the findings of PTM simulations to look at the eventual fate of objects in the river over a defined period of time from a given point of origin in the system." BiOp at 366. [**256] According to the BiOp, "PTM data can be useful to indicate the magnitude of the net movement of water through the channel after the junction split (and the route selected by the fish), and thus can be used to infer the probable fate of salmonids that are advected into these channels during their migration." *Id.* at 367.
>
> Mr. Cavallo opined that PTM data are not useful to infer the probable fate of salmonids because, in contrast to PTM particles, which have no behavior characteristics, fish have behavior, swim quickly, and have a destination in mind. 4/1/10 Tr. 20:14 - 21:5. Mr. Cramer explained that "[j]uvenile salmonids are strong swimmers whose movements are determined by a wide variety of factors varying with species, size, developmental state, season, time of day, and water temperature, as well as relative hydraulic conditions in a channel. Unlike passive particles, juveniles can and do swim against significant currents." SLDMWA Ex. 120 at ¶6. To illustrate the problems with PTM, Mr. Stuart compared PTM simulations to actual data from mark-recapture studies of Chinook salmon. This comparison demonstrated that salmon move approximately 3.5 times faster though the water than neutrally [**257] buoyant particles and would arrive at Chipps Island in a considerably shorter time frame. 4/1/10 Tr. 37:13 - 38:4.
>
> This was a concern expressed in other studies by other experts. For example, the BiOp relied upon Wim J. Kimmerer and Matthew Nobriga's report entitled "Investigating Particle Transport and Fate in the Sacramento-San Joaquin Delta Using a Particle Tracking Model" ("Kimmerer and Nobriga 2008"). BiOp 105 at 380-381; Gov't Salmon Ex. 1 at [*900] ¶4; Gov't Salmon Ex. 4 at ¶8. Kimmerer and Nobriga 2008 disclaims: "[w]e do not claim that the specific results presented here represent actual movements of salmon; rather, these results indicate what factors may or may not be important in determining how salmon smolts may move through the Delta." DWR Ex. 501 at 18.
>
> DWR expressed similar concerns in an email to NMFS dated April 20, 2009 regarding the draft 2009 Salmonid BiOp, asserting that NMFS improperly applied the PTM results in determining the eventual fate of salmonids. Attachment 1 to DWR's comments is a comparison of the results of an experimental release of coded wire tagged salmon in the San Joaquin River under known hydrodynamic conditions with a PTM simulation under identical conditions. [**258] 4/1/10 Tr. 32:19-33:8. These results indicate that under low flow conditions, the coded wire tag salmon reached the end location of Chipps Island long before the arrival of most of the PTM particles. The PTM results only partially corresponded with the coded wire tag results under high flow conditions. *Id.* at 34:3-35:18; DWR Ex. 502 at AR 00086765, AR 00086767.
>
> NMFS recognized the limitations of applying the PTM model simulation to

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salmonids. 4/1/10 Tr. 144:2-8. There were discussions with DWR concerning this issue during the consultation process. *Id.* at 144:9-11. In discussions between DWR and NMFS, NMFS indicated it was using the PTM to evaluate water movement and the potential vulnerability to particle entrainment from various locations in the Delta. *Id.* at 144:13-19. NMFS was explicit that it was not using PTM to predict exactly how fish were moving within these same channels, but that the information gleaned from PTM about water movement through the Delta could provide information on vulnerability to entrainment. *Id.* at 144:19-25.

DWR's expert, Mr. Cavallo, agrees with the BiOp that PTM data can be useful to indicate the magnitude of the net movement of water through a channel after [**259] a junction split. *Id.* at 20:21-23; BiOp at 367.

Mr. Cavallo also agrees that PTM results may be informative with regard to salmon movement. 4/1/10 Tr. 28:21-25. Mr. Cavallo stated that under the appropriate conditions, PTM simulations would be an appropriate tool to describe fish movement in discharge-driven portions of the Delta watershed. *Id.* at 86:8-10. Mr. Cavallo stated that the Kimmerer and Nobriga PTM study shows that "flow has a big effect on the path that water takes through the Delta," and that fish in a riverine system will tend to go with the flow. *Id.* at 30:11-15.

Mr. Cavallo's time-step critique of the PTM simulations used in the BiOp is unsupported.

Mr. Cavallo opines that the correct approach to PTM simulations is [] to ensure that the time horizon used in the model was consistent with the time horizon of the fish being studied. *Id.* at 25:6-11. Mr. Cavallo interpreted particular graphs in the biological opinion to indicate that NMFS used a 31-day time horizon in its PTM simulations, *id.* at 26:6-16, and opined that this time horizon was too long and would skew the results of the simulation, *id.* at 27:7-11.

The PTM simulations NMFS used were run by DWR. *Id.* at 86:14-15; 146:9-10. [**260] These simulations included four model runs for the months of February through June, using both [a] wet year [and] a dry year, and varied whether HORB was installed during the April/May period. *Id.* at 146:14-24, 147:4-6. [*901] Three different OMR flows were examined: -3,000 cfs, -2,500 cfs, and -1,250 cfs. *Id.* at 147:15-18. During that simulation, the particles actually were tracked every five days for the first 30 days. *Id.* at 147:1-4; Gov't Salmon Ex. 23 at 2. Mr. Cavallo was unsure that the particles were tracked every five days, nor did he review Mr. Stuart's memorandum explaining the PTM simulation results. 4/1/10 Tr. 87:11-13.

Mr. Cavallo's critique of the choice of injection sites is weakened by his agreement that at least two of the particle injection sites modeled by DWR, at NMFS' request, were useful in evaluating the movement of water particles at channel junctions. *Id.* at 90:17-91:16. NMFS selected the particular injection sites in order to model the vulnerability of particles within the waterways of the south Delta. *Id.* at 147:22-149:13.

NMFS' PTM simulation also showed that, as export levels increase, OMR levels became more negative. 4/1/10 Tr. 150:21-21. Mr. Cavallo stated that [**261] exports are highly correlated with OMR flows. 4/1/10 Tr. 40:25-41:2.

NMFS' PTM simulation showed that, as exports increased, the percentage of particles entrained at the export facilities increased, particularly from the Mossdale and Union Island sites and stations 912, 815, 902, and 915. 4/1/10 Tr. 150:22-25; *see* Gov't Salmon Ex. 18 (map of injection sites). The proximity of the injection point to the export facilities led to a much higher level of particle entrainment. 4/1/10 Tr. 151:1-3. As exports increased, the rate at which the particles arrived at the export facilities increased. *Id.* at 151:3-5; *see also* BiOp at 365-66; *4/1/10* Tr. 151:21-153:9 (explaining graphs in biological opinion).

Despite the statement in the Kimmerer and Nobriga study that they could not establish a "zone of influence" of ex-

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ports, Mr. Stuart testified that the shorter time horizon used in NMFS' PTM simulations distinguished it from the Kimmerer and Nobriga simulations, which utilized a 90-day period. 4/2/10 Tr. 23:21-24:2.

Mr. Stuart testified that there is no precisely defined boundary for the influence of the exports, and that the boundary of influence depends on river flow, tides, and the magnitude of [**262] the exports. *Id.* at 29:4-9. If there are extremely low-flow conditions and high exports, the extent of the exports could travel considerably farther downstream, even towards the junction of the Sacramento and San Joaquin Rivers. *Id.* at 29:9-13. Typically, according to Mr. Stuart, the boundary would be close to station 815 at the confluence of Georgiana Slough and the Mokelumne River or slightly farther downstream. *Id.* at 29:13-15. As the BiOp explains:

> The data output for the PTM simulation of particles injected at the confluence of the Mokelumne River and the San Joaquin River (Station 815) indicate that as net OMR flow increases southwards from -2,500 to -3,500 cfs, the risk of particle entrainment nearly doubles from 10 percent to 20 percent, and quadruples to 40 percent at -5,000 cfs. At flows more negative than -5,000 cfs, the risk of entrainment increases at an even greater rate, reaching approximately 90 percent at -7,000 cfs. Even if salmonids do not behave exactly as neutrally buoyant particles, the risk of entrainment escalates considerably with increasing exports, as represented by the net OMR flows. The logical conclusion is that as OMR reverse flows increase, risk of entrainment [**263] into the channels of the South Delta is increased. Conversely, the risk of entrainment into the channels of the South delta is reduced when exports [*902] are lower and the net flow in the OMR channels is more positive -- that is, in the direction of the natural flow toward the ocean.

BiOp at 652.

This is a dispute among scientists. While DWR criticizes PTM modeling, Stuart and NMFS recognized its limitations and found PTM studies helpful to support its conclusions that: (a) as exports increase, negative OMR flows also increase; and (b) that at Station 815 (the confluence of the Mokelumne River and the San Joaquin River), particle entrainment increases from 10% at -2,500 cfs, to 20% at -3,500 cfs, to 40% at -5,000 cfs, and 90% at -7,000 cfs. NMFS, through Mr. Stuart, took into account inherent differences in the movement of neutrally buoyant particles and their speed and direction of travel. Administrative law requires deference to the Agency. Additional record analysis is necessary to determine the extent of support for NMFS's additional opinion that exports affect salmonid survival.

Consol. Salmonid Cases, 713 F. Supp. 2d at, 1138-41. DWR raises several additional arguments regarding the use [**264] of PTM.

(1) DWR's Argument that NMFS Failed to Address PTM Limitations Described by Kimmerer and Nobriga.

DWR argues that NMFS did not adequately address PTM limitations described in Kimmerer and Nobriga's 2008 article "Investigating Particle Transport and Fate in the Sacramento San Joaquin Delta using a Particle Tracking Model." AR 00122246-71.

First, Kimmerer and Nobriga cautioned that PTM "was a useful predictor of entrainment probability if the model were allowed to run long enough to resolve particles' ultimate fate" and that "model accuracy varies depending on the length of the simulation." AR 00112246, 00122250. DWR argues that NMFS disregarded these "words of caution." Doc. 446-1 at 20. This is inaccurate.

No comments

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NMFS convened a group of State and federal scientists to discuss PTM simulations, including DWR representatives, who raised some of the same criticisms asserted here. AR 00106021-25 (June 3, 2009 Memo Re: PTM "results for [OMR] flow manipulation" ("PTM Memo")). NMFS considered the length of simulation at multiple meetings, AR 00106021-22 (PTM Memo discussing meetings from January through March 2009 and durations of PTM tracking); AR 00061290-91 (communication between Jeffrey [**265] Stuart and Tracy Hinojosa at DWR regarding PTM simulations), AR 00060023-24 (agenda items for discussion at "Modeling work group), and addressed concerns raised in the PTM Memo, *see* AR 00105025-27.

Second, DWR highlights that Kimmerer and Nobriga (2008) notes that the PTM model "has not been calibrated." AR 00122262. DWR argues that NMFS should not have used an un-calibrated model. Doc. 446-1 at 20. This ignores the fact that DWR and others have in fact performed validation and calibration on the PTM to ensure that it accurately depicts hydrodynamics. Fourth Stuart Decl., Doc. 485 at ¶ 47.

Finally DWR argues that NMFS's reliance on this study to "analyz[e] the potential 'zone of effects' for entraining emigrating juvenile and smolting salmonids," BiOp at 361, conflicts with the recommendations of Kimmerer and Nobriga, Doc. 446-1 at 21. Specifically, Kimmerer and Nobriga stated: "[w]e are ... not inclined to define a 'zone of influence' of the pumps on the basis of our results." AR 00122263. The entire paragraph goes on:

> A consequence of this is that simple questions (e.g., what proportion of particles are entrained under a given set of [*903] conditions) have no clear answer. Instead, the answer [**266] depends on the time horizon, which in turn depends on the overall flow conditions and the site of the release. We are, furthermore, not inclined to define a "zone of influence" of the pumps on the basis of our results, since the probability of entrainment depends on time horizon which, in many cases, is too long to be useful for analyzing the movements of larval fish. By the end of the modeled time period, the fish would already have metamorphosed, and their behavior would have become more complex.

AR 00122263. Kimmerer and Nobriga (2008) addresses both larval delta smelt and juvenile salmonids. Their reluctance to define a "zone of influence" is focused on the difficulties posed by modeling larval delta smelt, which may metamorphose to a more complex state within the time horizon of the PTM simulation. This apologetic does not suggest there are not problems with using PTM to define a of zone of influence, it is simply a statement that endeavors to explain uncertainty. Although NMFS's interpretation and use of Kimmerer and Nobriga (2008) was not accurate, again it is the agency's spin on the science. It is not unlawfully erroneous.

(2) DWR's Argument that NMFS Failed to Address Evidence [**267] in the Record Critical of the Use of PTM to Explain Salmonid Behavior.

DWR revisits the issue of whether NMFS gave adequate consideration to record evidence critical of the use of PTM to explain salmonid behavior. DWR specifically cites a 2001 article by Baker and Morhardt, AR 00108384-403, and an analysis conducted by DWR included in DWR's April 24, 2009 comments on the draft BiOp. *See* Doc. 446-1 at 22-23. Baker and Morhardt (2001) demonstrated that the fate of particles in the PTM was different from actual salmon behavior. AR 00108394 ("for the hydraulic simulations available to us ... 77 % of the tracer [PTM] particles ended up at the export pumps, while only 13% of the smolts arrived there"). Likewise, the DWR (2009) analysis concluded there "is no correlation" between coded wire tagged ("CWT") Chinook recoveries and PTM particle behavior. AR 00105430.

These additional studies do not undermine the reasoning of the 2010 PI Decision:

> NMFS recognized the limitations of applying the PTM model simulation to salmonids. 4/1/10 Tr. 144:2-8. There were discussions with DWR concerning this issue during the consultation process. *Id.* at 144:9-11. In discussions between DWR and NMFS, NMFS indicated [**268] it was using the PTM to evaluate water movement and the potential vulnerability to particle entrainment from various locations in the Delta. *Id.* at 144:13-19. NMFS was explicit that it was not using PTM to predict exactly how fish were moving within these same channels, but that the information gleaned from PTM about water movement through the Delta could provide information on vulnerability to entrainment. *Id.* at 144:19-25.

No comments

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Consol. Salmonid Cases, 713 F. Supp. 2d at 1139. DWR has acknowledged that this is a permissible PTM use. It has cast doubt on the efficacy of NMFS's reliance on the PTM, even for this narrow purpose, but has not shown it to be substantially unreasonable.

There is more to DWR's critique. To validly rely on the PTM results to impose management measures designed to aid salmonid survival, the movement of water described by the PTM must be reasonably related to the movement of salmonids. Citing the Baker and Morhardt (2001) study and DWR (2009) comments, Mr. Cavallo [*904] opines that this "has been shown to be incorrect." Cavallo Decl., Doc. 452 at ¶ 54.

NMFS justifies reliance on PTM simulations as a proxy for salmonid behavior:

> NMFS uses the findings of the PTM simulations [**269] to look at the eventual fate of objects in the river over a defined period of time from a given point of origin in the system. While salmonids and green sturgeon are not "neutrally buoyant particles", they can be represented to some degree by the PTM modeling results. The fish occupy a given body of water in the river and that body of water has eventual fates in the system, as represented by the dispersion of the injected particles. The salmonids have volitional movement within that body of water and react to environmental cues such as tides, water velocity vectors, and net water flow movement within the channel. The eventual fate of that body of water signifies the potential vulnerabilities of fish within that body of water to external physical factors such as export pumping or river inflows. For example, if exports increase, and the eventual fate of the water body indicates that it has a higher probability of entrainment compared to other conditions (i.e., lower export pumping), then NMFS believes that salmonids within that same body of water will also experience a higher probability of entrainment by the export pumping. Conversely, under conditions where the eventual fate of injected [**270] particles indicate a high probability of successfully exiting the Delta at Chipps Island, NMFS believes salmonids traveling in the same body of water will have a higher probability of exiting the Delta successfully. Furthermore, conditions which delay movement of particles out of the Delta yet don't result in increased entrainment at the export facilities would indicate conditions that might delay migration through the Delta, which would increase vulnerabilities to predation or contaminant exposure. Finally, flow conditions at river channel splits indicate situations where migrating fish must make a "decision" as to which channel to follow. If water is flowing into a given channel, then fish closer to that channel bifurcation are more likely to be influenced by the flow conditions adjacent to the channel opening than fish located farther away from the channel mouth. Burau *et al.* (2007) describes the complexity of these temporal and spatial conditions and their potential influence on salmonid movement. PTM simulations currently do not give the necessary fine scale resolution both temporally (minutes to fractions of hours) and spatially (three dimensional on the scale of meters) to give [**271] clear results at these channel splits. Burau states that spatial distribution of fish across the river channel occurs upstream of the channel splits and is dependent "upon the interaction between local hydrodynamic processes (e.g., secondary currents) and subtle behaviors that play out in a Lagrangian reference frame. These spatial structures evolve over fractions of hours to hours. Junction interactions, on the other hand, happen very rapidly, typically within minutes. Thus, route selection may only minimally depend on behavioral responses that occur in the junction, depending to a greater degree on spatial distributions that are created by subtle behavioral responses/interactions to geometry-mediated current structures that occur up-current of a given junction." This description illustrates the complexity of route selection. Based on Burau's explanation, fish upstream of the split are dispersed by the environmental conditions present in the channel into discrete locations across the channel's cross section. The proximity of these locations to [*905] the channel mouth is predictive of the risk of diversion into the channel itself. PTM data can be useful to indicate the magnitude of the net [**272] movement of water through the channel after the junction split (and the route selected by the fish),

No comments

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> and thus can be used to infer the probable fate of salmonids that are advected into these channels during their migrations.

BiOp 366-67. The BiOp does not explain the basis for NMFS's "belief" that salmonids within a body of water with a higher probability of particle entrainment will themselves "also experience a higher probability of entrainment by the export pumping"; its "belief" that salmonids within a body of water "where the eventual fate of injected particles indicate a high probability of successfully exiting the Delta at Chipps Island" will themselves have a "higher probability of exiting the Delta successfully"; nor its conclusion that conditions which delay movement of particles out of the Delta yet don't result in increased entrainment at the export facilities suggest conditions that might delay migration through the Delta. What support for these conclusions does the record contain?

(3) Salvage Data.

The BiOp relies in part on the plots of juvenile loss versus monthly OMR flows in Figures 6-65 and 6-66 discussed above to link the PTM results to salmonid behavior.

> Based on particle [**273] tracking modeling, the Delta smelt work group concluded that net river flows greater than -2000 ± 500 cfs in the Old River and Middle River complex reduced the zone of entrainment so that particles injected into the central Delta at Potato Slough would not be entrained towards the pumps (Kimmerer and Nobriga 2008 op cit. CVP/SWP operations BA). NMFS considers this information useful in analyzing the potential "zone of effects" for entraining emigrating juvenile and smolting salmonids. A similar pattern is observed in material (figures 6-65 and 6-66) provided to NMFS by DWR (Greene 2009). Loss of older juveniles at the CVP and SWP fish collection facilities increase sharply at Old and Middle River flows of approximately -5,000 cfs and depart from the initial slope at flows below this. Given the data derived from the CVP/SWP operations BA Appendix E, flows in Old and Middle River are consistently in excess of the -2000 ± 500 cfs threshold for entrainment (i.e., more upstream flow). Assuming that in the normal (natural) flow patterns in the Delta, juvenile and smolting Chinook salmon and steelhead will use flow as a cue in their movements and will orient to the ambient flow conditions [**274] prevailing in the Delta waterways, then upstream flows will carry fish towards the pumps during current operations. General tendencies of the modeling results indicate that Old River and Middle River net flows trend towards greater upstream flow in the near future and future conditions, resulting in even more fish carried towards the pumps.

BiOp at 361. The BiOp's reliance on figures 6-66 and 6-66 has been found unlawful. Without scaling for population size, the trends seen in Figures 6-65 and 6-66 are meaningless, because data points indicating greater salvage may simply be the result of a greater absolute number of individuals present in the entire Delta. The number of individuals lost to salvage could go up simply because the volume of water pumped through the salvage facility increases, not because increasing exports causes a greater percentage of the population to make its way toward the salvage facilities than would otherwise be present there.

[*906] (4) Other Studies.

In addition to Figures 6-65 and 6-66, NMFS relied on other studies, namely Vogel (2004), Perry & Skalski (2008), Newman (2008), and Newman and Brandes (2009), to conclude that as exports increase, greater numbers of salmonids [**275] are drawn into the interior Delta.

(a) Vogel (2004).

The 2010 PI Decision addressed the BiOp's reliance on Vogel (2004):

> The BiOp also relied upon Vogel (2004), which reviewed telemetry-tagging data to investigate fish route selection in the channels leading to the south Delta. See BiOp at 380-81. Based on Vogel's work, the BiOp found that when export levels were reduced and San Joaquin River flows were increased, more fish stayed in the main channel of the San Joaquin River, heading downstream toward the San Francisco Bay. *Id.*
>
> Mr. Cavallo maintains that Vogel (2004) does not support the conclusion that a reduction in export pumping resulted in the reduction of salmon leaving the mainstem of the San Joaquin River

No comments

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and entering the southern Delta. 4/1/10 Tr. 47:20-24, 49:8-13, 49:25 - 50:4, 50:17-23; DWR Ex. 505. The Vogel (2004) study concluded that the experiments it conducted "could not explain why some fish move off the mainstem of the San Joaquin River into the south Delta channels," noting that "[d]ue to the wide variation in hydrologic conditions" during the course of the experiments, "it was difficult to determine the principal factors affecting fish migration. Based on the limited [**276] data from these studies, it may be that a combination of a neap tide, reduced exports, and increased San Joaquin River flows is beneficial for outmigrating smolts, but more research is necessary." DWR Ex. 505 at 37.

When asked about Vogel's inconclusive results, not discussed in the BiOp, Mr. Stuart admitted that the BiOp's failure to disclose the conclusion was "an oversight on my part," for which he had no explanation. 4/2/10 Tr. 15:4-9.

It was not rational nor scientifically justified for the BiOp to rely on Vogel (2004) for findings the authors themselves refused to make.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1144. Defendant-Intervenors attempt to justify NMFS's reliance on Vogel (2004):

> [T]he paragraph from page 380 of the BiOp (NMFS 00106460) that DWR quotes and claims misstates Vogel (2004) is based not only on the 2004 Vogel study, but also the subsequent VAMP experiments. Vogel did conclude, as DWR states, that: "These [radio-tagged] experiments could not explain why some fish moved off the mainstem San Joaquin River into south Delta channels." NMFS 00217996 (Vogel 2004 at 37). But Vogel also went on to observe that "[b]ased on limited data from these studies, it may be that [**277] [a]combination of a neap tide, reduced exports, and increased San Joaquin River flows is beneficial for outmigrating smolts, but more research is necessary." *Id.* (emphasis added). According to Vogel, "[m]ore detailed analyses of fish movements in relation to quantitative measures of Delta hydrodynamics such as tidal excursion, net flow over a complete tide cycle, and flow structure at specific channel flow splits ... may provide more definitive conclusions on fish migration behavior." *Id.* Such further studies, according to Vogel, should include "water particle tracking model results in comparison to radio-tagged fish migration data," *id.* (emphasis added), as well as acoustic tagged salmon releases. *Id.* Thus, NMFS's conclusions are based [*907] not only on Vogel (2004), but the subsequent PTM and VAMP studies, discussed above, that Vogel and others recommended. And, NMFS has required the acoustic tag studies recommended by Vogel and others in Action IV.2.2.

Doc. 484 at 48-49. Vogel's call for further experiments or statement that he believes reduced exports, in conjunction with other factors, "may be" beneficial to migrating salmonids, does not change the fact that Vogel's own 2004 work does [**278] not explain why the fish studied moved off the mainstem San Joaquin. Reliance on this study to demonstrate that that Action IV.2.3's negative OMR flow limitations will reduce the vulnerability of juvenile salmonids to entrainment in the Delta is unreasonable.

(b) Perry and Skalski (2008).

The BiOp also relied upon a 2008 study by Perry and Skalski, which was previously addressed in the 2010 PI Decision:

> The BiOp utilized the Perry and Skalski (2008) study that concluded survival of fish moving into Georgiana Slough and nearby channels was reduced compared to those in the mainstem of the Sacramento River. 4/1/10 Tr. 161:20-162:1. These fish enter a portion of the San Joaquin River that NMFS found to be impacted by exports in its PTM simulation. *Id.* at 162:5-17; 4/2/10 Tr. 18:12-20, 19:22-20:11.
>
> However, Perry and Skalski 2008 noted that "there is limited understanding of how water management actions in the Delta affect population distribution and route-specific survival of juvenile salmon." SDLMWA Ex. 227 at 3. Mr. Cavallo testified that Perry and Skalski 2008 does not provide scientific support for the view that salmonids are lost due to

No comments

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water project-induced alterations to Delta hydrologic [**279] conditions. 4/1/10 Tr. 66:5-9.134.

Mr. Stuart admitted that Perry and Skalski 2008 did not address water project impacts on Delta hydrology, fish behavior, or the indirect mortality of fish in the central and southern channels of the Delta. Mr. Stuart further admitted that he reached his conclusions regarding water project impacts on Delta hydrology, fish behavior, and indirect salmonid mortality based upon his personal extrapolation from the data contained in Perry and Skalski 2008, and not from any conclusions reached by Perry and Skalski. 4/2/10 Tr. 19:2 - 21:24. However, these personal extrapolations are not documented or otherwise explained in the BiOp or elsewhere in the record.

Consol. Salmonid Cases, 713 F. Supp. 2d at 1143-44.

Mr. Stuart's Fifth Declaration clarifies that the BiOp cited Perry and Skalski (2008) in reference to "the risk that individual salmon smolts face to entrainment into either the channel of the Delta Cross Channel (when it is open) or into the channel of Georgiana Slough as they migrate downstream in the Sacramento River and not to the probability of ending up at the export facilities." Fifth Stuart Decl., Doc. 519 at ¶ 19. The BiOp did not rely on Perry [**280] and Skalski to justify its conclusion that the PTM is a valid proxy for salmonids or to demonstrate that exports cause salmonids to move toward the export facilities. Perry and Skalski does not support PTM as a proxy and should not have been cited.

(c) Newman (2008).

Newman (2008), which concluded that salmonids passing through Georgiana slough into the interior delta had slightly reduced survival when exports were higher relative to times when exports were lower, has been discussed. This lends marginal support to NMFSs conclusion that increasing exports negatively impacts salmonids moving through the interior delta.

[*908] (d) Newman and Brandes (2009).

DWR cites a 2008 draft of a study by Newman and Brandes analyzing the Delta Action 8 studies, "Hierarchical Modeling of Juvenile Chinook Salmon Survival as a Function of Sacramento-San Joaquin Delta Water Exports." In that draft, discussing the lower rate of survival of smolts traveling through Georgiana slough and the interior delta under high export conditions relative to low export conditions, the authors opined: "what we cannot conclude is that exports are the cause of this lower relative survival." NMFS 00127347. However, that sentence and [**281] several following paragraphs were eliminated by Newman and Brandes from the final, published version of the study. *See* AR 00089883. Like Newman (2008), Newman and Brandes (2009) found negative relationships between exports and survival. Fifth Stuart Decl., Doc. 519 at ¶ 33 (citing AR 00089884).

(e) Brandes & McLain (2001).

DWR also cites Brandes and McLain, "Juvenile Chinook Salmon Abundance, Distribution, and Survival in the Sacramento-San Joaquin Estuary" (2001). This study found "mixed results":

> Results were mixed showing in 1989 and 1990 that survival estimates between Dos Reis and Jersey Point were higher with higher exports whereas in 1991 between Stockton and the mouth of the Mokelumne River (Tables 11 and 12) survival was shown to be lower (0.008 compared to 0.15) when exports were higher. One potential bias in the 1989 and 1990 data is that as mentioned earlier, smolts released at Dos Reis in 1989 were from the Merced River Fish Facility while those released at Jersey Point were from Feather River hatchery. Using different stocks to estimate smolt survival between two locations may introduce bias. In addition, results in 1989 and 1990 also showed that survival indices of the [**282] upper Old River groups relative to the Jersey Point groups were also higher during the higher export period, but overall still about half that of the survival of smolts released at Dos Reis (Table 11).

AR 00109602. That the study's authors question the validity of the results from the years showing a positive relationship between exports and survival and do not critique the results from the year showing a negative relationship, lends minimal support to NMFS's conclusion that exports influence salmonid survival.

(f) Kimmerer 2008.

Defendant-Intervenors point to a Kimmerer 2008 that unequivocally found that "[t]he estimated proportion of migrating fish salvaged at the export facilities in-

No comments

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creased with increasing export flow." AR 00122236. DWR and Export Plaintiffs do not contest this conclusion.

(g) SJRGA 2007

Finally, Defendant-Intervenors point to the San Joaquin River Group Authority ("SJRGA") 2007 review of VAMP data, which found evidence of a negative relationship between exports and survival. *See* AR 00134423 ("The CDRRs [combined differential recovery rates] measured for the first group released in 2006, under low exports, appeared higher than those obtained in 2003-2005 and for the [**283] 2006 group released under higher exports and higher temperature.").

This entire record shows that the science is conflicting and often equivocal. Most of the evidence does not show a negative relationship between levels of exports and salmon survival. It is impossible to discern the effect of exports on salmon behavior from the record. Despite these numerous criticisms, NMFS chose to use PTM as a modeling tool for salmonid behavior. DWR's own staff biologist, [*909] Sheila Greene, testified in a related case by declaration that "Given the insufficiency of behavioral data, particle tracking is the best available science to estimate the proportions of juvenile Chinook salmon that emigrate through the Delta." AR 00118803. DWR is bound by this statement. Whether to use PTM modeling then becomes a matter of agency discretion.

b. Justification for the Specific Flow Prescriptions in Action IV.2.3.

Existence of record support for NMFS's reliance on the PTM does not end the inquiry. The BiOp applied the PTM to generate flow prescriptions using the following approach:

> The data output for the PTM simulation of particles injected at the confluence of the Mokelumne River and the San Joaquin River (Station [**284] 815) indicate that as net OMR flow increases southwards from -2,500 to -3,500 cfs, the risk of particle entrainment nearly doubles from 10 percent to 20 percent, and quadruples to 40 percent at -5,000 cfs. At flows more negative than -5,000 cfs, the risk of entrainment increases at an even greater rate, reaching approximately 90 percent at -7,000 cfs. Even if salmonids do not behave exactly as neutrally buoyant particles, the risk of entrainment escalates considerably with increasing exports, as represented by the net OMR flows. The logical conclusion is that as OMR reverse flows increase, risk of entrainment into the channels of the South Delta is increased. Conversely, the risk of entrainment into the channels of the South delta is reduced when exports are lower and the net flow in the OMR channels is more positive -- that is, in the direction of the natural flow toward the ocean.

BiOp at 652. Even if the PTM is the best available mechanism for modeling salmonid behavior, NMFS has failed to justify this leap of logic, which in essence assumes that salmonids will be drawn toward the export facilities to the same extent as neutrally buoyant particles. In light of undisputed record evidence [**285] discussed above demonstrating the many deficiencies in the PTM and that it is far from a perfect proxy for salmon behavior, NMFS has not provided "a thorough explanation of how each component of the [RPA] is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43 (emphasis added). Conclusory explanations of the value of RPA actions are insufficient. *PCFFA v. U.S. Bureau of Reclamation, 426 F.3d 1082, 1093 (9th Cir. 2005).*

Plaintiffs' and DWR's motion challenges to Action IV.2.3 is GRANTED IN PART AND DENIED IN PART, as are Federal Defendants' and Defendant-Intervenors' cross motions. There is nominal record support for the imposition of some form of OMR flow restriction, but the Action must be remanded for further explanation of the necessity the specific flow prescriptions imposed, which are derived primarily from PTM simulations, a method that is undisputedly an imperfect predictor of salmon behavior.

3. Action IV.3.

From November 1 through December 31, Action IV.3 restricts combined CVP and SWP exports to 6,000 cfs or 4,000 cfs when certain salvage thresholds are met. BiOp at 653. The 6,000 cfs export limit is triggered when daily SWP and CVP older juvenile loss [**286] density is greater than 8 fish per thousand acre feet ("TAF"), daily loss is greater than 95 fish per day, or the Coleman National Fish Hatchery coded wire tagged late fall-run Chinook salmon ("Coleman CWT fish") or Livingstone Stone National Hatchery coded wire tagged winter-run ("L-S CWT fish") cumulative loss is greater than 0.5%. *Id.* [*910] The more restrictive 4,000 cfs export limit is triggered when the daily older juvenile loss density is grater than 15 fish per TAF, daily loss is greater than 120 fish per day, or the Coleman CWT or L-S CTW fish cumulative loss is greater than 0.5%. Either export restriction remains in place for three days, or until daily older

No comments

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juvenile loss density is less than 8 fish per TAF. *Id.* Action IV.3 also establishes an "alert," which signals that export restrictions may need to be altered when either the Knights Landing or Sacramento catch index is greater than 10 fish captured per day from November 1 to February 28, or greater than 15 fish captured per day from March 1 to April 30. *Id.* at 652.

The objective of Action IV.3 is to "[r]educe losses of winter-run, spring-run, CV steelhead, and Southern DPS of green sturgeon by reducing exports when large numbers [**287] of juvenile Chinook salmon are migrating into the upper Delta region, at risk of entrainment into the central and south Delta and then to the export pumps in the following weeks." *Id.*

DWR does not challenge this RPA Action. Export Plaintiffs, however, raise several objections. First, Export Plaintiffs challenge NMFS's underlying assumption for Action IV.3 that "[e]xport pumping changes flow patterns and increases residence time of ... diverted fish in the central Delta, which increases the risk of mortality from [other factors], as well as the likelihood of entrainment at the pumps." *Id.* at 653. They argue that this assumption is not supported by the best available science, reiterating the argument that the studies relied upon by NMFS do not "connect mortality in the interior delta to export levels," and that NMFS's use of PTM studies to show "potential vulnerabilities of fish" is not appropriate. Doc. 431 at 106-108. Although the evidence supporting a survival effect of increased exports weak and disputed, NMFS's conclusion that export pumping negatively impacts salmonid survival has marginal support in the record and is not unlawfully erroneous. The BiOp's related use of PTM as a [**288] modeling tool for salmonids is a highly disputed scientific choice, described by DWR as the best available science in at least one application.

Export Plaintiffs also challenge the specific triggers used in Action IV.3, on the grounds that: (1) as was the case with the plots of raw salvage used to justify other Actions, the triggers do not account for the relative size of the various salmonid populations; and (2) "NMFS nowhere explains how it arrived at these thresholds. Doc. 431 at 108-09.

Federal Defendants respond that Plaintiffs' concern that Action IV.3 fails to scale the loss triggers against the population size is "a red herring" because "NMFS did not conclude that Action IV.3 alone is avoiding jeopardy. Rather, the measure simply reflects NMFS's conclusion that it is important to have increased protections when you have more fish at the salvage facilities." Doc. 477-1. This is a total abdication from NMFS's self-imposed requirement that the RPA provide "a thorough explanation of how each component of the [RPA] is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43 (emphasis added). Federal Defendants cannot impose a complex and burdensome RPA, damaging [**289] of other interests, without specifically justifying each of its components. Adoption of Federal Defendants' "trust me" approach would mean that the more complex an RPA, the more obscured it is from judicial review. Each component need not eliminate jeopardy on its own, but that does not excuse NMFS from separately justifying individual Actions.

While there is record explanation for an action designed to prevent large numbers [*911] of fish from being killed or harmed at the export pumping facilities, Export Plaintiffs raise serious questions related to the need to scale the triggers to the overall size of the salmonid populations they aim to protect. Given previous findings about the use of raw salvage figures, the best available science calls for an index related to population size, rather than a fixed number. More importantly, even if this were not a problem, Federal Defendants have entirely failed to provide any record explanation for why the specific triggers were chosen. NMFS must address and correct this failure on remand. Plaintiffs' motion is GRANTED on this issue; Federal Defendants' and Defendant-Intervenors' cross motion is DENIED.

G. Compliance with *50 C.F.R. § 402.02*.

ESA section 7(b)(3)(A) [**290] provides that, "[i]f jeopardy or adverse modification is found, the Secretary shall suggest those reasonable and prudent alternatives which he believes would not violate subsection (a)(2) of [Section 7] and can be taken by the Federal agency ... in implementing the agency action." *Id.* "Reasonable and prudent alternatives refer to alternative actions identified during formal consultation [1] that can be implemented in a manner consistent with the intended purpose of the action, [2] that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, [3] that is economically and technologically feasible, and [4] that the Director believes would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat." *50 C.F.R. § 402.02* (the "four RPA requirements").

NMFS and FWS's joint Consultation Handbook explains that during the formal consultation period, NMFS should "meet or communicate with the action agency ... to gather any additional information necessary to conduct the consultation." Consultation Handbook at 4-6. Among other things, the formal consultation [**291] period should be used to "develop reasonable and prudent alternatives to an action likely to result in jeopardy or adverse modification...." *Id.*

No comments

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Consultation "should be undertaken cooperatively with the action agency and any applicant, thus allowing the Services to develop a better understanding of direct and indirect effects of a proposed action and any cumulative effects in the action area. Action agencies also have the project expertise necessary to help identify reasonable and prudent alternatives, and reasonable and prudent measures. Other interested parties (including the applicant, and affected State and tribal governments) should also be involved in these discussions.... These cooperative efforts should be documented for the administrative record." *Id.*

The Handbook contains a section on RPAs, which provides as follows:

> Reasonable and prudent alternatives This section lays out reasonable and prudent alternative actions, if any, that the Services believe the agency or the applicant may take to avoid the likelihood of jeopardy to the species or destruction or adverse modification of designated critical habitat (*50 CFR § 402.14(h)(3)*). When a reasonable and prudent alternative consists [**292] of multiple activities, it is imperative that the opinion contain a thorough explanation of how each component of the alternative is essential to avoid jeopardy and/or adverse modification. The action agency and the applicant (if any) should be given every opportunity to assist in developing the reasonable and prudent alternatives. Often they are the only ones who can determine if an alternative is within their legal authority and jurisdiction, and if it is economically and technologically feasible.
>
> [*912] If adopted by the action agency, the reasonable and prudent alternatives do not undergo subsequent consultation to meet the requirements of section 7(a)(2). The action agency's acceptance in writing of the Services' reasonable and prudent alternative concludes the consultation process.
>
> Section 7 regulations (*50 CFR §402.02*) limit reasonable and prudent alternatives to:
>
> o alternatives the Services believe will avoid the likelihood of jeopardy or adverse modification,
>
> o alternatives that can be implemented in a manner consistent with the intended purpose of the action,
>
> o alternatives that can be implemented consistent with the scope of the action agency's legal authority and jurisdiction, and
>
> o [**293] alternatives that are economically and technologically feasible.
>
> If the Services conclude that certain alternatives are available that would avoid jeopardy and adverse modification, but such alternatives fail to meet one of the other three elements in the definition of "reasonable and prudent alternative," the Services should document the alternative in the biological opinion to show it was considered during the formal consultation process. This information could prove important during any subsequent proceeding before the Endangered Species Committee (established under section 7(e) of the Act), which reviews requests for exemptions from the requirements of section 7(a)(2).
>
> Although a strong effort should always be made to identify reasonable and prudent alternatives, in some cases, no alternatives are available to avoid jeopardy or adverse modification.
>
> Examples include cases in which the corrective action relies on:
>
> o an alternative not under consideration (e.g., locating a project in uplands instead of requiring a Corps permit to fill a wetland);
>
> o actions of a third party not involved in the proposed action (e.g., only the County, which is not a party to the consultation, has the authority [**294] to regulate speed limits);
>
> o actions on lands over which the action agency has no jurisdiction or no residual authority to enforce compliance; and
>
> o data not available on which to base an alternative.
>
> In these cases, a statement is included that no reasonable and prudent alternatives are available, along with an explana-

No comments

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> tion. When data are not available to support an alternative, the explanation is that according to the best available scientific and commercial data, there are no reasonable and prudent alternatives to the action undergoing consultation. The Services are committed to working closely with action agencies and applicants in developing reasonable and prudent alternatives. The Services will, in most cases, defer to the action agency's expertise and judgment as to the feasibility of an alternative. When the agency maintains that the alternative is not reasonable or not prudent, the reasoning for its position is to be provided in writing for the administrative record. The Services retain the final decision on which reasonable and prudent alternatives are included in the biological opinion. When necessary, the Services may question the agency's view of the scope of its authorities [**295] to implement reasonable and prudent alternatives.

Consultation Handbook, 4-41 - 4-42.

San Luis & Delta-Mendota Water Authority v. Salazar (Consolidated Delta Smelt Cases), 666 F. Supp. 2d 1137 [*913] *(E.D. Cal. 2009)*, discussed *section 402.02* in considering a facial challenge to a related biological opinion, filed before the administrative record was completed. Plaintiffs argued that FWS acted unlawfully by failing to discuss the four *§ 402.02* factors on the face of the biological opinion. The decision found that FWS was only required to make explicit findings in the biological opinion on the fourth factor, namely whether the RPA will avoid the likelihood of jeopardy or adverse modification. "[W]hether FWS properly promulgated the RPA [consistent with the requirements of *§ 402.02*] must be decided on the basis of the entire record." *Id. at 1158-59.*

Export Plaintiffs now bring a record-based challenge to NMFS's alleged non-compliance with *§ 402.02*, asserting that entire RPA is invalid because the record does not support a finding that NMFS complied with the four *§ 402.02* factors. Doc. 431 at 109-118. DWR joins this aspect of Export Plaintiffs' motion. Doc. 446-1 at 27.

There is scant authority [**296] to aid interpretation of *§ 402.02*. The text of the Federal Register Notice promulgating *§ 402.02* provides limited guidance:

> "Reasonable and prudent alternatives" is defined in the final rule. Section 7(b) of the Act requires the Service to include reasonable and prudent alternatives, if any, in a "jeopardy" biological opinion. An alternative is considered reasonable and prudent only if it can be implemented by the Federal agency and any applicant in a manner consistent with the intended purpose of the action, and if the Director believes it would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat of such species. Further, the Service should be mindful of the limits of a Federal agency's jurisdiction and authority when prescribing a reasonable and prudent alternative. An alternative, to be reasonable and prudent, should be formulated in such a way that it can be implemented by a Federal agency consistent with the scope of its legal authority and jurisdiction. However, the Service notes that a Federal agency's responsibility under section 7(a)(2) permeates the full range of discretionary [**297] authority held by that agency; i.e., the Service can specify a reasonable and prudent alternative that involves the maximum exercise of Federal agency authority when to do so is necessary, in the opinion of the Service, to avoid jeopardy. The Service recognizes that economic and technological feasibility are factors to be used in developing reasonable and prudent alternatives, as requested by one commenter. The definition of "reasonable and prudent alternatives" has been amended to reflect these considerations. If there are no alternatives that meet the definition of "reasonable and prudent alternatives," the Service will issue a "jeopardy" biological opinion without alternatives.
>
> Two commenters stated that reasonable and prudent alternatives should include mitigation measures designed to reduce adverse effects, i.e., conservation recommendations. One of those commenters urged the Service to limit the scope of recommended alternatives to those "consistent with the scope, magnitude, and duration of the project as well as the extent of its adverse effects." First, because there is a distinction between "reasonable and prudent alternatives" (that satisfy section 7(a)(2)) and "conservation [**298] recommendations" (that are authorized by section 7(a)(1)), the Service

No comments

- n/a -

> declines to include conservation measures within the scope of the definition. Second, the Service agrees that reasonable and prudent alternatives should be [*914] consistent with the intended purpose of the action and should therefore be economically and technologically feasible, but the Service cannot limit its range of choices to the criteria suggested by the commenter. Reasonable and prudent alternatives must cover the full gamut of design changes that are economically and technologically feasible for an action, independent of who is sponsoring the action.

51 Fed. Reg. 19,926, 19,937 (June 3, 1986).

1. Consistency with Purposes of the Action.

The BiOp reasons that because the operational changes demanded by the RPA do not preclude continued operation of the CVP and SWP, the RPA is consistent with the purpose of the action:

> [T]his RPA is consistent with the intended purpose of the action. According to the BA, "[t]he proposed action is the continued operation of the CVP and SWP." (CVP and SWP operations BA, P. 2-1) Specifically, Reclamation and DWR "propose to operate the Central Valley Project (CVP) and State Water Project [**299] (SWP) to divert, store, and convey CVP and SWP (Project) water consistent with applicable law and contractual obligations." (CVP and SWP operations BA, p.1-1) Changes in operation of the projects to avoid jeopardizing listed species or adversely modifying their critical habitats require that additional sources of water for the projects be obtained, or that water delivery be made in a different way than in the past (e.g., elimination of RBDD), or that amounts of water that are withdrawn and exported from the Delta during some periods in some years be reduced. These operational changes do not, however, preclude operation of the Projects.

BiOp at 724. The BiOp also discussed the various purposes of the CVP:

> ....The Rivers and Harbors Act of 1937, which established the purposes of the CVP, provided that the dams and reservoirs of the CVP " 'shall be used, first, for river regulation, improvement of navigation and flood control; second, for irrigation and domestic uses; and, third, for power.'" (CVP and SWP operations BA, p. 1-2). The CVP was reauthorized in 1992 through the CVPIA, which modified the 1937 Act and added mitigation, protection, and restoration of fish and wildlife as project [**300] purposes. The CVPIA provided that the dams and reservoirs of the CVP should be used "'first, for river regulation, improvement of navigation, and flood control; second, for irrigation and domestic uses and fish and wildlife mitigation, protection and restoration purposes; and, third, for power and fish and wildlife enhancement." (CVP and SWP operations BA p. 1-3) One of the stated purposes of the CVPIA is to address impacts of the CVP on fish and wildlife. CVPIA, Sec. 3406(a). The CVPIA gives Reclamation broad authority to mitigate for the adverse effects of the projects on fish and wildlife, and nothing in the Rivers and Harbors Act of 1937 requires any set amount of water delivery.
>
> In addition to adding protection of fish and wildlife as second tier purposes of the CVP, the CVPIA set a goal of doubling the natural production of anadromous fish in Central Valley rivers and streams on a long-term sustainable basis, by 2002. Sec. 3406(b)(1). This goal has not been met. Instead, as detailed in this Opinion, natural production of anadromous fish has declined precipitously....

Id. at 724-25.

Export Plaintiffs challenge NMFS's finding that the RPA is consistent with the multiple purposes of [**301] the Projects. First, [*915] Export Plaintiffs argue that NMFS ignored warnings about the water costs of the RPA. For example, DWR commented that "the average combined water supply impact to the SWP and the CVP of the NFMS proposed RPA is roughly 900 [thousand acre feet ("taf")] to 1.1 [million acre feet ("Maf")] (or about 16% to 19%)." AR 00086760. DWR's estimate continues:

No comments

- n/a -

> By taking an alternative approach and layering the NFMS proposed RPA on top of the terms of the USFWS 2008 [Smelt] BiOp RPA that have been provisionally accepted by Reclamation, the average combined water supply impact of the NMFS draft RPA to the SWP and CVP is roughly 150 taf to 750 taf, or about 3% to 15% above the impact of the USFWS 2008 [Smelt] BiOp RPA depending on the range of adaptive actions implemented by the USFWS under the terms of the [Smelt] BiOp. When compared to OCAP Study 7.0, the average combined water supply impact of the collective USFWS [Smelt] RPA and NMFS draft RPA to the SWP and CVP is roughly 1.3 Maf to 1.6 Maf (or about 23% to 29%).
>
> [I]t should be noted that these estimated impacts are incomplete, and we would expect them to be greater because they do not include reoperation of CVP reservoirs as [**302] specified in the draft NMFS RPA. In addition, these studies do not include any assessment of the USFWS Fall X2 measure which has not been accepted by Reclamation as reasonable or prudent.

Id. Plaintiffs also point to Reclamation's comments on the RPA, which express general concerns over water supply impacts. AR 00210461-69, 00210473-76, 00105273.

That there are water supply impacts does not necessarily render the RPA inconsistent with the purposes of the action. However, NMFS is absolutely obligated do more than simply check to ensure that the proposed operational changes do not "preclude operation of the Projects." *See* BiOp at 724. Assumedly, if the Projects delivered ten AF of water in a water year, the Projects would be "operating." An RPA that effectively eliminates Project water deliveries to parts of the CVP's service area is inconsistent with one of the co-equal purposes of that project. [28] What is [*916] the ultimate impact of the salmonid BiOp RPA? The BiOp does not provide explicit answers to these questions. The BiOp predicted a lower estimate of water supply costs than DWR:

> NMFS estimates the water costs associated with the RPA to be 5-7% of average annual combined exports: 5% for [**303] CVP, or 130 TAF/year, and 7% for SWP, or 200 TAF/year. The combined estimated annual average export curtailment is 330 TAF/year. These estimates are over and above export curtailments associated with the USFWS' Smelt Opinion. The OMR restrictions in both Opinions tend to result in export curtailments of similar quantities at similar times of year. Therefore, in general, these 330 TAF export curtailments are associated with the NMFS San Joaquin River Ratio actions in the RPA.
>
> NMFS also considered that there may be additional localized water costs not associated with South Delta exports. These may include, in some years, localized water shortages necessitating groundwater use, water conservation measures, or other infrastructure improvements in the New Melones service area, and localized impacts in the North of Delta in some years, associated with curtailments of fall deliveries used for rice decomposition. NMFS considered whether it was feasible to model and estimate any water costs associated with the Shasta or American River RPA actions, and discussed this issue with Reclamation. In general, it was decided that modeling tools were not available to assess these costs and/or that costs [**304] would be highly variable depending on adaptive management actions, and therefore, not meaningful to model.

BiOp at 720-21 (footnote omitted).

28 Federal Defendants cite *Kandra v. United States, 145 F. Supp. 2d 1192, 1207 (D. Or. 2001)*, which briefly discusses consistency with the project purposes, for the proposition that so long as wildlife protection is a legitimate purpose of a project, an RPA designed to protect a species is consistent with the purposes of that. In *Kandra*, water user plaintiffs sought to enjoin Reclamation from implementing a 2001 Annual Operations Plan for the Klamath Reclamation Project, which included RPAs that would modify flows to support listed species, resulting in complete curtailment of water deliveries to the majority of land within the Klamath Project. *Id. at 1195-96*. Plaintiffs argued that the purpose of the Klamath Project, pursuant to the Reclamation Act, is irrigation, and that the RPAs adopted by Reclamation benefit fish to the detriment of irrigation was inconsistent with the Project's purpose. *Id. at 1207*.

No comments

- n/a -

The district court found this argument unpersuasive:

> True, an RPA is defined as an alternative action[,] which is "consistent with the purposes [**305] of the action...." *50 C.F.R. § 402.02*. ...[A]gency actions taken pursuant to the Reclamation Act must comply with the requirements of the ESA. See *Tennessee Valley Authority v. Hill, 437 U.S. 153, 185, 98 S. Ct. 2279, 57 L. Ed. 2d 117 (1978)* (ESA obligations take "priority over the 'primary' missions" of federal agencies). Further, agency actions are subject to the government's duty to protect tribal resources. Reclamation's legal duty to operate the Project consistent with its ESA and tribal trust obligations does not render the RPAs inconsistent with the Project's purpose. [*Klamath Water Users Protective Ass'n v.] Patterson, 204 F.3d [1206,] 1213-14 [(9th Cir. 1999)]*.

Id. at 1207. This non-binding decision is decidedly unpersuasive, as it ignores the competing, Congressionally mandated irrigation purpose. Even if the logic of *Kandra* is accepted, *arguendo*, the Agency has a duty to closely examine the adverse effects to prevent emasculation of the co-equal purpose of irrigation.

The agency abandoned its legal duties and said in effect: "we can't model, we won't do it." However, much of the Defendants' support for the BiOp and its RPA actions is based upon the same highly variable and questionable modeling of species [**306] populations and effects from exports. As this agency practices, what is "science" for the "goose" is clearly not "for the gander."

Export Plaintiffs argue that NMFS has failed to explain why its estimate is more reliable than the 900,000 - 1,100,000 AF water cost estimate (16%-19% of the Projects' combined water supply) provided by DWR, one of the Project co-operators. Doc. 431 at 113-14. In particular, Export Plaintiffs challenge the BiOp's consideration of only the impacts of export curtailments "associated with the NMFS San Joaquin River Ratio actions in the RPA," presumably a reference to Action IV.2.1. The BiOp explains that many of the OMR restrictions in both the Salmon and Smelt BiOps "tend to result in export curtailments of similar quantities at similar times of year," but does not explain why it is appropriate to entirely ignore the effects of those curtailments that may overlap with those mandated by the Smelt BiOp. This requires further clarification and revision in light of competent and meaningful impact studies. [29]

> 29 Export Plaintiffs also challenge the BiOp's related conclusion that the 330,000 AF of export curtailments "can be offset by application of (b)(2) water resources, [**307] water conservation, groundwater use, water recycling and other processes currently underway." BiOp at 580. This is not an essential element of the BiOp's reasoning, as NMFS later concedes that "NMFS could not be reasonably certain b(2) water would be available" and indicates that the BiOp's analysis of the RPA actions does not depend on the availability of (b)(2) water. *Id.* at 722.

[*917] Even assuming, *arguendo*, the BiOp's water cost prediction is correct, is such a reduction "consistent" with the irrigation purpose of the CVP? How should the RPA analyze the extent of water supply reductions that are consistent with the co-equal legislative irrigation purpose? The ESA provides no guidance, nor do the joint ESA regulations or any other authority identified by any party. It cannot simply be said that if an ESA-listed species' protection is at stake, the "no balancing of hardships" principle excludes such consideration. This would impermissibly rewrite Reclamation law to eliminate the regulatory requirement that NMFS consider the RPA's effect on the co-equal statutory purpose of irrigation. Federal Defendants' examination of this factor is insufficient. Export Plaintiffs' motion for summary [**308] judgment on this issue is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

2. Consistency with the Action Agency's Legal Authority and Jurisdiction.

Export Plaintiffs dispute the BiOp's conclusion that the RPA can be implemented in a manner consistent with the legal authority and jurisdiction of Reclamation and DWR. The BiOp reasons that "[t]he CVPIA gives Reclamation broad authority to mitigate for the adverse effects of the projects on fish and wildlife, and nothing in the Rivers and Harbors Act of 1937 requires any set amount of water delivery." BiOp at 724-25. The BiOp also recognizes that the CVPIA contains a goal of doubling the natural production of anadromous fish in Central Valley rivers and streams, and that this goal has not yet been met. *Id.* at 725. As Federal Defendants well know, the CVPIA dedicates a finite 800,000 AF of annual CVP yield to the fish-doubling objective.

No comments

- n/a -

The BiOp reasons that Reclamation has broad powers to restore anadromous fish populations:

> A 2008 report on the CVPIA anadromous fish program by independent reviewers (Cummins *et al.* 2008), recommended by the Office of Management and Budget and requested by Reclamation and [**309] the USFWS, stated that
>
> > "it is far from clear that the agencies have done what is possible and necessary to improve freshwater conditions to help these species weather environmental variability, halt their decline and begin rebuilding in a sustainable way. A number of the most serious impediments to survival and recovery are not being effectively addressed, especially in terms of the overall design and operation of the [CVP] system."
>
> One of the review panel's specific recommendations was that the agencies
>
> > "should develop a more expansive view of the authorities at their disposal to address the problems, especially with regard to water management and project operations. The agencies have followed a more restrictive view of their authorities than appears legally necessary or appropriate to the seriousness of the mission. "
>
> The report notes that the CVPIA contains a "long list of operational changes, actions, tools, and authorities - some quite specific and discrete, some general and on-going -that Interior is to use to help achieve the anadromous fish restoration purposes of the CVPIA ...." (Cummins *et al.* 2008 at 5) The report then describes development of a Final Restoration Plan that would [**310] utilize these authorities, but concludes that "[t]he agencies implement the CVPIA . . . in a way that bears little resemblance to the integrated, coordinated, holistic vision of [*918] the Final Restoration Plan." (Cummins *et al.* 2008 at 9)
>
> Most relevant to this consultation, the review panel observed that
>
> > "[i]t would seem that CVPIA activities and personnel should be central to the OCAP plan, the Section 7 consultation, and the agencies' efforts to satisfy the requirements of the ESA (that is, after all, one of the directives of the CVPIA). The panel received no information or presentations on the involvement of the CVPIA program or personnel in the ESA consultation effort ... and in the determination of what actions the agencies should be taking to meet the ESA."
>
> (Cummins *et al.* 2008 at 11)

Id. The CVPIA contains prescriptives; it does not elevate the ESA over all other statutory purposes for use of Project water. Although specific provisions of the law may authorize finite increase in fish protection water appropriation, there is no indefinite, unlimited power for NMFS to take whatever Project water it deems essential for the species.

The BiOp also finds that "state law gives DWR authority [**311] to provide for needs of fish and wildlife independent of the connection of the two water projects."

> According to the [Biological Assessment], DWR
>
> > "is required to plan for recreational and fish and wildlife uses of water in connection with State-constructed water projects and can acquire land for

No comments

- n/a -

> such uses (Wat. Code Sec. 233, 345,346, 12582). The Davis-Dolwig Act (Wat. Code Sec. 11900-11925) establishes the policy that preservation of fish and wildlife is part of State costs to be paid by water supply contractors, and recreation and enhancement of fish and wildlife are to be provided by appropriations from the General Fund."

> (CVP/SWP operations BA, page 1-4) DWR, like Reclamation, has broad authority to preserve and enhance fish and wildlife.

Id. at 726.

Although *§ 402.02*'s RPA requirements demand that NMFS engage in an evaluation of its legal authority to implement the RPA Actions, NMFS's interpretations of these laws set forth in the BiOp are not entitled to deference, as they were neither promulgated through notice and comment rulemaking procedures, *see Chevron v. NRDC, 467 U.S. 837, 104 S. Ct. 2778, 81 L. Ed. 2d 694 (1984)*, nor contained within an agency policy statement, manual, enforcement guideline, or other document [**312] entitled to limited deference, *see Skidmore v. Swift & Co., 323 U.S. 134, 65 S. Ct. 161, 89 L. Ed. 124 (1944)*; *Christensen v. Harris County, 529 U.S. 576, 587, 120 S. Ct. 1655, 146 L. Ed. 2d 621 (2000)*.

State and federal law impose upon Reclamation and DWR a nondiscretionary duty to comply with state water rights law. *See 43 U.S.C. § 383*; *California v. United States, 438 U.S. 645, 675, 98 S. Ct. 2985, 57 L. Ed. 2d 1018 (1978)*. Export Plaintiffs point to the "obligation imposed upon both Reclamation and DWR by D-1641 to comply with the reasonable and beneficial use requirements and prohibition against waste [of water] set forth in *Article X, section 2 of the California Constitution*, in their respective operations of the CVP and SWP." Doc. 431 at 117. The argument continues:

> Because there is no indication in the record that NMFS undertook any analysis of whether DWR and Reclamation have jurisdiction and authority under the reasonable and beneficial use requirements of California law to annually reallocate hundreds of thousands of acre feet of project water, particularly where the benefits to listed salmonid species [*919] have not been demonstrated, the requirements of *Section 402.02 and the ESA* have been violated.

Id.

It is undisputed that California law identifies the preservation of fish and [**313] wildlife as a beneficial use of water. *Cal. Water Code § 1243*. In addition to requiring compliance with California's reasonable and beneficial use standard, D-1641 imposes a condition upon both Reclamation's and DWR's water rights requiring both to "meet[] all requirements of the applicable Endangered Species Act for the project authorized under [their respective] permit[s]/license[s]." D-1641 at 148. When jeopardy is found, the ESA requires implementation of a RPA. D-1641 authorizes Reclamation's implementation of lawful RPAs. [30]

> 30 In light of D-1641's requirement that DWR and the Bureau comply with the ESA, Export Plaintiffs have not pointed to any substantive statute or jurisdictional limitation that precludes the Reclamation or DWR from implementing a lawful ESA RPA. The SR Plaintiffs have made such an argument. That argument is addressed below.

However, several of the specific RPA prescriptions have failed to demonstrate compliance with the Handbook's requirement that every RPA be "essential to avoid jeopardy and/or adverse modification." Obviously, to the extent that any RPA Action has been found unlawful, Federal Defendants cannot establish that implementation of that RPA is consistent [**314] with Reclamation's legal authority.

Export Plaintiffs' motion for summary judgment that NMFS failed to demonstrate the RPA's consistency with Reclamation and DWR's legal authority is GRANTED IN PART AND DENIED IN PART, as are Federal Defendants' and Defendant-Intervenors' cross motions. To the extent individual RPA Actions are otherwise lawful, Export Plaintiffs' argument that Federal Defendants' failed to demonstrate Reclamation's authority to implement those Actions is belied by D-1641, which expressly requires implementation of lawful RPA Actions. Correlatively, to the extent individual RPA Actions are unlawful, Federal Defendants cannot find authority for their implementation.

3. Economic and Technical Feasibility.

No comments

- n/a -

The BiOp contains a lengthy discussion of economic and technical feasibility. Export Plaintiffs attack the discussion as insufficient in several respects. First, Export Plaintiffs argue that NMFS ignored objections and evidence submitted by Reclamation and DWR suggesting that the RPA was not technologically or economically feasible. A March 23, 2009 letter from Reclamation to NMFS details a number of concerns with the proposed RPA. *See* AR 00105277-84. A March 20, 2009 letter [**315] from DWR to NMFS describes some specific feasibility concerns and a general objection that several of the RPA actions were not economically feasible. *See* AR 00105285-99.

Export Plaintiffs object generally that NMFS failed to articulate a reasoned response to DWR and Reclamation's objections. Doc. 431 at 114. The BiOp explained that the relevant state and federal agencies engaged in a back-and-forth exchange of information regarding feasibility of the RPA and adjustments were made:

> Some of the more complex RPA actions, including Shasta Storage, Habitat Rearing Actions, Passage Program, Stanislaus Flows and the San Joaquin River Inflow Export Ratio, went through many iterations of review, re-drafting, and refinement, involving interagency staff and management expertise, including biology, ecology, hydrology, and operations, in order to ensure that the [*920] actions were based on best available science, would be effective in avoiding jeopardy, and would be feasible to implement. NMFS also secured outside contractual services to provide additional modeling expertise in evaluating draft RPA actions.
>
> Examples of Feasibility Concerns in RPA Actions As a result of this iterative consultation process, [**316] NMFS considered economic and technological feasibility in several ways when developing the CVP/SWP operations RPA. Examples include:
>
> > 1) Providing reasonable time to develop technologically feasible alternatives where none are "ready to go" -e.g., the Delta engineering action (Action IV.1.3), and lower Sacramento River rearing habitat action (Action I.6.1);
> >
> > 2) Calling for a stepped approach to fish passage at dams, including studies and pilot projects, prior to a significant commitment of resources to build a ladder or invest in a permanent trap and haul program. A reinitiation trigger is built into this action in the event passage is not deemed feasible, prior to construction of permanent infrastructure;
> >
> > 3) Considering limitations of the overall capacity of CVP/SWP systems of reservoirs in determining feasibility of flow actions below reservoirs, and considering the hydrologic record and CALSIM modeling results (Shasta/Sacramento River, Folsom/American River, New Melones/Stanislaus River).
> >
> > 4) Tiering actions to water year type and/or storage in order to conserve storage at reservoirs and not unduly impact water supplies during drought (e.g., see appendix 5);
> >
> > 5) Providing health and safety [**317] exceptions for export curtailments;
> >
> > 6) Using monitoring for species presence to initiate actions when biologically supported and most needed, in order to limit the duration of export curtailments;
> >
> > 7) Incorporating scientific uncertainty into the design of the action, when appropriate, in order to refine the action over time (e.g., 6-year acoustic tag study for San Joaquin steelhead).

No comments

- n/a -

> 8) Incorporating performance goals into more complex actions (for example, Shasta storage, rearing habitat and San Joaquin acoustic tag study). A performance goal approach will allow for adaptation of the action over time to incorporate the most up-to-date thinking on cost-effective technologies or operations.
>
> 9) Allowing for interim, further constrained, water deliveries to TCCA through modified RBDD operations for 3 years, while an alternative pumping plant is being built.

Id. at 719-20.

NMFS viewed adaptive management as another tool to address feasibility issues:

> The RPA includes collaborative research to enhance scientific understanding of the species and ecosystem, and to adapt actions to new scientific knowledge. This adaptive structure is important, given the long-term nature of the consultation and the [**318] scientific uncertainty inherent in a highly variable system. Monitoring and adaptive management are both built into many of the individual actions and are the subject of an annual program review. This annual program review will provide for additional opportunities to address any unforeseen concerns about RPA feasibility that may arise.

Id. at 720.

Export Plaintiffs do not identify any specific technological feasibility objection [*921] that was not addressed by NMFS's adjustments to the draft RPA. Export Plaintiffs do argue that NMFS ignored "extensive evidence" submitted by DWR about economic feasibility. DWR informed NMFS of its opinion as to the economic impact of the RPA:

> For the 2004 scenario, the NMFS draft RPA would have a net economic impact of about $320 million to $390 million per year while the combined costs of both the USFWS and NMFS opinions would be about $500 million to $670 million per year. For the 2030 scenario, the NMFS draft RPA in the Delta would have a net economic impact of about $320 million to $390 million per year while the combined costs of both the USFWS and NMFS opinions would be about $480 million to $620 million per year.

AR 00113831-32. Export Plaintiffs argue [**319] that according to DWR's figures, the net cost of the NMFS RPA over a 20-year implementation period could exceed $8 billion dollars. Doc. 431 at 115. Based on its own figures, DWR urged NMFS to find that the RPA did not meet the standard for economic feasibility. AR 00113831-32.

Does *section 402.02* contemplate consideration of economic costs to third parties or just to the action agencies? Without any analysis or legal authority, the district court in *Kandra* conluded: "Read in context ... the RPAs must be economically and technically feasible for the government to implement." *Id. at 1207* (emphasis added). The regulation itself does not specify whether feasibility should be limited to the economic impact on the action agencies or on others affected by the agency action. Defendants contend the regulation must be interpreted in a manner that does not violate *Tennessee Valley Auth. v. Hill, 437 U.S. 153, 184, 98 S. Ct. 2279, 57 L. Ed. 2d 117 (1978)*, which concluded that Congress enacted the ESA to "halt and reverse the trend toward species extinction, whatever the cost." (Emphasis added.) This language directs the conclusion that the economic feasibility requirement refers only to the costs to the action agency, requiring analysis of whether [**320] the corrective measures required by an RPA can be implemented from a purely budgetary perspective.

NMFS engaged in such an analysis. Starting with its 330,000 AF water supply impact projection, which has been remanded for other reasons, NMFS examined the impact of water supply reductions on Reclamation and DWRs costs:

> In evaluating economic feasibility, NMFS examined the direct costs of the modified operations to the Federal action agency, Reclamation. According to the [California State Legislative Analyst's Office ("LAO")], 85% of Reclamation's

No comments

- n/a -

costs are reimbursed by water users, and 95% of DWR's SWP costs are reimbursed:

> Irrigation water users pay about 55 percent of CVP reimbursable costs ($1.6 billion), while municipal and industrial water users are responsible for the remaining 45 percent (or about $1.3 billion). These reimbursements are paid through long-term contracts with water agencies. The total capital cost to construct the CVP as of September 30, 2006, is about $3.4 billion. The federal Bureau of Reclamation calculates how much of the capital construction cost is reimbursable from water users. Currently, users pay about 85 percent of total costs. In contrast, more than 95 [**321] percent of SWP's costs are reimbursable from water users. The costs assigned to such CVP purposes as flood control, navigation, and fish and wildlife needs are not reimbursable and are paid by the federal government.

(LAO, 2008) Through this arrangement, costs to the action agency itself are minimized.

[*922] BiOp at 723. NMFS also evaluated direct Project Costs.

> In addition to water costs, Reclamation and DWR will incur project costs associated with certain RPA actions (e.g., the fish passage program). The State of California has authorized $19.6 billion in water-related general obligation bonds since 2000, and these bonds often contain provisions for environmental conservation related purposes (LAO, 2008). Over $3 billion has been spent through the Calfed Bay-Delta Program. The CALFED ROD contains a commitment to fund projects through the Ecosystem Restoration Program. Similarly, the CVPIA AFRP funds eligible restoration projects, using federal authorities. Some of the projects in the RPA may qualify for those sources of funds.

Id. at 723-24.

Even assuming DWR's higher water costs figures (approximately three times NMFS's estimate), no party suggests that the costs to the agency would be prohibitive, [**322] given the reimbursement structure. Export Plaintiffs' motion for summary judgment that NMFS failed to demonstrate economic and technological feasibility is DENIED. Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED. DWR's specific challenge to the feasibility of Action IV.4.2 is addressed separately below.

4. Avoidance Jeopardy and/or Adverse Modification.

Export Plaintiffs incorporate by reference their substantive challenges to the RPA, arguing that for all those reasons, NMFS failed to comply with the fourth requirement of *section 402.02*. Consistent with and incorporating the rulings on the merits of the challenges to RPA Actions IV.2.1, IV.2.3 and IV.3, Export Plaintiffs' motion regarding the fourth *section 402.02* requirement is GRANTED IN PART AND DENIED IN PART and Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED IN PART AND DENIED IN PART. While there is some record support for the general approaches used in these RPA Actions, the specific prescriptions imposed are not sufficiently justified. As a result, NMFS did not reasonably conclude that Actions IV.2.1, IV.2.3 and IV.3 were essential to avoid jeopardy to the continued existence [**323] of the Listed Species and/or destruction or adverse modification of the species' critical habitat.

5. DWR's Feasibility Challenges to Action IV.4.2.

The stated objective of Action IV.4.2, entitled "Skinner Fish Collection Facility Improvements to Reduce Pre-Screen Loss and Improve Screening Efficiency," is to "[i]mplement specific measures to reduce pre-screen loss and improve screening efficiency at state facilities." BiOp at 655. The Action requires DWR to undertake the following actions at the Skinner Fish Collection Facility:

> 1) By December 31, 2012, operate the whole Skinner Fish Protection Facility to

No comments

- n/a -

achieve a minimum 75 percent salvage efficiency for CV salmon, steelhead, and Southern DPS of green sturgeon after fish enter the primary channels in front of the louvers.

2) Immediately commence studies to develop predator control methods for Clifton Court Forebay that will reduce salmon and steelhead pre-screen loss in Clifton Court Forebay to no more than 40 percent.

a) On or before March 31, 2011, improved predator control methods. Full compliance shall be achieved by March 31, 2014. Failure to meet this timeline shall result in the cessation of incidental take exemption at SWP [*923] facilities [**324] unless NMFS agrees to an extended timeline.

b) DWR may petition the Fish and Game Commission to increase bag limits on striped bass caught in Clifton Court Forebay.

3) Remove predators in the secondary channel at least once per week.

Id. at 655-56.

a. Is Action IV.4.2 Inconsistent with Action IV.4.

DWR argues that Action IV.4.2 is arbitrary and capricious because it is inconsistent with Action IV.4 ("Modifications of the Operations and Infrastructure of the CVP and SWP Fish Collection Facilities"), which provides:

Objective: Achieve 75 percent performance goal for whole facility salvage at both state and Federal facilities. Increase the efficiency of the Tracy and Skinner Fish Collection Facilities to improve the overall salvage survival of winter-run, spring-run, CV steelhead, and green sturgeon.

Action: Reclamation and DWR shall each achieve a whole facility salvage efficiency of 75 percent at their respective fish collection facilities. Reclamation and DWR shall implement the following actions to reduce losses associated with the salvage process, including: (1) conduct studies to evaluate current operations and salvage criteria to reduce take associated with salvage, (2) develop new procedures [**325] and modifications to improve the current operations, and (3) implement changes to the physical infrastructure of the facilities where information indicates such changes need to be made. Reclamation shall continue to fund and implement the CVPIA Tracy Fish Facility Program. In addition, Reclamation and DWR shall fund quality control and quality assurance programs, genetic analysis, louver cleaning loss studies, release site studies and predation studies. Funding shall also include new studies to estimate green sturgeon screening efficiency at both facilities and survival through the trucking and handling process.

By January 31 of each year, Reclamation and DWR shall submit to NMFS an annual progress report summarizing progress of the studies, recommendations made and/or implemented, and whole facility salvage efficiency. These reports shall be considered in the Annual Program Review.

Id. at 653-54. DWR suggests that Action IV.4 defines 75% salvage efficiency as a "performance goal," rather than a requirement, and therefore that Action IV.4.2's "requirement" of 75% efficiency is inconsistent with Action IV.4. Action IV.4 does not relegate the 75% target to the status of a "performance [**326] goal." The action sets a requirement for the Bureau and DWR "shall each achieve a whole facility salvage efficiency of 75 percent." *Id.* at 653. There is nothing equivocal about this language and no inconsistency between Actions IV.4 and IV.4.2.

DWR's motion for summary judgment that Action IV.4.2 is unlawful because it is inconsistent with IV.4 is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

No comments

- n/a -

b. DWR's Argument that the Record Does not Support the Conclusion that Action IV.4.2 (Subpart(1)) is Economically and Technologically Feasible.

DWR next complains that the record does not support the conclusion that the first subpart of Action IV.4.2, which requires 75% salvage efficiency at the Skinner Fish Facility for Chinook salmon, CV steelhead, and Southern DPS of green sturgeon by December 31, 2012, is technologically or economically feasible. DWR maintains that NMFS arbitrarily took the "goal" of Action IV.4, namely achieving a [*924] 75% salvage efficiency for the Skinner Fish Facility, turned it into an "action," and "slapped a date for compliance on the goal." Doc. 446-1. DWR's first premise -- that the 75% efficiency target in Action IV.4.2 is a "goal" - is [**327] mistaken. Nor is it inherently illogical for NMFS to impose a compliance deadline for the 75% target. DWR has been studying salvage efficiency and ways to improve the salvage process for many years, *see, e.g.*, AR 00109712-31, and NMFS was warned by a Reclamation biologist with experience working with individuals at the facility that without a deadline, improvements might never take place, AR 00105052. The deadline of December 31, 2012 provided DWR with approximately three and a half years from the adoption of the BiOp in June 2009. DWR has not demonstrated that imposing this deadline was irrational or arbitrary.

DWR next argues that the record does not support the conclusion that the standard of 75% efficiency at the Skinner Fish Facility is technologically or economically feasible. DWR points to its assertion in a March 20, 2009 letter to NMFS that it might not be possible to meet the December 31, 2012 deadline.

> Part 1 of this action is infeasible because it requires DWR to operate Skinner Fish Protection Facility to achieve a minimum 75% salvage efficiency for salmonids and green sturgeon by December 31, 2012. While DWR can strive to achieve this rate of success by that date, there [**328] is uncertainty that it can occur within that timeframe. To incrementally improve the salvage efficiency within Skinner Fish Protection Facility will require the efficiency of each component to be determined and a strategy developed to identify the most effective improvements to be made. Testing within a hydraulic lab may be required to evaluate the improvements of potential structural changes within the facility. In addition, making the actual modifications will take time. It is quite likely that these efforts will extend past the required implementation date. We recommend that a process involving the annual progress reports required by January 31 st be incorporated into this action. The process would involve the review of the annual status report by DWR and NMFS to determine if satisfactory progress is being made toward meeting the salvage requirement and, if it is determined that satisfactory progress is being made but the deadline of December 31,2012 will not be met, NMFS will adjust the deadline accordingly.

AR 00078204. That DWR's expressed "uncertainty" to NMFS that it could not meet the higher target by the end of 2010 does not mean the action is "infeasible." One and one-half [**329] years remain to perform.

DWR also maintains that NMFS had information indicating that DWR could not even complete the necessary studies on the current facilities' efficiency by the deadline. Steelhead studies had been ongoing since 2005, AR 00003660, 3642, 4105, 4128-29. DWR maintains that "[t]here are no similar studies as to sturgeon and salmon and "[f]rom the steelhead facility study, NMFS was aware that a study on facility efficiency would take at least three years to perform." However, DWR provides no record citation to support this three-year timeframe. To the contrary, the methods described in a 2008 technical study plan for the Tracy Fish Facility suggest that the actual experiments would be run over a period of only several months. AR 00078557, 00078563 (explaining that efficiency experiments for fiscal year 2009 will be "completed during the months of March-June," with results available by August 2010).

[*925] DWR next argues "the standard for efficiency imposed by NMFS seems to have changed from 90%, to 80%, to 75%" without explanation as to whether one or any of the standards was economically or technologically feasible. Doc. 446-1 at 6. Federal Defendants emphasize that a study [**330] cited by DWR found that the Skinner Fish Collection Facility is already operating at an estimated 74% efficiency for steelhead. AR 00113798 (cited in BiOp at 346). Federal Defendants further explain the reasoning behind the 75% efficiency standard:

> ... NMFS's decision to require this efficiency rate was based on numerous studies and NMFS's own technical experience working with both the state and federal facilities over the last 20 years. In choos-

No comments

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ing the 75% salvage efficiency at the Skinner Fish Facility, NMFS considered, among other things: (i) the fish facilities' original design, which was 90-95% efficiency based on juvenile striped bass similar in size to Chinook salmon smolts; (ii) historical efficiency testing performed by the California Department of Fish and Game; (iii) and current efficiency estimates performed by DWR, which is 74% ± 7%. NMFS 00113798.

NMFS considered whether the original 90-95% design efficiency could be met at the facilities. However, over the years the efficiency of both the State and the Federal facility has varied due a variety of problems in the southern Delta, including, among other things, surface water levels, aquatic weeds, corrosion, introduced species [**331] like the mitten crab, and infrastructure age. NMFS 50871-73; NMFS 112963 (DWR noting similar "challenges"). Thus, given these changes in Delta conditions, NMFS concluded it would be unreasonable to assume the original 90-95% design efficiency could be met.

To determine a reasonable efficiency rate, NMFS also reviewed the history of the facilities and consulted with the Denver Technical Center. Contrary to DWR's claim that "facility efficiency is currently unknown," DWR Br. at 6, there have been a number of studies to determine the what that efficiency rate is in order to mitigate for the loss of striped bass and Chinook salmon (i.e., mitigation requirements established in the 1986 4-Pumps Agreement between DFG and DWR). A study conducted by DFG and DWR in 1994 based on 13 years of data established methods and a process for DWR to use to calculate the facility efficiency at each one of its four bays. NMFS 109712-731 (Brown *et al.* 1996). A review of the salmon losses related to the CVP and SWP export pumping in that study found that facility efficiency ranged from 70 - 85% at the primary louvers, and 70 - 95% at the secondary louvers for the Skinner Fish Facility. NMFS 109712-731 (Brown [**332] *et al.* 1996). NMFS's 75% criteria is within the established range and conservatively lower than the average efficiency as stated in previous studies. Similarly, the first biological opinion on winter-run Chinook salmon assumed 75% salvage efficiency in calculating the loss at Skinner Fish Facility. NMFS 127399-454 (NMFS 1992).

Moreover, the current Skinner Fish Facility efficiency, which is calculated on a daily basis by DFG in order to estimate the loss at facility, uses a efficiency rate for the louvers is 0.630 for fish < 101 mm and 0.568 for fish 100 mm, plus the primary channel flow divided by the primary channel volume. Overall, calculated louver efficiencies are typically in the range of 70-80% for most salmon that enter the facility. *See e.g.*, NMFS 109725-26 (estimating "70 and 85 percent" at primary louvers and "70 to 95 percent" at secondary louvers, and noting CDFG "combined the data to obtain [*926] an overall ... screen efficiency ... calculated as 0.630 for fish < 101 mm, and 0.568 for fish 100 mm, divided by an approach velocity"). Critically, DWR's own brief states that the Skinner Fish Facility efficiency "was estimated to be 74% +- 7%" in a 2008 DWR study, DWR Br. at 6, which [**333] meets the criteria set forth in the BiOp. NMFS 113798. Thus, it is possible that no further action may be necessary, except to initiate a study to determine efficiency for green sturgeon through the facility.

Doc. 477 at 104-106.

DWR argues that Brown, *et al.* (1996) is based upon obsolete data collected at the louvers approximately 40 years ago, in 1970 and 1971. AR 00109725. The Brown study recognized that changes to the Skinner Fish Facility had been made between the time the data was collected and the article's publication. AR 00109728. Therefore, DWR argues that the data relied upon in Brown, *et al.* (1996) does not reflect the current or potential efficiency at the Skinner Fish Facility. Doc. 495 at 10. Nor does the data reflect the entire process by which DWR protects fish at Skinner, which involves handling, trucking, and releasing entrained fish. The focus of Action 4.2.1(1) is the overall efficiency of the Skinner Facility, not just the louver facility. *Id.*

Federal Defendants do not respond to these critiques of the obviously outdated Brown (1996) study, but instead focus on the fact that DWR's own 2007 study predicted that efficiency at the entire Skinner Facility was

No comments

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estimated [**334] to be "74 ± 5% (mean ±95% Confidence Interval) for the 2007 study period. AR 00113798. DWR objects that "even this data does not support Federal Defendants' conclusion that an improvement of 1% to 75% overall efficiency standard for operating the Skinner Fish Facility as to Chinook salmon, steelhead trout, and green sturgeon, is economically and technologically feasible by the date imposed under the BiOp." Doc. 495 at 10-11. Based on the information before NMFS, was it unreasonable to conclude that a 1% improvement was technologically or economically feasible? NMFS justifies its conclusion on the ground that DWR "did not say it could not possibly reach a one percent higher efficiency target by 2012." Doc. 477-1 at 107 (emphasis added). Rather, DWR's comment letter stated that DWR had "uncertainty" as to whether the efficiency improvements were feasible.

To uphold an agency's decision, its rationale must "reasonably be discerned," from the record. *See Modesto Irr. Dist., 619 F.3d at 1035*. Here, NMFS has failed to cite any record evidence indicating that the efficiency improvement, albeit a minor one, is economically or technologically feasible. DWR's own 2007 study indicates the efficiency [**335] is close to the target, from which it could be inferred that the technological changes may be possible, but the record lacks affirmative support for a finding of feasibility.

DWR's motion for summary judgment that the record lacks support for a finding that Action IV.4.2(1) is feasible is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

c. DWR's Argument that the Record Does not Support the Conclusion that Action IV.4.2 (Subpart(2)) is Economically and Technologically Feasible

DWR maintains that the record does not support NMFS's economic and feasibility determination as to subpart 2 of Action IV.4.2, which requires reduction of predation at Clifton Court Forebay to 40% by March 31, 2014.

There is undisputed record evidence that at DWR's facility, most loss of fish occurs in the Clifton Court Forebay. AR 00117410-441 (Gingras 1997). DWR concedes [*927] that pre-screen loss at the Forebay is estimated at between 63 and 99% for juvenile Chinook salmon. Doc. 446-1 at 7 (citing BiOp at 348 and AR 00106736).

It is also undisputed that reducing predation would improve survival across the Forebay. *See* AR 00113817 (DWR (2008)). However, DWR argues that the record does [**336] not support Action IV.4.2(2)'s imposition of the specific requirement that DWR reduce "predation" in the Forebay to 40%. In support of Action IV.4.2(d), NMFS cites a 2008 DWR study that in turn cites a 1952 study by Ricker. Doc. 477-1 (citing AR 113817). Ricker concluded that when survival rates are below 25%, a reduction of predator numbers to below 50% can double the survival rate of the prey. But, DWR points out that Ricker's finding that predator numbers should be reduced to below 50% is distinct from whether predation should be reduced to below 50%. [31] In response, Federal Defendants disclaim reliance on Ricker, asserting that NMFS considered DWR (2008) as support for the proposition that predator removal is a method of reducing pre-screen loss. Doc. 515 at 44. Rather than rely directly on Ricker's work, NMFS "reasoned by simple math that if predation was reduced by half to no more than 40%, giving 60% survival rather than 20-25% survival, overall survival through the Skinner Facility would reach approximately 39%, roughly equivalent to the current CVP survival efficiency." *Id.* Federal Defendants provide no record citation related to this imprecise guestimate.

31 DWR points out [**337] that, in response to DWR's motion to admit expert testimony, Federal Defendants made a judicial admission that they would not rely on Ricker's 1952 study or the statement that when survival is below 25%, a reduction of predator numbers to below 50% can double survival. *See* Doc. No. 464; Draft Tr. 7/19/10 at 61-67. Relying on that admission, the Court concluded expert testimony was not needed to explain application of the Ricker study. Doc. 464 at 1-2. DWR now asserts that it is prejudiced by Federal Defendants reliance on a passage that discusses Ricker because DWR "does not have an expert to explain DWR (2008) and the Ricker equation. However, DWR successfully explains the Ricker study and NMFS's use of it. *See* Doc. 495 at 4-5. Expert clarification is unnecessary. Nonetheless, Federal Defendants are precluded from using the 1952 Ricker study after they said they would not.

Even if the 40% target is scientifically justified, whether predation in the Forebay is a problem and/or whether a reduction to 40% is a reasonable goal is an entirely different inquiry from whether reducing predation to 40% is feasible. NMFS mentions numerous examples of methods of reducing predators on juvenile [**338] salmon and steelhead, but nothing in the record indicates whether the 40% target can be met, or whether it could be met by the deadline imposed by the BiOp. [32] It cannot be determined from the existing record whether NMFS's feasibility determinations are supportable. There is no explanation.

32 While Action IV.4.2(2) provides that NMFS may agree to an extended timeline, the Action

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provides no basis for determination of whether an extension should be given.

DWR's motion for summary judgment that the record lacks support for a finding that Action IV.4.2(2) is feasible is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

d. DWR's Argument that Action IV.4.2 is Arbitrary and Capricious Because it Fails to Explain How the Action Will Avoid Jeopardy and/or Adverse Modification.

DWR also argues that the record does not support NMFS's finding that Action IV.4.2 is essential to avoid jeopardy and/or adverse modification. There is record evidence to support NMFS's findings that [*928] prescreen loss and loss due to salvage are significant and that reducing these sources of loss will improve survival. However, the record does not explain why increasing the existing salvage [**339] efficiency by 1% and/or reducing predation to 40% "is essential to avoid jeopardy and/or adverse modification." ESA Handbook at 4-43 (requiring a "thorough explanation of how each component of the [RPA] is essential to avoid jeopardy and/or adverse modification"). The RPA is not lawful without the required through explanation, which shall be provided on remand.

VI. STANISLAUS RIVER PLAINTIFFS' CLAIMS.

A. Relevant Factual Background.

1. The New Melones Project.

The New Melones Project was approved as the last unit of the CVP in 1962. Pub. L. No. 87-874, 76 Stat. 1173, 1191-92 (1962). The New Melones Project includes a dam and 2.4 million acre-foot reservoir on the Stanislaus River. USBR AR 007570. The New Melones Reservoir is "operated primarily for purposes of water supply, flood control, power generation, fishery enhancement, and water quality improvements in the lower San Joaquin River. The reservoir and river also provide recreation benefits." *Id.* The United States holds appropriative water rights issued by the SWRCB for the New Melones Project, conditioned by Water Rights Decisions 1422, 1616 and Revised Decision 1641 ("D-1641"). *See generally* USBR AR 007571-73.

2. The Stanislaus River [**340] Plaintiffs.

Plaintiffs Oakdale Irrigation District ("OID"), and South San Joaquin Irrigation District ("SSJID") hold pre-1914 water rights to Stanislaus River water. OID and SSJD receive water from New Melones under a 1988 Agreement with the United States designed to fulfill their prior rights. USBR AR 007571-72; USBR AR 011751. That agreement requires Reclamation to provide to OID and SSJID:

> o The inflow into New Melones plus the amount derived by the formula of (600,000 minus inflow) divided by 3, not to exceed 600,000 AF per year, USBR AR 011751; and
>
> o The right to conserve up to 200,000 AF in New Melones, USBR AR 011752.

Plaintiff Stockton East Water District ("SEWD") is one of only two "Eastside Contractors" that receive a CVP supply from New Melones pursuant to Reclamation water service contracts. SWED's contract provides for up to 75,000 AF of water annually. *See* USBR AR 011728-29. (Collectively, these three plaintiffs are referred to as the "Stanislaus River Plaintiffs" or "SR Plaintiffs.")

3. The Status of Steelhead in the Stanislaus River.

The OCAP BA summarizes the history and status of Steelhead in the Stanislaus River:

> Historically, steelhead distribution extended into the headwaters [**341] of the Stanislaus River (Yoshiyama *et al.* 1996). Dam construction and water diversion for mining and irrigation purposes began during and after the Gold rush. Goodwin Dam, constructed in 1913, was probably the first permanent barrier to significantly affect Chinook salmon access to upstream habitat. Goodwin Dam had a fishway, but Chinook could seldom pass it. Steelhead may have been similarly affected. The original Melones Dam, completed in 1926, permanently prevented access to upstream areas for all salmonids. Currently, steelhead can ascend over 58 miles up the Stanislaus River to the base of Goodwin Dam. Al [*929] though steelhead spawning locations are unknown in the Stanislaus, most are thought to occur upstream of the City of Oakdale where gradients are slightly higher and more riffle habitat is available.
>
> The Fishery Foundation of California (Kennedy and Cannon 2002) has monitored habitat use by juvenile steelhead/rainbow since 2000 by snorkeling seven sites from Oakdale to Goodwin Dam every other week. Steelhead fry be-

No comments

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gin to show up in late March and April at upstream sites, with densities increasing into June and distribution becoming more even between upstream and downstream sites [**342] through July. Beginning in August and continuing through the winter months, densities appeared highest at upstream sites (Goodwin to Knights Ferry). Age 1-plus fish were observed throughout the year with densities generally higher at upstream sites (Goodwin to Knights Ferry). Low densities were observed from late December until April. It is unknown whether fish left the system in December or if, with the cooler winter water temperatures, they were less active and more concealed during the day.

Since 1993, catches of juvenile steelhead/rainbow in rotary screw traps (RSTs) indicate a small portion of the Stanislaus River steelhead/rainbow population displays downstream migratory characteristics at a time that is typical of steelhead migrants elsewhere. The capture of these fish in downstream migrant traps and the advanced smolting characteristics exhibited by many of the fish indicate that some steelhead/rainbow juveniles might migrate to the ocean in spring. However, it is not known whether the parents of these fish were anadromous or fluvial (they migrate within freshwater). Resident populations of steelhead/rainbow in large streams are typically fluvial and migratory juveniles look [**343] much like smolts. Further work is needed to determine the parental life histories that are producing migratory juveniles. The Stanislaus River Weir has been installed annually since 2003 at RM 31.4. The primary purpose of the weir[] is to monitor escapement of fall-run Chinook salmon, so it is installed from September through June each year. Fish passing the weir are monitored using a Vaki infrared RiverWatcher Fish Counter. From 2003 through 2007, O. mykiss have been observed passing the weir a total of 16 times. Scale analysis of one individual indicated that it was a steelhead.

Smolts have been captured each year since 1995 in RSTs at Caswell State Park and at Oakdale (Demko *et al.* 2000). Captures occurred throughout the time the traps were run, generally January through June. Most fish were between 175 and 300 mm at the Caswell site, with only six fish in seven years less than 100 mm. Larger numbers of fry were captured upstream at Oakdale. During 2001, 33 smolts were captured at Caswell and 55 were captured at Oakdale, the highest catch of all years. Although improved traps were used, the higher catch in 2001, was likely due to more fish present and not due to better trap efficiencies [**344] (Doug Demko, personal communication, 2001). RSTs are generally not considered efficient at catching fish as large as steelhead smolts and the number captured is too small to estimate capture efficiency so no steelhead smolt outmigration population estimated has been calculated.

USBR AR 007670-71.

The BiOp describes the impacts of proposed operation of New Melones on survival of CV steelhead and its critical habitat, [*930] BiOp at 296-313, and imposes a number of RPAs that affect the New Melones Unit.

o Action III.1. - Establishes a real-time operational decisionmaking team, the Stanislaus Operations Group ("SOG"), to "provide direction and oversight to ensure that the East Side Division actions are implemented, monitored for effectiveness and evaluated." *Id.* at 620.

o Action III.1.2 - Requires Reclamation to make releases from New Melones to achieve specified water temperatures at two locations downstream of Goodwin Dam. Temperature compliance is to be measured on a seven-day average daily maximum temperature. *Id.* at 620-22.

o Action II.1.3 - Requires Reclamation to release water pursuant to a year-round minimum flow schedule, dependent on hydrologic year time, to "optimize CV steelhead habitat [**345] for all life history stages and to incorporate habitat maintaining geomorphic flows in a flow pattern that will provide migratory cues to smolts and facilitate out-migrant smolt movement on [the] declining limb of [the] pulse." *Id.* at 622; BiOp App. 2-E.

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o Action III.2.1 - Calls for the addition of 50,000 cubic yards of gravel to improve spawning habitat by 2014, and 8,000 cubic yards per year for the duration of the Project Actions. BiOp at 626-27.

o Action III.2.2 - Requires Reclamation, with advice from SOG, to develop an operational strategy to achieve floodplain inundation flows that inundate CV steelhead juvenile rearing habitat on a one- to three-year return schedule. A proposed plan shall be submitted by June 2011. If NMFS approves the plan, Reclamation will begin to implement it in 2012. *Id.* at 627.

o Action III.2.3 - Requires Reclamation, in cooperation with SOG, to develop a list of projects to improve the habitat values of freshwater migratory habitat in the Stanislaus River. *Id.* at 627-28.

o Action III.2.4 - Requires an evaluation of options to enable steelhead to pass New Melones, Goodwin, and Tulloch dams in order to access their historic habitat. A report detailing options [**346] is to be prepared by December 13, 2016. *Id.* at 628.

o Action IV.2.1 - This Delta action, a part of which is discussed above, requires Reclamation to release water from New Melones, in addition to the minimum flow schedule set forth in Appendix 2-E, to meet certain flow requirements at Vernalis. This requirement is valid through 2011. At that time, it is anticipated that the SWRCB will establish minimum flows for the San Joaquin River. BiOp at 642-43. There is no information about such minimum flows or whether they have been established. SR Plaintiffs raise a number of challenges to the treatment of New Melones in the BiOp, its effects analysis, and RPAs related to New Melones. [33]

33 SR Plaintiffs' motion suffers from a lack of internal organization, repeatedly shifting back and forth between challenges to the effects analysis and challenges to the RPA, making evaluation of the merits of their arguments unnecessarily time consuming and difficult.

B. Inclusion of the New Melones Unit in the Proposed Action Subject to Consultation.

SR Plaintiffs challenge NMFS's decision to include the New Melones Unit in the action subject to consultation. The ESA's consultation requirement applies to "agency [**347] actions." *See 16 U.S.C. 1536(a)(2).* The ESA implementing regulations define "action" to mean "all activities [*931] or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." *50 C.F.R. § 402.02.* No regulation defines the scope of the action to be considered. The question is whether NMFS's definition of the scope of the action is reasonable in light of the record. *See PCFFA, 426 F.3d at 1090* ("Even when an agency explains its decision with less than ideal clarity, a reviewing court will not upset the decision on that account if the agency's path may reasonably be discerned.").

SR Plaintiffs make two attacks on NMFS's decision to include New Melones in the Project Description. They first argue that the touchstone of inclusion in the action appears to be "coordination" of the Unit in question with Project operations. For example, the SWP is included in the action because its operations are closely coordinated with those of the CVP through the Coordinated Operating Agreement. BiOp at 31; USBR AR 007495 (BA 1-4) ("SWP operations are coordinated with CVP operations and, as such, are consulted on as part of the [**348] proposed action described in the BA."). In contrast, the Friant Unit was deliberately excluded from the action because it operates separately from the rest of the CVP and is not integrated into the CVP OCAP." BiOp App. 1 at 79. SR Plaintiffs argue that while "New Melones is an element of the CVP, it is also clear that operation of New Melones is not coordinated with the operation of the rest of the CVP and/or SWP." Doc. 454 at 37. This assertion is belied by the record. Stanislaus Plaintiffs admit that New Melones is one of the major reservoirs in the CVP system and releases from it are needed to meet non-consumptive downstream purposes, such as water quality and the preservation and enhancement of fish and wildlife in both the Stanislaus and San Joaquin rivers. *Id.* at 37-38; *see also* Sixth Milligan Decl., Doc. 517 at ¶ 10 (explaining that "[r]eleases from New Melones down the Stanislaus River affect Reclamation's ability to comply with Vernalis flow and water quality requirements.").

SR Plaintiffs also argue that inclusion of New Melones in the action subject to consultation will lead to "absurd results" because the Incidental Take Statement provides that the RPAs must be implemented [**349] as a whole and if Reclamation and/or DWR fail to comply with the terms of the ITS, they may no longer comply with the ESA. *See* BiOp at 728. SR Plaintiffs maintain

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that this is "absurd given the lack of coordination" between New Melones and other operations of the CVP and SWP. Doc. 454 at 38. "Simply put, what happens on the Sacramento River as a result of actions taken by the CVP and/or SWP has nothing to do with the listed species contained in the Stanislaus River, and vice-versa." *Id.* This statement is incorrect. Mr. Milligan opines: "during balanced conditions, releases from New Melones down the Stanislaus River affect overall Delta conditions, which potentially play a role in determining how Reclamation operates the rest of the CVP.... Therefore [Reclamation] typically coordinate[s] operations of the various Delta facilities and CVP reservoirs, including New Melones Reservoir ... with DWR in its operation of the SWP, on a daily basis." Sixth Milligan Decl., Doc. 517 at ¶ 10. SR Plaintiffs have presented no contrary evidence.

SR Plaintiffs' motion for summary judgment that Federal Defendants erred by including New Melones in its coordinated Project description is DENIED. Federal [**350] Defendants' and Defendant-Intervenors' cross motions are GRANTED.

C. Effects Analysis Challenges.

1. New Melones Operations v. Baseline Effects.

SR Plaintiffs argue that the BiOp is unlawful because NMFS improperly [*932] identified as "effects of the action," effects caused by the existence of New Melones Dam. Doc. 454 at 18-21. Specifically, SR Plaintiffs point to the BiOp's conclusions that the action (1) altered flows, which impact habitat conditions and survival at various life history stages, and (2) modified the hydrograph to dampen peak flood flows, mute flow variability, and reduce or eliminate channel forming flows. *Id.* at 19. SR Plaintiffs maintain that "[t]hese are effects associated with the fact that the dam exists, rather than effects associated with the operational plan." *Id.* at 20. SR Plaintiffs' seminal argument is that NMFS has "failed to identify with any clarity how continued operations, as opposed to the basic existence of the dam itself, cause any additional incremental harm to steelhead, deepen their jeopardy, or otherwise 'tip' them into extinction." Doc. 454 at 20.

The record does explain how continued operations will cause additional incremental harm. The BiOp compares [**351] effects of the action both to pre-dam "unimpeded" conditions and to the "future baseline" which includes the existence of the dams:

> The future baseline of the existing dams prevents access to historical habitat, but the proposed operations of the dams control the quality and quantity of available alternative habitat below Goodwin Dam and the suitability of the physical conditions to support CV steelhead at various life history stages. Survival of CV steelhead may be affected by operations of the East Side Division in the following ways:
>
> o Operational releases control extent of cool water habitat available below Goodwin Dam.
>
> o Operational release levels control the quantity and functionality of instream habitat for spawning, egg incubation, juvenile rearing and smoltification.
>
> o Operational releases are typically lower than unimpaired flows, requiring smolting juveniles to expend more energy to outmigrate and lower stream velocities increase the exposure of juveniles and smolts to predation.
>
> ***
>
> The proposed New Melones operations will create an altered hydrograph as compared to the unimpaired flows and as compared to the future baseline. The dampening of flood events and freshets eliminates [**352] the geomorphic processes that are important to CV steelhead to replenish and rejuvenate spawning riffles and to inundate floodplain terraces to provide nutrients and rearing habitat for juvenile salmonids. The Corps has limited controlled flood releases from New Melones Dam to 8,000 cfs. The dampening of flood events also eliminates or reduces the intensity and duration of freshets and storm flows that would otherwise convey smolting CV steelhead to the ocean and create a clear signature for the river. A more moderated hydrograph has eliminated periodic channel forming flows. The dams (a future baseline condition) capture sediment that would otherwise be transported downstream for geomorphic

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> processes. Operations of the dams result in channel incision that further reduces the chance of inundated floodplain habitat and degrades spawning habitat quality. Releases from New Melones can affect downstream temperatures at critical times to affect adult migration, spawning, egg incubation success, juvenile survival and anadromy. Predicted increases in temperature as a result of climate change will affect instream water temperatures directly, and will affect New Melones operations as more precipitation [**353] will fall as rain, rather than snow, and as storm event intensity is expected to increase. Climate [*933] change may affect the types and cover rates of vegetation upslope of the river, potentially increasing the rate of fine sediment transport to the river and to spawning areas. Future baseline stressors that are exacerbated by the proposed East Side Division operations include increased vulnerability to non-native fish predators owing to flow velocities and downstream temperatures conducive to these species and competition from resident O. mykiss, which may be more abundant as a result of less variability in instream conditions.

BiOp at 300-301 (emphasis added). The subsequent pages provide more specific support for these conclusions. *Id.* at 302-309.

SR Plaintiffs specifically challenge only one aspect of this analysis; NMFS's reliance on a 2001 Kondolf, *et al.* study to support the assertion that available steelhead spawning gravel habitat decreased 40% since 1994. BiOp at 308. Kondolf, et al. (2001) concluded that spawning gravel habitat decreased 40% between 1972 and 1993, and thereafter decreased by a smaller percentage, within the study's margin of error, between 1993 and 2000, excluding [**354] gravel augmentation efforts. The significance of this minor error to SR Plaintiffs' argument is unclear. The BiOp does not specifically attribute this 40% loss to Project operations. Rather, later in the same paragraph, NMFS explains with specificity the ongoing impact of dam operations:

> Operational criteria have resulted in channel incision of 1-3 feet since the construction and operation of New Melones Reservoir (Kondolf *et al.* 2001). This downcutting, combined with operational criteria, have effectively cut off overbank flows which would have inundated floodplain rearing habitat, as well as providing areas for fine sediment deposition, rather than within spawning gravels, as occurs now. Additionally, the flow reductions in late spring and early summer are too rapid to allow recruitment of large riparian trees such as Fremont cottonwoods. Consequently, within 10 to 20 years as existing trees scenesce and fall, there will be no younger riparian trees to replace them, resulting in less riparian shading, higher instream temperatures, less food production from allochtonous sources, and less LWD for nutrients and channel complexity[.]

BiOp at 308.

SR Plaintiffs do not dispute the science [**355] underlying this conclusion, nor do they suggest that the impacts of operations, per se, are *de minimis*. Rather, they argue that the real issue is whether the amount of New Melones water within Reclamation's discretion is significant enough to cause appreciable harm to CV Steelhead and/or appreciable diminishment of its critical habitat. *See* Doc. 492 at 4-6. The median historical unimpaired runoff in the Stanislaus River Basin is 1.1 million acre feet per year ("MAFY"). BiOp App. 1 at 69. OID and SSJID are legally entitled to the first 600,000 AF. USBR AR 011751-53. In addition, Reclamation must release between 98,300 and 302,000 AF for fish pursuant to its agreement with CDFG. BiOP App. 1 at 71. Additional releases may be required to meet dissolved oxygen criteria and D-1641. BiOp App. 1 at 72-73, 76-77. [34]

> 34 SR Plaintiffs mention further legal constraints on the Bureau's use of water set forth in the September 30, 2009 Federal Circuit Ruling, *Stockton E. Water Dist. v. United States, 583 F.3d 1344 (Fed. Cir. 2009)*, which post-dates the June 4, 2009 issuance of the BiOp by several months. *See* Doc. 492 at 6 (discussing holding that Reclamation does not have discretion to breach SEWD [**356] CVP contract to comply with the ESA). Those subsequent constraints and their future effects do not apply to the reasonableness of the BiOp when issued.

[*934] Federal Defendants concede that these mandatory delivery requirements do exist, but emphasize that Reclamation nonetheless possesses discretion over how those releases are made. *See* Doc. 515 at 49. For example, while OID and SSJID have an entitlement to 600,000 AF, past water use data demonstrates that this

No comments

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full amount is not always requested, which in turn changes the amount of water available for other beneficial uses. *See* Hilts Decl., Doc. 480, Ex. 1 (showing that during the 1987-1992 drought, OID and SSJID never requested full allocation). In addition, Reclamation has the ability to request temporary exemptions from SWRCB conditions such as for dissolved oxygen and Vernalis flow objectives when warranted, and assumptions to reflect this option were inserted into the CalSim II modeling for the Stanislaus River. Fifth Milligan Decl., Doc. 479 at ¶¶ 7-8; Hilts Decl., Doc. 480 at ¶ 12. Defendants do not suggest these are not *Home Buidlers* non-discretionary obligations on Reclamation.

SR Plaintiffs argue that NMFS must independently demonstrate [**357] that discretionary operations alone satisfy the jeopardy/adverse modification standard. This contention was rejected above. The ESA does not require the agency to segregate discretionary from non-discretionary impacts for the purposes of the effects analysis. (Whether an agency can implement an RPA within its legal authority if an insufficient amount of discretionary water is available is a different question.) Given that there is some discretionary water in the New Melones system and that Reclamation authority over how make discretionary deliveries, is there enough discretionary project water to cause appreciable harm to the species?

The BiOp identifies several negative impacts caused by Project operations, including increasing the likelihood that CV Steelhead will be exposed to unfavorable temperatures at various life stages and, by lowering instream flows, the amount of energy juveniles and smolts must expend to avoid predation is increased. BiOp at 301. SR Plaintiffs do not challenge these underlying findings. The BiOp does not have to demonstrate that these negative effects, alone, satisfy the jeopardy standard by "reduc[ing] appreciably the likelihood of both the survival and [**358] recovery of [the] listed species in the wild by reducing the reproduction, numbers, or distribution of that species." Rather, the jeopardy analysis must determine the overall impact on the species of the entire project, not just the New Melones unit. *See 50 C.F.R. § 402.14* (NMFS's obligation during formal consultation is to determine "whether the action, taken together with cumulative effects, is likely to jeopardize the continued existence of the listed species or result in the destruction or adverse modification of critical habitat").

SR Plaintiffs' motion for summary judgment that the BiOp's effects analysis is unlawful because it does not properly distinguish between baseline effects and effects of the action is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED on this issue.

2. Challenge to Critical Habitat Adverse Modification Finding.

SR Plaintiffs complain that NMFS has not specifically identified ow the proposed action will cause "adverse modification" to the steelhead's critical habitat. Doc. 492 at 7-9. [35]

35 Defendant-Intervenors and Federal Defendants suggest that SR Plaintiffs' opening brief failed to challenge NMFS's determination that the actin [**359] would adversely modify CV steelhead critical habitat. Doc. 484 at 88 & Doc. 515 at 53. However, although the critical habitat analysis was not a direct subject of discussion in SR Plaintiffs' opening brief, that brief did directly challenge the effects analysis regarding the Stanislaus River, which includes both effects on the species and critical habitat. Defendant-Intervenors' discussion of critical habitat as an alternative justification for the RPAs, Doc. 484 at 82-85, invites SR Plaintiffs' discussing critical habitat in reply.

[*935] a. Spawnable Area.

SR Plaintiffs first challenge aspects of the BiOp's treatment of the "spawnable area" aspect of CV Steelhead critical habitat. Doc. 492 at 8. The BiOp found that steelhead spawning habitat would be "maximized" if instream flows were maintained at 200 cfs. However, operations for the protection of fall-run Chinook require higher flow rates may "conflict" with the needs of steelhead. BiOp at 311. SR Plaintiffs argue that habitat "maximization" is not a requirement of the ESA and is not relevant to the effects analysis. Doc. 492 at 8. NMFS does not explain why it set the benchmark for evaluating project impacts at the spawning habitat "maximum." [**360] To ascertain whether project operations will impact the likelihood of CV steelhead survival and recovery, the more appropriate benchmark is that amount of habitat that is "essential" for survival and recovery. The BiOp does not identify the extent of this "essential" habitat or how it relates to the "maximum" habitat. The use of the "maximum" habitat benchmark necessarily resulted in a finding of adverse modification to this aspect of CV habitat. That finding is not justified.

SR Plaintiffs motion for summary judgment that the record does not support NMFS's findings regarding spawnable area is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

b. Spawning Gravel Quality and Quantity.

No comments

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SR Plaintiffs dispute the BiOp's findings related to "Spawning Gravel Quality and Quantity." The entire section on this topic provides:

> Pebble counts and sediment size analysis of spawning areas has shown an increase in sand and fine material in spawning beds since construction of New Melones Dam (Kondolf *et al.* 2001, Mesick 2001). Most non-enhanced riffles had sufficient fine material to impair egg incubation and survival.
>
> Gravel replenishment actions below Goodwin Dam add suitably-sized [**361] gravel for CV steelhead spawning, but it is rapidly mobilized at flows as low as 280 cfs (Kondolf *et al.* 2001). CVPIA spawning gravel additions have targeted 3,000 cubic yards per year. This is not of sufficient volume to offset the deficits created by the loss of recruitment from upstream sources (over 1 million cubic yards, Kondolf *et al.* 2001). At best, these additions may strategically maintain the quality of few spawning riffles. The project description does not specify a level of spawning gravel addition to be performed on the Stanislaus River.

BiOp at 311. SR Plaintiffs contest the BiOp's reliance on the 2001 Kondolf, *et al.* study to find that an increase in fine material in spawning beds since the construction of New Melones impairs egg incubation and survival. *Id.* at 311. Federal Defendants acknowledge that the loss of gravel recruitment from upstream sources is not the result of the proposed action. *See* Doc. 515 at 51. However, Federal Defendants argue that "continuing discretionary flow releases eliminates the variability which replenishes spawning riffles," *id.*, citing page 301 of the BiOp, which discusses how "[t]he dampening of flood events and freshets eliminates the [**362] geomorphic processes that are important to CV steelhead to replenish and rejuvenate [*936] spawning riffles and to inundate floodplain terraces to provide nutrients and rearing habitat for juvenile salmonids." Page 301 includes this finding, but the section of the BiOp challenged by SR Plaintiffs, at page 311, specifically discusses gravel recruitment (i.e. the volumes of gravel present), not "riffle rejuvenation." There is no record evidence that loss of gravel recruitment is an effect of the action. This effect is completely without support and the purported impact of any changed analysis on the overall critical habitat discussion must be addressed by NFMS on remand.

SR Plaintiffs motion for summary judgment that the record does not support NMFS's finding that New Melones operations effect gravel recruitment is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED on this issue.

c. Challenge to Temperature Requirements for Spawning Habitat.

SR Plaintiffs also purport to challenge the BiOp's finding regarding "degradation of rearing habitat conditions," but actually advance arguments about temperature requirements for spawning habitat. *See* Doc. 492 at 9. The BiOp [**363] explains that "[b]ecause CV steelhead are unable to reach their historical spawning areas above Goodwin Dam, they are dependent on East Side Division operations maintaining temperatures suitable for spawning below the dam..." and concludes that appropriate temperature conditions likely cannot be met for April and May for future operations. BiOp at 310. SR Plaintiffs argue "NMFS fails to explain whether or not these 'temperature conditions' will be met with the proposed operations or whether there is any evidence that temperatures, as the result of existing operations, have been detrimental to steelhead." Doc. 492 at 9. This argument entirely ignores the four-and-a-quarter page discussion of temperature at BiOp pages 302 through 306, discussing results of computer modeling showing that project operations will result in temperature exceedances that will have detrimental effects on certain life stages of CV steelhead in the Stanislaus. This challenge is without merit.

SR Plaintiffs motion for summary judgment that the record does not support NMFS's findings regarding New Melones operations' impacts on temperature conditions in spawning habitat is DENIED; Federal Defendants' and Defendant-Intervenors' [**364] cross motions are GRANTED on this issue.

d. Freshwater Migration Corridors.

SR Plaintiffs challenge the BiOp's finding that proposed operations will negatively affect upstream and downstream migration corridors. The relevant section of the BiOp provides:

> Under proposed operations the freshwater migration corridors on the Stanislaus River will continue to require juvenile CV steelhead to pass through predator-rich abandoned mining pits, incised channels that limit channel complexity and water temperatures that may be physiologically lethal or sublethal. The spring pulse flows defined in VAMP are generally less than the spring pulse flows measured in 1989,

No comments

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> a critically dry year (Kondolf *et al.* 2001), hence the operational assistance provided to assist CV steelhead outmigrants is only representative of the lowest migratory volumes historically experienced by CV steelhead.
>
> Channel incision resulting from post New Melones operations has produced overhanging large wood and river edge aquatic vegetation but the lack of scouring and channel forming flows has effectively channelized and simplified the corridor. The variety of habitats that allow them to avoid high flows, avoid predators, [*937] successfully [**365] compete, begin the behavioral and physiological changes needed for life in the ocean, and reach the ocean in a timely manner has been limited by operational conditions. Obstruction of access to historic spawning and rearing habitat requires CV steelhead to utilize these freshwater migration corridors at times that may not be optimal with respect to temperature, forage availability and exposure to predators.
>
> Adult CV steelhead migrating upstream frequently are delayed entering the river owing to poor water quality conditions in the Delta. Fall attraction flows released for Fall Run typically improve conditions for steelhead migration also, hence steelhead tend to be observed on the Stanislaus River earlier in the year than in other Central Valley streams.

BiOp at 312-13. SR Plaintiffs argue "there is nothing in the AR that indicates that existing operations have negatively affected upstream or downstream migration to begin with, let alone that future operations will 'continue' to do so." Doc. 492 at 9. SR Plaintiffs' argument continues:

> ...[T]he AR reveals that as to fall attraction, existing pulse flows for fall-run salmon appear to also attract steelhead (BO at 625). Nonetheless, NMFS [**366] imposes additional fall pulse-flows to attract steelhead. (BO at 624). For out-migration, the BO explains that steelhead are larger than fall-run smolts and may be less dependent on pulse flows to convey them out of the Stanislaus River (Id.). Without any evidence that the existing population of steelhead in the Stanislaus River that has been unable to outmigrate due to impaired flows, the BO states that the late spring flows in Action III.1.3 are needed to "allow more smolted fish to migrate out of the system."

Doc. 492 at 9. The pages cited by SR Plaintiffs are from the section of the BiOp discussing the need for the RPA Actions. SR Plaintiffs do not challenge the clearly explained conclusions of the effects section. Project operations reduce spring pulse flows to levels that are below normal migratory flows, and the flow regime implemented by Reclamation under the action results in channel incision, which reduces connection to floodplain areas necessary for steelhead to rear to large enough size to begin the smolting process. BiOp at 312-13.

SR Plaintiffs motion for summary judgment that the record does not support NMFS's finding that New Melones operations effect downstream migration [**367] corridors is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

D. Stanislaus River RPA Challenges.

1. Challenge to the Assumptions Used to Model New Melones Project Operations.

SR Plaintiffs' claim that NMFS used a flawed project description for New Melones and that this "fundamental error renders the entire consultation for the New Melones unit erroneous." Doc. 454 at 17. This objection concerns the assumptions used to represent New Melones operations in computer modeling.

In 1997, Reclamation and FWS adopted an Interim Plan of Operations to guide the annual operations for New Melones ("NMIPO"). Although the NMIPO was only a two-year plan, it is still used today as an operational guide. USBR AR 0007573-74. Reclamation has deviated from NMIPO in recent years to provide more water to meet State Water Resources Control Board ("SWRCB") conditions and fulfill CVP Contracts, USBR AR 0007575. The 2008 OCAP BA described [*938] the modified operating plan that was the subject of consultation as a "Transitional Operating Plan" ("TOP"). *See* USBR AR 0007513. The TOP differs from the NMIPO in several ways, which are described in Table 2-11 of the BA. USBR AR 0007576. SR Plaintiffs [**368] note that under the NMIPO, allocations to CVP contractors are capped at 90,000 af, while under the TPO Reclamation provides for the full 155,000 AF allocation in "high allocation years." *Id.*

It is undisputed that NMFS used the TOP as the basis for its effects analysis. *See* Doc. 477-1 at 119; Doc.

No comments

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492 at 4. SR Plaintiffs object instead to NMFS's decision to use the NMIPO assumptions to model RPA options. NMFS elected to use the NMIPO assumptions after it concluded that the TPO would not provide sufficient water for fishery needs in 59% of years. BiOp at 306. The BiOp explained that a 1993 study by Aceituno applied the so-called "instream flow incremental methodology" to the Stanislaus River between Riverbank and Goodwin dam and "determined that 155 TAF was needed to maximize weighted usable habitat area for salmon, not including outmigration flows or fall attraction flows." *Id.* The BiOp then determined that the proposed allocation strategy for the East Side Division under the TPO only commits to providing this level of water for fisheries in 41 percent of years (meaning insufficient supplies would be present in 59% percent of years). *Id.*

SR Plaintiffs assert in a footnote that this conclusion [**369] is "bogus" because NMFS did not explain to "[w]hich fisheries" it was referring, nor how much water is "sufficient." Doc. 492 at 4 n. 4. More importantly, the BiOp nowhere explains why it is "essential" to achieve flows designed to "maximize" steelhead habitat area. Is the status of the species so dire that improvement to 60, 70, 80, or 90% of the "maximum" would be insufficient, even if that marginal difference from the maximum saved large amounts of water? The record provides no explanation of the decision to aim for "maximum" habitat in a system of limited resources. This must be specifically addressed and explained on remand.

NMFS admits that the modeling used to support the RPA builds upon this unexplained decision to set a "maximum habitat" goal. Doc. 477-1 at 119. The agency's own internal guidance requires an explanation why operating to this goal is "essential." None is provided. It is impossible to determine how a change in this goal impacts the overall rationale for the RPA. This too must be addressed on remand.

SR Plaintiffs' motion for summary judgment that Federal Defendants erred by modeling RPA actions based on inappropriate assumptions is GRANTED. Federal Defendants' [**370] and Defendant-Intervenors' cross motions are DENIED.

2. Do Actions III.1.2, III.1.3, and IV.1.2 Improperly Require Reclamation to Infringe Upon OID and SSJID's Prior Right to Stanislaus River Water in violation of *50 C.F.R. § 402.02*?

"Reasonable and prudent alternatives refer to alternative actions identified during formal consultation [1] that can be implemented in a manner consistent with the intended purpose of the action, [2] that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, [3] that [are] economically and technologically feasible, and [4] that the Director believes would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat." *50 C.F.R. § 402.02* (the "four RPA requirements").

SR Plaintiffs claim that Actions III.1.2, III.1.3, and IV.1.2 exceed Reclamation's [*939] legal authority because they require Reclamation to infringe upon OID and SSJID's prior (superior) water rights in the Stanislaus River. It is undisputed that OID and SSJID hold perfected water rights to Stanislaus River water that are senior to Reclamation's rights to divert [**371] from the Stanislaus. OID and SSJD receive water from New Melones under a 1988 Agreement with the United States designed to fulfill their prior rights. USBR AR 0007571-72; USBR AR 0011751. That agreement requires Reclamation to provide to OID and SSJID:

> o The inflow into New Melones plus the amount derived by the formula of (600,000 minus inflow) divided by 3, not to exceed 600,000 AF per year, USBR AR 011751; and
>
> o The right to conserve up to 200,000 AF in New Melones, USBR AR 011752.

SR Plaintiffs point to studies in the record that they claim indicate the RPAs will require Reclamation to short OID and SSJID 13,000 AF on average. AR 00219154. They maintain that this is actually an underestimate of the amounts they will be shorted under the Stanislaus River RPA Actions because of certain of NMFS's modeling assumptions. Specifically, the modeling assumed:

> (1) OID and SSJID's senior water rights would be shorted;
>
> (2) non-compliance with a Court order to limit non-flood flows to no more than 1500 cfs
>
> (3) relaxation of dissolved oxygen ("DO") requirement that is a condition of Reclamation's water right for New Melones;
>
> (4) a successful petition to the SWRCB to relax D-1641 salinity requirements [**372] at Vernalis; and
>
> (5) a successful petition to the SWRCB to relax D-1641 flow requirements at Vernalis.

No comments

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Doc. 492 at 13.

Neither the underlying study purportedly demonstrating that water rights will be shorted, nor the inclusion of the listed modeling assumptions require Reclamation to short senior water rights or demonstrated that it is likely they will be unable to comply with the RPA without doing so. The study cited by SR Plaintiffs was restricted to modeling two years, 2010-2011, when the Phase I requirements of Action IV.2.1 were in place. AR 00219154. Reclamation complied with the RPA during this period and there is no indication that Reclamation shorted senior water rights. More to the point, neither NMFS nor the Bureau has discretion to violate these water rights. It is inappropriate to speculate they will break the law.

As for the modeling assumptions, each is justified based on past practice and experience and has long been included in the CALSIM II modeling process. The Calsim II model inputs do not assume that OID and SSJID's rights will be shorted. They cannot be. Rather, the RPAs assume that demand from these districts will be reduced under certain circumstances, based upon [**373] land use projections developed by the California Department of Planning and Local Assistance. Hilts Decl., Doc. 480 at ¶ 6 ("hydrology-land-use-demand input [data] set ... was best available... [and] suggest that OID and SSJID will not use their full entitlement in most years"); Fifth Milligan Decl., Doc. 479 at ¶ 5 (SR Plaintiffs' expert Mr. Steiner participated in 2005 update of land use demand assumptions, which were used in the BA and relied upon in the BiOp). In addition to the land-use based assumptions, the relevant modeling included assumptions designed to reasonably reflect water usage [*940] by the Stanislaus basin stakeholders during sustained dry periods. Hilts Decl., Doc. 480 at ¶ 10.

SR Plaintiffs cite a number of cases in which mitigation measures were deemed unsatisfactory to satisfy an agency's burden to insure against jeopardy because those measures were not "reasonably specific, certain to occur, [] capable of implementation, [and] subject to deadlines or otherwise-enforceable obligations...." *Ctr. for Biological Diversity v. Rumsfeld, 198 F. Supp. 2d 1139, 1152-54 (D. Ariz. 2002)*. But, the cases cited are distinguishable, and it is unclear whether the "reasonably certain [**374] to occur" language should be applied to RPAs. *Rumsfeld* concerned a biological opinion's "no jeopardy" finding that relied upon the action agency to mitigate groundwater impacts of its activities through participation in a regional plan to protect groundwater resources, despite the fact that the action agency had no authority to ensure the regional plan was implemented. Nor did the biological opinion set any goals or deadlines regarding groundwater protection. *Rumsfeld* reasoned that necessary mitigation measures designed to prevent adverse impacts to groundwater must be identified and included either in the proposed action or as RPAs. *Id. at 1154*. Without these adjustments there was no rational basis for the "no jeopardy conclusion." *Id. Rumsfeld* address the requirements for mitigation measures, not RPAs. *See also NWF v. NMFS, 254 F. Supp. 2d 1196, 1213-14 (D. Ore. 2003)* (requiring reasonable certainty when NMFS relied upon off-site federal actions to conclude that jeopardy will not occur).

Rumsfeld relied upon *Sierra Club v. Marsh, 816 F.2d 1376 (9th Cir. 1987)*, which addressed whether an agency was required to reinitiate formal consultation after failing to acquire certain mitigation [**375] lands. Those lands were considered a "vital" RPA by FWS in its biological opinion concerning the agency's action. *Id. at 1378*. Marsh explained that the "reasonably certain to occur" standard applies to "[i]ndirect effects ... caused by the proposed action," not to RPA actions. *See id. at 1388* (citing *50 C.F.R. § 402.02*). Rather, *Marsh* applied the regulatory criteria from *50 C.F.R § 402.16* to determine whether the action agency unlawfully failed to reinitiate consultation. *Id. at 1388-89*.

Even if reasonable certainty is the benchmark, it is satisfied here. The RPAs in question here require Reclamation to use its own water resources for particular purposes. Reclamation has reasonably examined past patterns of Project water use by third parties and concluded that water will be available to implement the RPAs. *See S.W. Ctr. for Biological Diversity v. U.S. Bureau of Reclamation, 143 F.3d 515, 518-19 (9th Cir. 1988)* (upholding generalized RPA requiring agency to protect 1,400 acres without identifying the particular location or timeframe). SR Plaintiffs have not demonstrated that reliance on past practice is unreasonable. If, however, Reclamation's predictions prove incorrect and make the [**376] RPAs' implementation infeasible, the burden cannot be imposed on senior water rights holders. Rather, Reclamation must then re-initiate consultation.

Federal Defendants have reasonably explained the remaining modeling assumptions about acquisition of waivers from the SWRCB regarding dissolved oxygen and D-1641 flow and salinity requirements. Fifth Milligan Decl., Doc. 497 at ¶ 7-8; Hilts Decl., Doc. 48 at ¶ 12 (explaining it is "reasonable to assume the SWRCB will take a holistic approach and grant such petitions" under relevant conditions). This is speculation and may be mistaken, however the law does not require more. If no Petitions are granted, absent available existing water, NMFS must reinitiate consultation. [*941] SR Plaintiffs have not demonstrated that these assumptions were clearly erroneous.

No comments

- n/a -

SR Plaintiffs' final challenge to the modeling assumptions is based on a March 10, 1982 injunction imposed in *United States v. California*, purportedly requiring Reclamation to limit non-flood flows to no more than 1,500 cfs. It is undisputed that Action III.1.3 calls for spring pulse flow releases as high as 5,000 cfs, BiOp at 623, Fig. 11-1, and Action IV.1.2 requires releases from New Melones [**377] to meet higher Vernalis flow rates, BiOp at 642.

The Ninth Circuit's March 10, 1982 injunction "pending determination of appeal," required the United States to provide the State of California with a plan to protect downstream property from damage caused by inundation or seepage. SR Plaintiffs' Request for Judicial Notice ("SRJN"), Doc. 453-7, Ex. 7 at 2. That plan, set forth in a February 1982 memo drafted by the Bureau, indicated that flows above 1,500 cfs would "create water tables high enough to have the potential to damage the almond and walnut orchards adjacent to the [Stanislaus] river." *Id.*, Ex. 8, at 1. [36] But, the injunction, by its own terms, was limited to the time period pending appeal. The appeal was decided nine months later on December 20, 1982. *694 F.2d 1171 (9th Cir. 1982)*. The Ninth Circuit's remanded with instructions that "[t]he injunction previously issued by the court may be modified or amended by the district court as it deems necessary and appropriate in view of this opinion and the present circumstances of the dam and its storage facility," *id.*, but there is no evidence in the record that the district court ever imposed a similar 1,500 cfs ceiling on non-flood [**378] flows. NMFS reasonably concluded that the limitation no longer applies and could be omitted from Stanislaus River modeling. [37] This is not the appropriate forum for SR Plaintiffs to attempt to enforce a nineteen-year-old injunction, which has no continuing validity.

36 Both SRJN Exhibit 7 and 8 are public records subject to judicial notice for their content. *San Luis Unit Food Producers v. United States, 772 F. Supp. 2d 1210, 1216 n.1 (E.D. Cal. 2011)*.

37 SR Plaintiffs cite a May 2009 Memo authored by NMFS's Rhonda Reed, which discussed the purported 1,500 non flood flow limit:

> Issues raised were his understanding that Reclamation couldn't exceed 1500 cfs because of seepage. Roger Guinee pointed out that the 1500 cfs cap related to a ruling in a judgment that applied only to the period that New Melones reservoir was filling, and no longer applies (per Jim Monroe, FWS). Kaylee Allen (Reclamation) said she was researching the issue and wasn't sure of outcome. I asked how long it takes for high flows to cause seepage problems. Ron was not definite, but implied about ten days.

AR 105885. SR Plaintiffs erroneously assert that this paragraph indicates that an NMFS scientist, Roger Guinee, offered [**379] a "legal opinion" that the injunction no longer applied. In fact, the paragraph states that the legal opinion came from Jim Monroe, a federal government attorney.

SR Plaintiffs' motion for summary judgment that the RPA improperly requires Reclamation to infringe on OID and SSJID's prior rights to Stanislaus River water is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

3. Use of the San Joaquin River Temperature Model.

Federal agencies must use "the best scientific and commercial data available" in developing reasonable and prudent alternatives. *16 U.S.C. § 1536(a)(2)*; *50 C.F.R. §402.14(g)(8)*. SR Plaintiffs assert that Federal Defendants did not use the best available science in formulating [*942] the Stanislaus River RPAs because they did not model the feasibility of the RPAs using the San Joaquin River Water Temperature Model ("SJRWTM").

There is no dispute that temperature modeling is critical to the management of the Stanislaus River and to implementation of the Stanislaus River RPAs. NMFS relied on Reclamation's "USBR Temperature Model," to run an operational scenario involving a draft RPA for new minimum flow releases on the Stanislaus. AR 00105890.

SR Plaintiffs' [**380] expert, Avery Dotan, opines that no reasonably prudent modeler would choose to use the USBR Temperature Model, which can only simulate the mean monthly vertical temperatures, to assess the feasibility of meeting a seven-day average daily maximum temperature requirement, such as Action III.1.2. *See* Dotan Decl., Doc. 442 at ¶¶ 53-58

The agencies had numerous discussions throughout 2009 regarding temperature modeling, including some specific requests to look into the use of the SJRWTM. *See, e.g.*, AR 00065939 (Feb. 6, 2009 email regarding modeling), 00070965, 00074969 (requesting use of a different model), 00077217 (Feb. 18, 2009 email asking questions about "Derek's model run"), 00077613 (Mar. 20, 2009 inquiry regarding application of the SJRWTM), 00078887 (Mar. 29, 2009 email containing information about SJRWTM), 00079052 (Mar. 27, 2009 email containing information about SJRWTM), 00085078 (Apr.

No comments

- n/a -

10, 2009 email asking for assistance from "Don Smith and Avry Dotan" as the "SJR-Basin wide temperature modelers"). CalFed's Science Program held a special workshop on temperature modeling for the BO in April 2008 and advised the agencies to utilize the "latest technology" in temperature modeling, [**381] including adopting models with "smaller time-steps to better assess biological effects." AR 00038723. The CalFed Science Review Panel, in reviewing the draft BiOp, specifically recommended that Federal Defendants utilize the SJRWTM, a sub-daily temperature model developed for the Stanislaus River by Avry Dotan and Resources Management Associates. *See* AR 00219651. Several federal agencies, including NMFS, FWS, and Reclamation, participated in its development. Dotan Decl., Doc. 442 at ¶¶ 6, 23-34. The model was funded by CalFed and peer reviewed by CalFed scientists. *Id.* at ¶¶ 24, 21, 26.

The SJRWTM could have modeled temperatures on a seven-day average daily maximum basis, a more appropriate time scale according to Mr. Dotan. *Id.* at ¶¶ 53, 80. SR Plaintiffs assert that the SJRWTM was the best available science and should have been used to evaluate the feasibility of the RPA actions.

The model runs in the AR using the USBR Temperature Model predict that the new flow requirements in Action III.1.3 will occasionally cause temperatures to exceed the objectives set forth in Action III.1.2. Dotan Decl., Doc. 442 at ¶¶ 73-77. Mr. Dotan opines that these results are unreliable because the model [**382] could only predict monthly mean temperatures and was not capable of determining when the seven-day average daily maximum temperature was or was not met. *Id.* at ¶¶ 52-72. To demonstrate that this error is material, Mr. Dotan repeated the analysis using the SJRWTM. The results of this analysis are depicted in Figure 7 to his Declaration, which shows that in February, March, April, May, June, July, August, and September the Bureau's model estimates fewer exceedances than does the SJRWTM. Doc. 441-15. (Mr. Dotan does not discuss the fact that this figure also shows that in October and November, the SJRWTM indicates fewer exceedances than the Bureau's model. *Id.*)

[*943] The SJRWTM model also predicts that the water cost associated with meeting Action III.1.2 vary between 22,000 - 190,000 AF per year with an average cost of 84,000 AF, Dotan Decl., Doc. 442 at ¶ 87; that operating for temperature control will deplete the volume of water in New Melones by as much as 717,000 AF during 1987-1995, *id.* at ¶¶ 86; and that this successive operation for temperature control will eventually cease to be effective as New Melones' pool of cold water is depleted, *id.* at ¶¶ 89.

Federal Defendants do not dispute [**383] the superiority of the SJRWTM. Rather, they strenuously object that contemporaneous documents in NMFS administrative record demonstrate that the model was not "available" to the agencies during the consultation. Doc. 477-1 at 131. Although employees of the Federal Defendants were trained to use the model between 2001 and 2009, Dotan Decl., Doc. 442 at ¶¶ 35-42, and Mr. Dotan answered specific questions posed by NMFS and Reclamation regarding the use of model, *see, e.g.*, NAR 00093319 & 00094138, there were concerns that documentation of the complex model was insufficient to allow others to run it, AR 00089101 (May 1, 2009 email indicating "NMFS has the model" but discussing problems with the contract for technical support); AR 00089027 (model in public domain but difficult to run unassisted). The BiOp explains why it did not use the SJRWTM:

> When evaluating the effect on salmonids of an operational strategy on the Stanislaus River, [USBR] would normally take the CalSim modeled results and conduct post-processing to determine temperature effects. When we met in early March to discuss the March 3 version of the RPA with the action agencies, we requested help from [USBR] to do temperature [**384] modeling on these flows using their tools. In subsequent discussion with USFWS and CDFG, the need to perform temperature modeling on these flows was also identified, but NMFS and USFWS lacked internal expertise to perform the modeling. CDFG was unable to assist with running the San Joaquin River Basin temperature model because of funding freezes. Tetra Tech was hired by NMFS to assist with such activities...[but] [i]nsufficient time was available to them to learn and apply the specifics of the operating model.

AR 00105884.

Record evidence demonstrates that the model was not self-explanatory, even for staff with background in a related model used as the basis for the SJRWTM: HEC-5Q. NMFS had to seek outside help to use the model, and encountered implementation issues. *See* AR 00077320 (NMFS discussing hiring Tetra Tech to help run SJRWTM), 00092267 (NMFS seeking assistance from Bureau engineer with model), 00093101 (NMFS obtaining promise of documentation from FWS), 00093319 (Dotan answering NMFS's questions about

No comments

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application of model), 00093538 (discussing "numerous issues (above and beyond downscaling) with bringing CalSim data into the SJ temp model"), 00094138 (Dotan answering NMFS's [**385] questions about application of model). Once NMFS engaged a consultant to run the modeling, the model's other co-developer, Don Smith, resisted providing the assistance necessary to run the model. *See* AR 00089096. In addition, the material provided with the then-available version of the SJRWTM did not allow the model to be correctly utilized. Reed Decl., Doc. 482 at ¶¶ 10-13.

SR Plaintiffs concede that Federal Defendants are only required to use the best science available, and not the best science possible. *See* Doc. 492 at 17 (citing *S.W. Ctr. for Biological Diversity v. Babbitt, 215 F.3d 58, 60-61, 342 U.S. App. D.C. 58 (D.C. Cir. 2000))*. However, [*944] SR Plaintiffs assert it "stretches credulity" to accept that the Government was unable to run this model because:

> [its] development began in 1999 with the assistance and participation of Reclamation and FWS (Dotan Decl., ¶ 6), [it] is based upon the HEC-5Q platform that has been around since the 1980s and which is the platform of the USBR's Upper Sacramento River Water Temperature Model used in this consultation (Id., ¶ 8; BA, App. H, p. H-5), [it] was completed for the Stanislaus River only in 2001 (Dotan Decl., ¶ 19), and [it] has been used by Reclamation for its [**386] Friant Restoration Project and Delta-Mendota Canal Recirculation Project. (Dotan Decl. ¶ 33).

Id. This argument continues:

> All of this, coupled with the fact that representatives from NMFS, FWS and Reclamation sit on the TAC and Super TAC committees overseeing the development and use of the SJRWTM, and that employees from these agencies have received specific training on how to run the model (Dotan Decl., ¶¶ 36-43), shows that the Government's defense is, at best, one of willful ignorance that should not be tolerated. Moreover, the Government was told repeatedly to use a temperature model with a smaller time-step, and specifically the Stanislaus River portion of the SJRWTM, well before the BO was due, yet the Government failed to do so at every turn.
>
> In April 2008, the CALFED Science Program told the Government that it needed to use the latest technology in temperature modeling by utilizing models with smaller time-steps (NMFS AR at 00038723), but the Government chose not to take this advice in regards to the Stanislaus River. In January 2009, a mere six months before the final BO was due and eight months after the Science Program recommended using models with shorter time-steps, a draft [**387] of the BO was reviewed by the CALFED Science Review Panel. The Panel again noted the paucity of relevant temperature data for the Stanislaus River and specifically recommended that the Government incorporate into the BO the "considerable temperature work" that had been done on the Stanislaus River with the Stanislaus River portion of the sub-daily SJRWTM. (NMFS AR at 00219651). Again, the Government did nothing. In fact, only in March 2009 - almost a full year after being told to use a model with shorter timesteps and only three months before the final BO was due - did the Government finally have internal discussions with its modeler TetraTech about its ability to conduct water temperature modeling for the Stanislaus River. (Reed Decl., ¶ 15). Any inability to run the SJRWTM has more to do with the Government's delay in responding to the advice of the CALFED review teams than with the Government's lack of knowledge or resources.

Id. at 17-18.

Ms. Reed, an NMFS employee with significant involvement in the development of the BiOp disagrees with Plaintiffs' assessment of the circumstances. She declares that the SJRWTM was not functionally available during the consultation:

> 8. ... NMFS was [**388] aware of the development of the SJRWTM and participated in some of the advisory group meetings, but NMFS's attempts to use this model in developing the BiOp were not successful.
>
> 9. NMFS disagrees with Mr. Dotan's assertion that the November 2008 version

No comments

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of the SJRWTM was sufficiently complete to utilize. Mr. Dotan states that the final version of the SJRWTM was submitted to CALFED October 2009, months after the June 4, 2009 completion date of the BiOp. Dotan [*945] Decl. ¶ 43. He goes on to state that this version "was almost identical" to the November 19, 2008 pre-release version that he made available to stakeholders including NMFS. Dotan Decl. ¶ 42. However, the flaws in the November 2008 version and supporting documentation made it so that NMFS was unable to run the model.

10. On December 10, 2008, Mr. Craig Anderson, hydrologist/modeler for NMFS, attended a Super TAC meeting. Dotan Decl. Exhibit C. This was his first introduction to the model and its availability. He subsequently downloaded a version of the SJRWTM and documentation from the ftp site, as directed by Mr. Dotan. Mr. Anderson forwarded this model and associated information to Mustafa Faizullabhoy at Tetra Tech who was under [**389] contract with NMFS to conduct temperature and other modeling related to the biological opinion development. NMFS 85074-7. Mr. Faizullabhoy has extensive experience with developing, implementing, and evaluating water quality and flow models for environmental analyses including applications of the BASINS, QUAL2E, EFDC, and CE-QUAL-W2 models amongst others. However, Mr. Faizullabhoy had substantial difficulty running the model based only on the information provided at the ftp site and sought advice from Mr. Dotan and Mr. Don Smith, Mr. Dotan's partner in developing the model. NMFS 85074-77, 86560-1, 87111-3, 92267-8, 93310-18, 93319-20, and 94185.

11. The communication between NMFS, Mr. Faizullabhoy, and the model developers reflects that the material was not self-explanatory, and that it was still in development mode. See e.g. NMFS 93319-20. For example, the Tetra Tech modeler had difficulty running the model because the documentation he received had an old version of a table necessary to run the model, which Mr. Dotan admitted "reflects our early work on the Stanislaus model." NMFS 93320. In any case, the model files made available on the FTP site did not include the source code necessary [**390] to fully evaluate model numerical schemes and mechanics and important pre-and post processing algorithms. Essentially, the pre-release modeling package contained compiled source code that limits an outside user's ability to effectively alter the model in any substantial way.

12. Mr. Dotan also asserts that he provided training to NMFS and Reclamation staff so that they should have known how to run the model as a result of this participation. Dotan Decl. ¶¶ 37, 39, 40, 41. NMFS disagrees with this contention. While staff participated in the coordination meetings during the development of the SJRWTM, Mr. Dotan's implication that attendees were all fully trained to run the model is incorrect. For example, in response to a request to run the SJRWTM to evaluate early versions of the RPA Actions, Mr. Dean Marston of the California Department of Fish and Game responded that DFG had no resources to run the model, despite the fact that Mr. Marston attended almost all the meetings. NMFS 77613-5; Dotan Decl. Exhibit C. Based on personal communication with other attendees of these trainings, I understand that these sessions were more like demonstrations of the model's features, rather than a training [**391] course intended to prepare the participant to be able to run the model (Pers. comm. Mr. Craig Anderson, now USFWS, and Mr. Russ Yaworsky, Reclamation).

13. In order to apply the SJRWTM to the RPA or to Reclamations proposed action, the CalSim II results that govern allocations would have to be disaggregated from a monthly time step for use with the SJRWTM, which operates on a 6-hour time step. The manner in which [*946] the disaggregation is done is important, as indicated in Mr. Milligan's declaration. Milligan Decl. ¶9. The November 2008 documentation available for running the SJRWTM stated the following regarding using CalSim II data in the model:

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"2.8 Using Addition Tools

The Dss file viewer, HecDssVue, is provided as a tool within the application for viewing and editing dss file data. It can be accessed through the Tool menu in the main HWMS application window. Downscale CalSim will also be included. This tool is used to modify the CalSim output files for use in the HEC5Q model."

HWMS-HEC5Q User Interface at 8, Exhibit 1. This is the only reference to how to use CalSim II inputs to the model and it indicates that while a tool to downscale CalSim II information will be included in a future [**392] version of the model, it was not included in the version available in November 2008. In the absence of that data, there was no explanation which would have allowed NMFS staff to perform the disaggregation process on their own.

14. Mr. Dotan states that the SJRWTM has already been used in several proceedings, including the Stanislaus River studies, Friant Restoration Project, presentations for the SWRCB [303(d)/305(b)] workshop, and the USBR Delta Mendota Recirculation Project. However, Mr. Dotan does not disclose that the operation of this model was usually performed by Mr. Dotan or his partners who worked with him in the development of the code. Dotan Decl. ¶¶ 21, 25 and 33, SJRGA 2007 at 52, Exhibit 2. Their intimate and proprietary knowledge of the model made use of the model possible in those proceedings.

15. In November 2008, NMFS advertised a contract solicitation to contract for outside modeling expertise. This contract was announced on http://www.gsa.gov/portal/content/103541 , a public website for advertising Federal contract opportunities. Mr. Dotan did not submit a bid as a direct contractor or subcontractor. NMFS could only have contracted for Mr. Dotan's services through [**393] this sort of public, competitive solicitation given that this model is based on public domain code and is intended to be nonproprietary. It would have been inappropriate for NMFS to attempt to justify contracting Mr. Dotan's services as a sole-source contractor. In December 2009, the contract was awarded to Tetra Tech Inc. Early efforts by Tetra Tech were focused on modeling the Shasta Reservoir carryover storage RPA actions. Initial, internal discussions regarding Stanislaus River water temperature modeling by Tetra Tech occurred in late March 2009 (see NMFS 77320-1), and an official response from Tetra Tech re: their ability to conduct said water temperature modeling occurred on April 16, 2009. NMFS 86560-1. As discussed above, Tetra Tech staff (primarily Mr. Faizullabhoy) subsequently transmitted five emails to Mr. Anderson (NMFS 87111-3, 88597-602, 93310-18, 00093319-20, and 94185) containing model specific technical questions through the remainder of April 2009 into May 2009, with the final email transmission occurring on May 22, 2009 (NMFS 94185). Where appropriate, Mr. Anderson sought the assistance and technical advice of SJRWTM experienced practitioners, including Mr. Dotan. [**394] Despite these efforts neither NMFS nor their contractor was able to conduct runs with the SJRWTM for the BiOp analysis.

16. In summary, NMFS disputes that the model was sufficiently available for use in the preparation of our BiOp, without the direct and extensive intervention [*947] of the developer, Mr. Dotan or his consulting firm, and he did not choose to make his services available to NMFS through a legal contracting process.

Reed Decl., Doc. 482.

NMFS claims it did not have the expertise and could not get Dotan to respond. This is a factual dispute over whether NMFS could use the model. There is no dispute using the shorter time step was the best science. The Supreme Court has "repeated time and again, an agency has broad discretion to choose how best to marshal its lim-

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ited resources and personnel to carry out its delegated responsibilities." *Massachusetts v. EPA, 549 U.S. 497, 527, 127 S. Ct. 1438, 167 L. Ed. 2d 248 (2007).* Although the record suggest that the resources required to run this model properly would be modest, that the model results would be preferable to those presented in the BiOp, and that NMFS had knowledge of the model for over 8 years, a court does not have the authority to order the agency how to direct [**395] and allocate its resources. Congress has chosen to partially immunize such agency "mis-performance." SR Plaintiffs' motion for summary judgment that Federal Defendants acted unlawfully by failing to utilize the SRJWTM is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

4. Exceptions Built into Action III.1.2.

Even if, *arguendo*, Federal Defendants' failure to employ the SJRWTM was unlawful, Federal Defendants alternatively argue that that exceptions built into Action III.1.2 render any dispute over the model used irrelevant. Action III.1.2 was developed to address the impacts of adverse temperatures on the species. The temperature compliance schedule is purportedly based on the species' biological and physiological needs. Reed Decl., Doc. 482 at ¶¶ 3-4. Because the modeling indicated that these temperatures could not always be achieved, the RPA action has a built-in exception, which can be exercised any time the temperature requirements of Action III.1.2 will be exceeded on a three-day average daily maximum temperature. BiOp at 621. Operational adjustments to address such exceptions will be coordinated through the SOG and WOMT. *Id.* NMFS concluded:

> Because [**396] every year is a bit different, we determined that matching temperature requirements to the appropriate life cycle timing and providing for exceptions was an appropriate way to provide necessary protections for listed species while allowing for occasional off-ramps when meeting temperatures was not feasible. That is, an approach using feasibility-based exceptions to biologically-based temperature criteria was deemed more protective.

Reed Decl., Doc. 482 at ¶ 29. Because the exception provision "has no limitations," Federal Defendants argue it is immaterial whether the SJRWTM would have shown more instances of exceeding the RPA Action's seven-day average daily maximum temperatures. Doc. 477-1 at 133.

This argument presents a conflict between the adaptive management scheme and the ESA Regulations' explicit demand that Federal Defendants demonstrate the necessity and feasibility of implementing every RPA Action. Flexibility is the essence of adaptive management, a tool that is indisputably beneficial both to the species and impacted stakeholders. But, Federal Defendants describe an exception that "has no limitations." [38] How often can the exception be triggered without rendering the Action [**397] ineffectual? This is not examined. Without such an analysis, the extent [*948] to which this RPA is "essential" to avoiding jeopardy cannot be evaluated. This makes the RPA unlawful and it must be addressed on remand.

> 38 Federal Defendants later clarify that Reclamation must support an invocation of the exception with iterative modeling that demonstrates varying allocations and delivery schedules do not let them meet the required temperatures." BiOp at 621. But, this does not place a limit on the number of times the exception may be invoked, nor does it demonstrate the extent to which repeated invocation of the exception will undermine the purpose of the Action.

5. Does the Record Support the Finding that Action III.1.3 Will Avoid Jeopardy to or Adverse Modification of CV Steelhead or Critical Habitat?

The objective of Action III.1.3 is to operate the East Side Division [39] dams to "optimize CV steelhead habitat for all life history stages and to incorporate habitat maintaining geomorphic flows in a flow pattern that will provide migratory cues to smolts and facilitate out-migrant smolt movement on [the] declining limb of pulse." BiOp at 622. Specifically, the Action requires the Bureau to achieve [**398] a minimum flow schedule prescribed in Appendix 2-E and generally described in Figure 11-1, copied below:

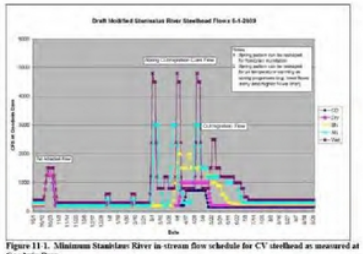

Figure 11-1. Minimum Stanislaus River in-stream flow schedule for CV steelhead as measured at Goodwin Dam

No comments

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Id. at 623. SR Plaintiffs take issue with the requirement of releases as high as 5,000 cfs in the spring of wet years, which represents a drastic change from the prior flow regime and such high flows are unjustified.

> 39 New Melones Dam operates in conjunction with Tulloch Reservoir and Goodwin Dam on the Stanislaus River to form the East Side Division. *See* BiOp at 197.

NMFS explains in a May 31, 2009 memo from Rhonda Reed to Maria Rea that the flow requirements of Action III.1.3 are based on a 1993 study by Aceituno, which uses "In-stream Flow Incremental Methodology" ("IFIM"). AR 00105879. NMFS then conferred with CDFG and [*949] FWS biologists regarding CV Steelhead's need for pulse flows. AR 00105881-82. These consultations revealed that a fall attraction pulse was needed. This is included in Action III.1.3 and is not challenged by SR Plaintiffs.

NMFS also assessed whether CV steelhead needed a spring pulse flow:

> Do steelhead need spring pulse flows, or can they just swim out on their own? CV steelhead are captured at the RSTs before the pulse flows, so early smolts may not need a spring [**399] pulse. However, the spring pulse does improve downstream water quality conditions for smolts that are leaving later, and this may be more important than for swimming assistance.

AR 00105882. SR Plaintiffs object that this language is equivocal and that a life stage of the species "may" need a particular pulse flow is not sufficient justification for requiring one.

Although this passage from the Reed Memo does admit that "early smolts may not need a spring pulse," AR 00105882, Defendants point to other record evidence supporting the imposition of a spring pulse flow requirement. Spring pulse flows cue more smolts to migrate, protecting the anadromous form. BiOp at 306-307; AR 00105882 (variability in flow triggers important to anadromy), AR 00105883 (flow variability important to anadromy).

SR Plaintiffs do not directly challenge this rationale. Rather, they argue that even if some form of spring pulse is justified, nothing in the BiOp justifies a 5,000 cfs pulse flow. SR Plaintiffs point out that Aceituno's 1993 IFIM study called for flows ranging from between 50-500 cfs. Aceituno's study focused on instream needs, and did not include an assessment of water needed for spring pulse flows [**400] to convey steelhead to delta. BiOp at 307 ("IFIM analysis did not include an assessment of the volume of water needed for a spring pulse flow to convey CV steelhead or fall run from the Stanislaus River into the Delta"); AR 00107828 (Aceituno (1993) explicitly acknowledging that "[t]his study did not directly provide information on flows needed for smolt emigration in the spring").

CDFG's initial draft recommendation for the RPA Action called for a spring pulse flow of 3,500 cfs. AR 00105882. CDFG's highest recommendation was for a pulse of 4,000 cfs. AR 00061652. NMFS raised the pulse to 5,000, reasoning that this would provide "minimum channel forming flows." AR 00105887. In support of providing such "channel forming flows," NMFS cites Kondolf (2001), which provides an analysis of pre- and post-New Melones flood frequency rates at Knights Ferry on the Stanislaus River. Kondolf (2001) concludes: "flows in excess of 5,000 to 8,000 cfs are needed to mobilize the bed and thereby maintain channel form and gravel quality." AR 00122645. Such flows are "important to rejuvenate spawning beds and floodplain rearing habitat and to recruit allochthonous nutrients and large wood into the river." [**401] BiOp at 308.

According to Kondolf (2001), channel-forming flows occurred every 1.4-1.8 years prior to the construction of New Melones, but only once every 5 to 20 years since construction of New Melones. *Id.* Kondolf further explains:

> The frequent floods, those with return intervals of one to five years, and the flows that move the most sediment over time in many natural alluvial channels (commonly considered the "channel forming" flows) (Kondolf *et al.* 1999; Leopold *et al.* 1964), are three to four times smaller since the construction of New Melones Dam. For example, the Ql.s (i.e., the flow equaled or exceeded once per 1.5 years), considered the bankfull flow in many rivers, has been reduced from 5,340 cfs to 1,840 cfs. The [*950] Qlo and Q20 were reduced by six to eight times after construction of New Melones Dam.

AR 00122626. Kondolf (2001) then evaluated the post-dam flood frequency, and concluded that the two-year return flow is 3,070 cfs, meaning that such a flow returns every two years. AR 00122714. A 5,000 cfs flow has a return rate of just over three years. *Id.* Kondolf (2001) supports a regime that would provide for high pulse

No comments

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flows to maintain gravel quality. In general, this is what [**402] Action III.1.3 attempts to achieve.

However, in light of Kondolf (2001)'s conclusion that "flows in excess of 5,000 to 8,000 cfs are needed to mobilize the bed and thereby maintain channel form and gravel quality," SR Plaintiffs challenge whether RPA Action III.1.3, which calls for peak flows of 3,000 cfs in above normal years and 5,000 in wet years, would maintain channel form and gravel quality. Kondolf (2001) provides the only record support for flows above the 3,000 suggested by CDFG, yet Action III.1.3 does not actually implement the flow regime suggested by Kondolf (2001). The record provides no support for the conclusion that the regime imposed by Action III.1.3 is sufficient to maintain gravel quality. Particularly in light of the potentially high water costs of these pulse flows, the rationale for Action III.1.3 must be lawfully explained and justified on remand.

SR Plaintiffs' motion for summary judgment that the record does not support the imposition of Action III.1.3's 5000 cfs spring pulse flow is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

6. DFG Salmon Population Model

a. Use of the Model to Set Out-Migration Flows.

In calculating the [**403] flows CV Steelhead need for outmigration, NMFS relied upon the "SJR salmon model (V.1.0) (output for doubling salmon and calculating the Stanislaus flow contribution....)" AR 00105883. It is undisputed that this is a reference to a CDFG model used to determine flows needed to double salmon in the San Joaquin River. SR Plaintiffs complain that NMFS's use of the model was inappropriate because: (1) steelhead are not salmon; and (2) the "doubling" goal is distinct from the goal of "avoiding jeopardy." Doc. 454 at 29.

The former argument is identical to the surrogate challenges raised by Plaintiffs and rejected above. Salmon are the best available surrogates for CV steelhead, for which the available data is inadequate for modeling purposes.

Nothing in the record explains why it is appropriate to use a model designed to double the existing salmon population to set numeric flow targets to avoid jeopardy to the CV steelhead. The BiOp must explain why each aspect of the RPA is essential to avoid jeopardy or adverse modification. The facial disconnect between the goal of the salmon-doubling model and the goal of ESA section 7 consultation requires explanation on remand.

SR Plaintiffs' motion for [**404] summary judgment that the BiOp unlawfully utilized the CDFG salmon doubling model is GRANTED IN PART AND DENIED IN PART; and Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED IN PART AND DENIED IN PART. That the model used salmon as a surrogate for CV Steelhead was not inappropriate, but the record does not support the use of a model designed to double salmon to set flow targets to avoid jeopardy.

b. NMFS's Reliance on Draft Model Runs from Outdated Version 1.

The record further suggests that NMFS relied on runs from an outdated version of the CDFG Salmon Model. When it produced [*951] the data to NMFS, CDFG explained that the results were preliminary and based upon version 1.0, AR 00061644, which was subsequently subject to peer review and further clarification, AR 00103255-58. CDFG specifically warned NMFS that the results would need to be confirmed through the performance of several checks. AR 00061644. The record reveals no evidence that such corrections were made. The need for confirmation must be addressed on remand.

SR Plaintiffs' motion for summary judgment that the BiOp unlawfully and unreasonably relied upon an outdated version of the CDFG salmon model is GRANTED; [**405] Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

7. SR Plaintiffs' "Impermissible Major Changes" Argument.

SR Plaintiffs originally advanced the argument that the Stanislaus River RPAs were unlawful because they constituted "impermissible major changes" to the New Melones Project. This argument was based on SR Plaintiffs citation to *50 C.F.R. § 402.14(i)(2)* which provides that "[r]easonable and prudent measures, along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration, or timing of the action and may involve only minor changes." However, reasonable and prudent measures ("RPMs") are those measures "necessary or appropriate to minimize [the] impact" of incidental take. *50 C.F.R. § 402.02*. No RPMs are imposed upon Stanislaus River operations. There is no "impermissible major changes" language associated with the imposition of RPAs. SR Plaintiffs' motion for summary judgment on this ground is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED. [40]

40 SR Plaintiffs' alternatively argue that the RPA definition impliedly incorporates the "impermissible major changes" prohibition contained

No comments

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[**406] in the RPM definition. SR Plaintiffs offer no support for this argument, which is contradicted by the general rule that the plain language of a statute governs, absent "some indication of [] regulatory intent that overcomes plain language ... referenced in the published notices that accompanied the rulemaking process." *See Webb v. Smart Document Solutions, 499 F.3d 1078, 1084 (9th Cir. 2007).*

8. Challenges to the BiOp's Feasibility Analyses?

SR Plaintiffs argue that it is impossible to determine from the record whether certain of the Stanislaus River RPA Actions are feasible.

a. General Objection that Feasibility Modeling Employed Erroneous Assumptions.

First, SR Plaintiffs argue that the feasibility modeling employed erroneous assumptions, such as assumptions that constrain allocations to OID and SSJID below their entitlements. Doc. 492 at 12-13. This objection has been rejected, as the modeling captures the actual operation of these districts with reasonable accuracy.

SR Plaintiffs' motion for summary judgment that the BiOp's feasibility modeling employed erroneous assumptions is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

b. Objection that Action [**407] III.1.2's Exception Proceedure Renders the BiOp's Feasibility Analysis of that Action Arbitrary and Capricious.

Second, SR Plaintiffs argue that the RPA's exception procedures render any feasibility analysis irrational. *Id.* at 13. SR Plaintiffs do not specifically identify which Action, III.1.2, III.1.3 or IV.2.1, they assert is rendered infeasible by its exception procedures; but they must be referring [*952] to Action III.1.2, which contains the broad exception procedure discussed above, *see* BiOp at 621. Action III.1.3 contains no exception procedure, BiOp at 622-26, and Action IV.2.1's exception procedure is narrowly limited, BiOp at 644. SR Plaintiffs succeeded on their argument that Action III.1.2's exception procedure is so broad that it has the potential, without further refinement, to render the RPAs ineffectual. Relatedly, an exception procedure without any guarantees as to whether the exception may be successfully invoked when necessary renders any feasibility analysis impossible. Although Federal Defendants' feasibility analysis need not be perfect, it must be rational. Federal Defendants must reconsider their approach to the feasibility analysis in light of the numerous problems [**408] with the exception process identified above.

SR Plaintiffs' motion for summary judgment that the BiOp's feasibility analysis for III.1.2 is arbitrary and capricious is GRANTED; Federal Defendants' and Defendant-Intervenors' cross motions are DENIED.

c. Feasibility of Action III.2.2.

SR Plaintiffs also challenge the feasibility of Action III.2.2, which calls for Reclamation to confer with the SOG to develop an operational strategy to meet the purpose of achieving floodplain inundation flows on a one to three year schedule. [41] *See* Doc. 454 at 32. As this RPA defines no action per se, it is impossible to perform a feasibility analysis of it. Federal Defendants cannot escape the requirement of a feasibility analysis simply because they delay the design of this RPA. Before implementation, Federal Defendants must ensure that any action implemented under RPA Action III.2.2 complies with the requirements of law.

41 Action III.2.2 specifically requires:

> Reclamation shall seek advice from SOG to develop an operational strategy to achieve floodplain inundation flows that inundate CV steelhead juvenile rearing habitat on a one- to three-year return schedule. Reclamation shall submit a proposed plan [**409] of operations to achieve this flow regime by June 2011. This plan shall include the minimum flow schedule identified in Action III.1.2, or shall provide justification for any proposed modification of the minimum flow schedule. NMFS will review and, if satisfactory, approve the operational strategy. Reclamation will implement strategy starting in 2012.

BiOp at 627.

SR Plaintiffs' challenge to this feasibility analysis is correct to the extent there is no validly formulated RPA Action.

9. Are Actions III.1.3, III.2.2 Consistent with the Purposes of the Project?

SR Plaintiffs also argue that implementation of Actions III.1.3 and III.2.2 conflict with one of the express project purposes of New Melones, namely flood control, in violation of *50 C.F.R. § 402.02*'s requirement that an RPA be "consistent with the intended purpose of the ac-

No comments

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tion." *See* Doc. 454 at 32. As to Action III.2.2, which calls for a plan to provide flows large enough to "inundate floodplains" in the winter or spring, no action has yet been defined. SR Plaintiffs' challenge to this feasibility analysis is valid to the extent there is not yet a validly formulated RPA Action.

Action III.1.3 imposes certain pulse flows to benefit [**410] CV Steelhead, including the 5,000 cfs pulse flows in wet years discussed above. SR Plaintiffs suggest that these pulse flows, designed to be "channel forming," will conflict with New Melones' flood control purpose. Doc. 454 at 32. However, the BiOp specifically explains that Action III.1.3 is to be implemented for ten days or less in order to limit seepage impacts to nearby landowners. BiOp at 624. SR Plaintiffs fail to [*953] acknowledge the short duration of the pulse flows, nor do they otherwise explain how flows of this magnitude and limited duration conflict with the flood control purpose of New Melones.

SR Plaintiffs' motion for summary judgment that RPA Action III.1.3 conflicts with the flood control purpose of the New Melones Dam is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

10. Waste and Unreasonable Use of Water (*California Constitution Article X, Section 2*).

Finally, the SR Plaintiffs argue that implementation of the Stanislaus River RPAs would require water waste and unreasonable use in violation of *Article X, Section 2 of the California Constitution*. The Bureau must comply with non-conflicting state water law. Reclamation Act of 1902, Pub. L. No. 57-161, 32 Stat. 288, at § 8 [**411] (June 17, 1902); *California v. United States, 438 U.S. 645, 675, 98 S. Ct. 2985, 57 L. Ed. 2d 1018 (1978).*

The California Constitution states that the right to water is limited to reasonable use, and does not extend to waste or unreasonable use:

> 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.

Cal. Const. art. X, § 2.

SR Plaintiffs concede that release of water for fish is a beneficial use of water in California. However, they argue that the spirit of *Article X, Section 2* dictate that any releases must be carefully tailored to "just what is needed to avoid jeopardy so that the remaining water can be reserved for other equally important beneficial uses." Doc. 454 at 35. SR Plaintiffs then argue that Actions III.1.2, III.1.3, III.2.2 and IV.2.1 violate *Article X, Section 2* "absent record evidence to support a finding that these RPAs use only as much water as is reasonable and necessary to avoid jeopardy." [**412] *Id.* SR Plaintiffs underestimate the complexity of the waste and unreasonable use standard and the process by which they must establish waste and unreasonable use is occurring.

SR Plaintiffs cite no caselaw to support their assertion that the California Constitution's reasonable use doctrine demands that an RPA "be carefully tailored to just what is necessary to avoid jeopardy." To the contrary, the reasonable use doctrine protects a broad range of interests, including fish protection interests that go far beyond prevention of jeopardy. *See, e.g., Nat'l Audubon Soc'y v. Superior Court, 33 Cal. 3d 419, 443, 189 Cal. Rptr. 346, 658 P.2d 709 (1983)* (use of water to maintain scenic and recreational values consistent with the reasonable use doctrine).

Nor do Federal Defendants bear any burden to affirmatively demonstrate that the RPA's comply with the California Constitution. The ESA's implementing regulations specifically enumerate in *50 C.F.R. § 402.02* the analyses NMFS and the Bureau must undertake when promulgating an RPA. It is Plaintiffs who bear the burden in a challenge based upon Article X. *State Water Resources Control Board Cases, 136 Cal. App. 4th 674, 762, 39 Cal. Rptr. 3d 189 (2006)* (rejecting allegation that releases of water pursuant [**413] to D-1641 constituted waste and unreasonable use because the plaintiffs failed to demonstrate that the releases "necessarily result[] in an unreasonable use of water."). The reasonableness of a use of water is a question of fact that depends on the particular circumstances [*954] of each case. *Id.* Any such claim arises under state law, not the APA, and is not limited to the administrative record. The briefing in this case has not addressed in any analytic respect the unreasonable use issue.

SR Plaintiffs motion for summary judgment that the Stanislaus River RPA Actions violate *Article X, Section 2 of the California Constitution* is DENIED WITHOUT PREJUDICE; Federal Defendants' and Defendant-Intervenors' cross motions are PREMATURE.

VII. RECLAMATION'S LIABILITY UNDER THE ESA.

All Plaintiffs move for summary judgment that Reclamation violated the ESA by adopting and implementing the BiOp. Following the issuance of a biological

No comments

- n/a -

opinion, the ESA regulations require the action agency, here, Reclamation, to "determine whether and in what manner to proceed with the action in light of its section 7 obligations and the Service's biological opinion." *50 C.F.R. § 402.15(a)*. In making that determination, [**414] a federal action agency "may not rely solely on a [] biological opinion to establish conclusively its compliance with its substantive obligations under section 7(a)(2)." *Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of Navy, 898 F.2d 1410, 1415 (9th Cir. 1990)*. In *City of Tacoma v. Fed. Energy Regulatory Comm'n, 460 F.3d 53, 76, 373 U.S. App. D.C. 117 (D.C. Cir. 2006)*, the D.C. Circuit summarized the caselaw culminating in *Pyramid Lake:*

> [The] interagency consultation process reflects Congress's awareness that expert agencies (such as the [NMFS] and [FWS]) are far more knowledgeable than other federal agencies about the precise conditions that pose a threat to listed species, and that those expert agencies are in the best position to make discretionary factual determinations about whether a proposed agency action will create a problem for a listed species and what measures might be appropriate to protect the species. Congress's recognition of this expertise suggests that Congress intended the action agency to defer, at least to some extent, to the determinations of the consultant agency, a point the Supreme Court recognized in *Bennett v. Spear, 520 U.S. 154, 169-170, 117 S. Ct. 1154, 137 L. Ed. 2d 281 (1997)*. In *Bennett*, the Court stated [**415] that an action agency disregards a jeopardy finding in a BiOp "at its own peril" and bears the burden of articulating the reasons for reaching its contrary conclusion. *Id.*

> Accordingly, when we are reviewing the decision of an action agency to rely on a BiOp, the focus of our review is quite different than when we are reviewing a BiOp directly. In the former case, the critical question is whether the action agency's reliance was arbitrary and capricious, not whether the BiOp itself is somehow flawed. *Aluminum Co. of Am. v. Adm'r, Bonneville Power Admin., 175 F.3d 1156, 1160 (9th Cir.1999)*; *Pyramid Lake Paiute Tribe v. United States Dep't of Navy, 898 F.2d 1410, 1415 (9th Cir.1990)*; *Stop H-3 Ass'n v. Dole, 740 F.2d 1442, 1460 (9th Cir.1984)*; cf. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv., 422 F.3d 782, 790 (9th Cir. 2005)* (direct review of a BiOp). Of course, the two inquiries overlap to some extent, because reliance on a facially flawed BiOp would likely be arbitrary and capricious, but the action agency "need not undertake a separate, independent analysis" of the issues addressed in the BiOp. *Aluminum Co., 175 F.3d at 1161*. In fact, if the law required the action agency to undertake [**416] an independent analysis, then the expertise of the consultant agency would be seriously undermined. Yet the action agency must not blindly adopt the conclusions [*955] of the consultant agency, citing that agency's expertise. *Id.* Rather, the ultimate responsibility for compliance with the ESA falls on the action agency. *16 U.S.C. § 1536(a) (1)-(2)*. In *Pyramid Lake*, the Ninth Circuit balanced these two somewhat inconsistent principles and articulated the following rule:

> [E]ven when the [consultant agency's] opinion is based on "admittedly weak" information, another agency's reliance on that opinion will satisfy its obligations under the Act if a challenging party can point to no "new" information-i.e., information the [consultant agency] did not take into account-which challenges the opinion's conclusions.

898 F.2d at 1415; *see also Defenders of Wildlife v. U.S. EPA, 420 F.3d 946, 959, 976 (9th Cir. 2005)*; *Stop H-3 Ass'n, 740 F.2d at 1459-60*.

City of Tacoma, 460 F.3d at 75-76. The D.C. Circuit rejected the City of Tacoma's claim that the consultant agency in that case, FERC, was liable under the ESA because the City had not "presented FERC with new information that was unavailable to [NMFS] [**417] or [FWS] and that would give FERC a basis for doubting the expert conclusions in the BiOps those agencies prepared." *Id. at 76*.

No comments

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Reclamation clearly disagreed with NMFS's approach to many important elements of the BiOp's analysis. *See* Doc. 431 at 119 (Plaintiffs' opening brief citing pages in the record containing Reclamation's critiques of the BiOp). This is not alone the litmus test for Reclamation's liability. In the context of ESA consultation, Reclamation is the regulated party and will not necessarily agree with every aspect of NMFS's opinion on the impacts of Reclamation's project on Listed Species. Under *City of Tacaoma*, Plaintiffs must demonstrate that, at the time it adopted the BiOp's RPA, Reclamation was in possession of any "new information" not considered by NMFS that provided Reclamation a basis for questioning the BiOp's expert conclusions. They have not. Absent such a showing, even though the BiOp is flawed in many ways, Reclamation could rely upon it without incurring ESA liability.

All Plaintiffs motions for summary judgment that Reclamation violated the ESA and/or the APA are DENIED; Federal Defendant and Defendant-Intervenors' cross motions are GRANTED.

VIII. CONCLUSION

For [**418] all the reasons set forth above:

(A) Plaintiffs' and DWR's motions for summary judgment that the BiOp violates the ESA and the APA are GRANTED IN PART AND DENIED IN PART; and Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED IN PART AND DENIED IN PART based on the following findings:

(1) It was clear error and inconsistent with standard practice in the field of fisheries biology for Federal Defendants to rely upon the raw salvage analyses set forth in Figures 6-65 and 6-66 to reach conclusions about the effect of specific levels of negative OMR flows on the Listed Species. None of the alternative record citations or analyses cited by Defendants, including the PTM Modeling Results, or Figures 6-71, 6-72, or 6-73, provide sufficient alternative bases for NMFS's conclusions regarding the negative OMR flows below which loss of juvenile salmonids "increases sharply."

(2) Federal Defendants' reliance on Figure 6-71 also suffers from the same unjustified use of raw salvage data. Federal Defendants must clarify on remand whether it is possible to scale the CV steelhead data used in Figures 6-72 and 6-73 to population size and, if not, [*956] why unscaled analyses are nevertheless [**419] useful. Federal Defendants must also further explain and/or refine the statistical methodologies used to develop these figures.

(3) Federal Defendants' did not act unlawfully in failing to apply either of the two suggested life-cycle models (IOS and/or OBAN) or other mathematical models, such as the Ricker or Beverton-Holt models, to evaluate project impacts on the Listed Species. However, NMFS's chronic and unsatisfactorily explained failure to avoid studying, analyzing, and applying a life cycle model approaches bad faith in light of all experts' opinions it can be done in far less than the five years the agency has been pleading lack of ability and resources, and in view of the undeniable importance of the information to resolve the perennial dispute over population dynamics.

(4) NMFS did not act unlawfully by failing to segregate discretionary from non-discretionary actions in evaluating the environmental baseline. Although such a delineation could better document the relationship between the requirements of the species and the action agency's statutory authority to implement the RPA, NMFS disclaims the capacity to undertake appropriate modeling and related analysis and Plaintiffs [**420] have failed to demonstrate that NMFS's claim is unreasonable or false.

(5) Although it is inexplicable that these species are being managed in a piecemeal fashion, without considering all aspects of their life cycles, including impacts to abundance from ocean conditions and ocean harvest, the ESA does not require a quantitative, causative analysis of the relative importance of these non-Project impacts vis-à-vis Project effects.

(6) NMFS did not act unlawfully by employing a 100-year timeframe for its analysis of extinction risk.

(7) Certain aspects of NMFS's winter-run viability analysis are clearly erroneous as identified above and must be corrected on remand.

(8) In view of the inconsistency, the 2009 Salmonid BiOp must explain on remand how its conclusions are consistent with the Orca Salmon Harvest BiOp.

(9) Although the BiOp contains some (uncontested) support for a connection between Project operations and the presence of exotic species, the BiOp is remanded for further explanation of how this relates to indirect mortality of the Listed Species.

(10) The record does not support the BiOp's conclusions about the connection between Project operations on the one hand and pollution and/or [**421] food limitations on the other. This is not the best available science.

(11) NMFS is not required to set a numeric threshold for adverse modification of critical habitat. The record supports the BiOp's conclusion that Project operations will have appreciable negative effects on the Listed Species' critical habitat.

(12) NMFS's use of surrogates was not unlawful.

No comments

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(13) The record provides some, albeit equivocal, evidence to support the imposition of some form of flow:export ratio as part of Action IV.2.1. In a world of sound science, a questionable judgment that has significant adverse consequences for the water supply would not drive the formulation of an RPA. However, this is a scientific dispute between the State and water users' scientists on the one side and federal scientists on the other. Administrative law permits the [*957] agency to make mistakes, and the ESA requires such disputes be resolved in the species' favor. This is Congress' choice.

(14) However, the BiOp does not clearly explain the rationale for imposing a 4:1 ratio in above normal and wet years. Particularly in light of the potential adverse consequences of imposing such a ratio, this is unlawful. Full explanation on remand [**422] is required.

(15) Likewise, although there is marginal record support for the imposition of some form of OMR flow restriction, Action IV.2.3 must be remanded for further explanation of the necessity for the specific flow prescriptions imposed, which are derived primarily from PTM simulations, a method that is undisputedly an imperfect, if not incompetent, predictor of salmon behavior.

(16) Action IV.3 suffers from a similar defect. Although there is record support for some form of action designed to prevent large numbers of fish from being killed or harmed at the export facilities, lawful explanation is required to justify the specific triggers imposed by Action IV.3.

(17) As to Export Plaintiffs' and DWR's argument that the RPA fails to satisfy the four requirements of *50 C.F.R. § 402.02*:

(a) Federal Defendants failed to sufficiently explain whether the RPA can be implemented consistent with the co-equal, non-environmental statutory purposes of the action.

(b) Although the CVPIA does not grant NMFS unlimited power to take whatever Project water it deems essential for the species, under D-1641, lawful RPA's can (and must) be implemented in a manner consistent with the legal authority and [**423] jurisdiction of Reclamation and DWR.

(c) The BiOp reasonably concluded that the RPA is economically feasible for the action agency to implement. Only the costs to the action agency are relevant; economic burdens upon third parties cannot be considered under *TVA v. Hill*.

(d) The fourth *§ 402.02* requirement demands that an RPA avoid jeopardy and/or adverse modification. Consistent with and incorporating the rulings on the merits of the challenges to RPA Actions IV.2.1, IV.2.3 and IV.3, while there is anecdotal evidence for some of the general approaches used in these RPA Actions, the specific prescriptions imposed are not sufficiently justified or explained. NMFS acted arbitrarily and capriciously in concluding that Actions IV.2.1, IV.2.3 and IV.3 are essential to avoid jeopardy and/or adverse modification.

(18) Regarding DWR's related challenges to Action IV.4.2:

(a) Action IV.4.2 is not inconsistent with Action IV.4, and is not unlawful in that respect.

(b) The record lacks affirmative support for findings that either Action IV.4.2(1) or Action IV.4.2(2) are feasible.

(c) The record fails to explain why the measures imposed by Action IV.4.2 are essential to avoid jeopardy and/or adverse [**424] modification.

(B) Stanislaus River Plaintiffs' motion for summary judgment that the BiOp violates the ESA and the APA is GRANTED IN PART AND DENIED IN PART; and Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED IN PART AND DENIED IN PART based on the following findings:

(1) It was not unlawful for NMFS to include the New Melones unit in the action under consideration.

[*958] (2) NMFS did not act unlawfully by failing to distinguish between baseline effects and effects of the action.

(3) As to SR Plaintiffs' challenges to the adverse modification findings related to New Melones:

(a) The BiOp's use of a "maximization" benchmark in connection with its analysis of spawnable area is without support in the record.

(b) The BiOp's finding that New Melones operations affect gravel recruitment is without support in the record.

(c) The record adequately supports the BiOp's findings regarding New Melones' effects on temperature conditions in spawning habitat and on downstream migration corridors.

(4) As to SR Plaintiffs' challenges to the New Melones RPA Actions:

(a) The BiOp does not reasonably or sufficiently explain its decision to set a "maximum habitat goal," which underlies its decision [**425] to use certain assumptions to model RPA actions.

(b) The Stanislaus River RPA Actions do not improperly require Reclamation to infringe on OID and SSJID's prior rights to Stanislaus River water.

No comments

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(c) Federal Defendants did not act unlawfully by failing to utilize the San Joaquin River Water Temperature Model.

(d) The limitations of the exceptions built into Action III.1.2 must be defined on remand to explain how often the exception can be triggered without rendering the Action ineffectual.

(e) The record and best available science do not support Action II.1.3's 5,000 cfs spring pulse flow.

(f) In calculating the flows CV Steelhead need for outmigration, NMFS relied on a CDFG model used to determine flows needed to double salmon in the San Joaquin River. While it was not inappropriate for NMFS to use a model employing salmon as a surrogate for CV Steelhead, nothing in the record explains why it is appropriate to use a model designed to double the existing salmon population to set numeric flow targets to avoid jeopardy to the CV steelhead. This is arbitrary and capricious and must be fully explained on remand. In addition, NMFS must address the fact that the BiOp unreasonably relied upon runs [**426] from an outdated version of the model.

(g) SR Plaintiffs' argument that the Stanislaus River RPAs were unlawful because they constituted "impermissible major changes" to the New Melones Project is without merit, as this requirement applies to "reasonable and prudent measures," none of which were applied to the Stanislaus River.

(h) As to SR Plaintiffs' challenges to the BiOp's feasibility analyses of the Stanislaus River RPA Actions:

(1) The feasibility modeling did not employ erroneous assumptions.

(2) Action III.1.2's exception procedure is so broad that it renders any feasibility analysis wholly unreliable and arbitrary. It is unlawful as formulated.

(3) The feasibility of Action III.2.2 cannot be evaluated because the RPA has yet to be defined. This is not a valid RPA. Federal Defendants must ensure that any Action defined in the future complies with the requirements of law. SR Plaintiffs' challenge to this feasibility analysis is correct to the extent there is not a validly formulated RPA Action.

[*959] (i) SR Plaintiffs' challenge to Action III.2.2 as inconsistent with the flood control purposes of the New Melones Project is valid, as that Action has yet to be defined and is not yet a valid [**427] RPA.

(j) SR Plaintiffs' have not demonstrated that the pulse flows called for in Action III.1.3, designed to be of short duration to limit seepage impacts to nearby landowners, conflict with the flood control purpose of the New Melones Project.

(k) SR Plaintiffs' have failed to meet their burden to demonstrate that the Stanislaus River RPAs violate *Article X, Section 2 of the California Constitution*.

(C) All Plaintiffs' motions for summary judgment that Reclamation violated the ESA and/or the APA are DENIED; Federal Defendant and Defendant-Intervenors' cross motions are GRANTED.

It is undisputed that the law entitles the winter-run and spring-run Chinook, CV steelhead, Southern DPS of green sturgeon, and Southern Resident killer whales to ESA protection. Plaintiffs have succeeded on some of their challenges to the BiOp's justifications and analyses of Delta and Stanislaus River operations. The BiOp discusses and prescribes RPAs to address many other sources of harm, including adverse temperature conditions and blockages caused by dams on the Sacramento River. The BiOp's jeopardy conclusion is lawful. Project operations negatively impact the Listed Species and adversely modify their critical [**428] habitat in various ways that remain incompletely described and quantified.

Some of NMFS's analyses rely upon equivocal or bad science to impose RPA Actions without clearly explaining or otherwise demonstrating why the specific measures imposed are essential to avoid jeopardy and/or adverse modification. Given the potential serious impacts of these measures, the agency must do more to comply with the law.

The 2009 Salmonid BiOp and its RPA are ARBITRARY, CAPRICIOUS, and UNLAWFUL, and are REMANDED to NMFS for further consideration in accordance with this decision and the requirements of law.

Plaintiffs shall submit a form of order consistent with this memorandum decision within five (5) days of electronic service.

Within five (5) days of service of this decision, Federal Defendants shall provide a proposed date by which they shall file the new BiOp and any RPA.

SO ORDERED
Dated: September 20, 2011

/s/ Oliver W. Wanger

United States District Judge

No comments

- n/a -

No comments

- n/a -

APPENDIX DOC. 6

H

United States District Court,
E.D. California.
SAN LUIS & DELTA–MENDOTA WATER AUTHORITY; Westlands Water District, Plaintiffs,
v.
Kenneth Lee SALAZAR, as Secretary of the Interior, et al., Defendants,
Natural Resources Defense Council and the Bay Institute, Defendant–Intervenors.

No. 1:09–CV–00407 OWW DLB.
May 29, 2009.

West KeySummary**Environmental Law 149E ⚷701**

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek701 k. Preliminary injunction. Most Cited Cases

California water districts were entitled to a preliminary injunction to enjoin the United States Fish and Wildlife Service ("FWS") from setting and implementing unnecessarily restrictive river flow restrictions designed to protect the threatened delta smelt. The districts alleged FWS failed to prepare an environmental impact statement ("EIS"), as required by the National Environmental Policy Act ("NEPA"), before it took action. The districts presented evidence that irreparable harm was likely to occur without an injunction and, therefore, FWS was required to consider the harm that its decisions and actions were likely to cause humans, the community, and the environment. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

Daniel Joseph O'Hanlon, Hanspeter Walter, Rebecca Dell Sheehan, William Thomas Chisum, Kronick, Moskovitz, Tiedemann & Girard, Sacramento, CA, for Plaintiffs.

James A. Maysonett, Department of Justice, Washington, DC, for Defendants.

Trent William Orr, George Matthew Torgun, Earthjustice, Oakland, CA, for Defendant–Intervenors.

FINDINGS OF FACT AND CONCLUSIONS OF LAW AND ORDER RE PLAINTIFFS' MOTION FOR PRELIMINARY INJUNCTION
OLIVER W. WANGER, District Judge.

I. *INTRODUCTION*

***1** This case concerns the United States Fish and Wildlife Service's ("FWS") December 15, 2008 biological opinion ("BiOp" or "2008 BiOp") concerning the impact of coordinated operations of the Central Valley Project ("CVP") and State Water Project ("SWP") on the threatened delta smelt. San Luis & Delta–Mendota Water Authority ("Authority") and Westlands Water District ("Westlands") (collectively "Plaintiffs") move for a preliminary injunction to enjoin the application of Component 2 of the Reasonable and Prudent Alternative ("RPA") in the BiOp, which imposes certain flow restrictions on CVP operations in the Old and Middle Rivers ("OMR") of the Sacramento–San Joaquin Delta. Doc. 31, filed April. 24, 2009 (Notice of Mot.); Doc. 32 (Mem. in Sup. of Mot.).

Plaintiffs' underlying complaint and motion for preliminary injunction raise claims against FWS based on the Endangered Species Act ("ESA") and the National Environmental Policy Act ("NEPA"). Plaintiffs have filed numerous supporting evidentiary declarations. Docs. 34–47, 71, 73–76, 78. Federal Defendants oppose the issuance of an injunction, and filed several evidentiary declarations. Doc. 56. Environmental Intervenors also oppose injunctive relief and filed an opposing evidentiary declaration. Doc. 58. The parties agreed to submit the Motion on the papers following oral argument.

Oral argument was heard May 22, 2009. Plaintiffs were represented by Kronick, Moskovitz, Tiedemann & Girard by Daniel J. O'Hanlon, Esq. Federal Defendants, including the Secretary of the Interior Kenneth Lee Salazar, the United States Department of the Interior, FWS, Acting Director of FWS Rowan Gould, Regional Director of FWS Ren Lohoefenor, United States Bureau of Reclamation ("Bureau" or "Reclamation"), Acting Commissioner of Reclamation J. William McDonald, and Regional

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No comments

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Director Donald Glaser, were represented by James A. Maysonett, Esq., and William J. Shapiro, Esq ., Trial Attorneys, Environment and Natural Resources Division, U.S. Department of Justice. Defendant–Intervenors, The Bay Institute and Natural Resources Defense Council ("NRDC") were represented by George M. Torgun, Esq., Katherine Poole, Esq. and Doug Obegi, Esq. After considering all of the briefs, oral argument, and evidence, the following findings of fact and conclusions of law are entered.

II. *BACKGROUND*

The 2004 Biological Opinion on the effects of the coordinated operations of the CVP and SPW on the delta smelt, a species currently listed as "threatened" under the ESA, was found unlawful in a May 25, 2007 decision, *NRDC v. Kempthorne,* 1:05–CV–1207 (*"NRDC"*), 506 F.Supp.2d 322 (E.D.Cal.2007). *See NRDC* Doc. 323. After remand and a requested extension of time, on December 15, 2008, FWS issued a new biological opinion ("BiOp" or "2008 BiOp"). *See* Plaintiffs' Request for Judicial Notice ("PRJN"), Doc. 33, at Ex. A. [FN1] In the 2008 BiOp, FWS concludes that CVP and SWP operations, as proposed, are "likely to jeopardize the continued existence of" the delta smelt and "adversely modify" its critical habitat. BiOp at 276–79. Because FWS reached a "jeopardy" conclusion, it adopted a "reasonable and prudent alternative" ("RPA") designed to avoid jeopardy and/or adverse modification. BiOp at 279–85. Component 2 of that RPA requires Reclamation and the California Department of Water Resources ("DWR") to operate the Projects to limit negative water flows in OMR during a defined period in the spring to "no more negative than –1,250 to –5,000 [cubic feet per second (cfs)]," ending on June 30, or when water temperature reaches 25°C for three consecutive days, whichever is sooner. BiOp at 282, 357–68.

FN1. Plaintiffs request that the court take judicial notice of the following: (1) FWS December 15, 2008 biological opinion on proposed coordinated operations of the CVP and SWP, PRJN Ex. A; (2) Proclamation, State of Emergency—Water Shortage, Governor of the State of California, Arnold Schwarzenegger, February 27, 2009, PRJN Ex. B; (3) Executive Order S–06–08, Governor of the State of California, Arnold Schwarzenegger, June 4, 2008, PRJN Ex. C; (4) Proclamation, State of Emergency—Central Valley Region, Governor of the State of California, Arnold Schwarzenegger, June 12, 2008, PRJN Ex. D; (5) Proclamation of Existence of a Local Emergency and Request for the Governor to Proclaim a State of Emergency and Request for a Presidential Declaration and Request for State and Federal Assistance by the Board of Supervisors, County of Fresno, State of California, Resolution 09–134, signed April 14, 2009, PRJN Ex. E. Pursuant to Federal Rule of Evidence 201, these public record are subject to judicial notice as to their content and existence but not for the truth of the matters stated therein. Plaintiffs' request is GRANTED.

***2** OMR flow restrictions have been the subject of a previous order. In July 2007, NRDC's motion for a preliminary injunction on OMR flow restrictions was denied. *NRDC,* Doc. 394. In December 2007, after a seven day remedies trial, extensive findings of fact were issued on the effects of negative OMR flows and Reclamation and DWR were ordered, among other things, to "operate the CVP and SWP to achieve a daily average net upstream flow in OMR of between 750 and 5,000 cfs on a seven-day running average" during a defined period in the spring. *NRDC,* Doc. 560 at 7; *see also NRDC,* Doc. 561 at 15–20.

III. *FINDINGS OF FACT*

A. *Status of the Species.*

1. The available, uncontradicted data indicates a precipitous decline (by as much as several orders of magnitude) in the relative abundance of delta smelt since 2000. In previous, related proceedings, the expert witnesses were in agreement that the species is in serous trouble. *NRDC,* Doc. 561 at ¶ 11.

2. More recent evidence shows that the species has declined even further since its status was last reviewed in December 2007. Recent fall mid-water trawl ("FMWT") abundance indices are among the lowest ever recorded. BiOp at 153–156. The 2008 index was 23, the lowest level ever recorded. Doc. 38, First Hanson Decl. at ¶ 7; Doc. 56–2, Goude Decl. at ¶ 2. Cay Goude, FWS's Assistant Field Supervisor for the endangered species program in FWS's Sacramento Fish and Wildlife Office, opines

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No comments

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that the delta smelt's failure to rebound in 2009 is not surprising because of the smelt's low abundance and the fact that California is in its third consecutive year of dry or critically dry conditions. Goude Decl. at ¶ 11.

3. On March 6, 2009, the California Fish and Game Commission reclassified delta smelt from threatened to endangered under the California Endangered Species Act ("CESA"), finding that the species has "declined significantly since its listing as threatened and the species' abundance is now extremely low." Doc. 59–2, Obegi Decl. at ¶ 7 & Attch. 6. On July 10, 2008, FWS announced a ninety-day finding that uplisting delta smelt as endangered under the ESA may be warranted. 73 Fed.Reg. 39,639 (July 10, 2008).

B. *Development of FWS's December 15, 2008 Biological Opinion.*

4. On remand from the Court, the Bureau and DWR, with the advice and assistance of Plaintiffs and other water contractors, prepared a biological assessment ("BA") describing the proposed operations for the consultation and evaluating the impact of proposed operations on the smelt. The BA included no measures to protect delta smelt, except for those measures required by the terms and conditions of the Projects' water rights permits and licenses. Obegi Decl. at ¶ 6 & Attch. 5.

5. FWS prepared a preliminary draft BiOp that was reviewed by both FWS's internal and an independent peer review team. *See* BiOp at vi. The final BiOp, issued December 15, 2008, concluded that the operations proposed in the BA would cause jeopardy to the continued existence and recovery of delta smelt and would adversely modify its critical habitat. *Id.* at 276–279. As a result of the jeopardy and adverse modification finding, FWS included a reasonable and prudent alternative ("RPA") designed to avoid jeopardy. *Id.* at 279–85.

C. *The Reasonable and Prudent Alternative.*

***3** 6. The RPA comprises five (5) components. Components 1, 2 and 3 establish a range of permissible OMR flows during different times of the winter and spring, with biologically based triggers to begin, suspend, or terminate each component. *Id.* at 279–285; *see also* BiOp Attch. B.[FN2] These components are designed to prevent entrainment of adults, juveniles, and larvae, as well as to improve flow conditions to allow delta smelt to spawn and rear successfully. *Id.* Once flow restrictions are triggered, FWS establishes the particular flow standard using an adaptive management process which incorporates current delta smelt surveys and sampling (including the FMWT, Spring Kodiak Trawl, 20–mm Survey, and TNS), water quality monitoring (turbidity and flow levels), particle tracking model ("PTM") [FN3] results, recent salvage data, and the advice of the Smelt Working Group ("SWG") and Water Operations Management Team ("WOMT"). *Id.; see* Goude Decl. at ¶ 7 & Ex. F (SWG notes). Plaintiffs' expert's initial suggestion that the adaptive management process places undue weight on PTM results, while ignoring actual delta smelt distribution, First Hanson Decl. at ¶ 15, is wrong.

FN2. Component 4, which requires DWR to implement a program to create or restore habitat in the Delta and Suisun Marsh, is "intended to provide benefits to delta smelt habitat to supplement the benefits resulting from the flow actions" described in Components 1 through 3. BiOp at 283. Component 5 requires the Bureau and DWR to implement a monitoring and reporting program. *Id* . at 284.

FN3. PTM focuses on the impact of flows upon imaginary particles "injected" into a particular location in the Central Delta, station 815. BiOp at 366.

7. The RPA is designed to avoid jeopardy to the continued existence and recovery of delta smelt and to prevent the adverse modification of critical habitat by:

> 1) preventing/reducing entrainment of delta smelt at Jones and Banks; 2) providing adequate habitat conditions that will allow the adult delta smelt to successfully migrate and spawn in the Bay–Delta; 3) providing adequate habitat conditions that will allow larvae and juvenile smelt to rear; and 4) providing suitable habitat conditions that will allow successful recruitment of juvenile delta smelt to adulthood.

BiOp at 279.

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No comments

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8. The current motion only seeks to enjoin application of Component 2. Doc. 32 at 5, 13–14. The period for Component 1 has expired, and Component 3 will not be implemented this year. *Id.* at 5 n. 2. Component 2 is designed to protect larval and juvenile delta smelt from entrainment and to provide adequate flow conditions "so that larval and juvenile delta smelt can successfully rear in the Central Delta and move downstream when appropriate." BiOp at 282. It is triggered by one of three events: completion of Component 1; capture of spent delta smelt females in salvage or surveys; or a 3–station average of Delta water temperatures reaching 12°C. *Id.* Component 2 ends when the three-day average of water temperatures at Clifton Court Forebay reaches 25°C, or June 30, whichever event comes first. *Id.* RPA Component 2 requires an OMR flow standard of between –1,250 and –5,000 cfs, on a 14–day running average, with the five-day running average within 25% of the required flow. *Id.*

9. The actual OMR flow levels permitted under Component 2 in May and June are based on an adaptive process developed in consultation with the SWG [FN4] starting in 2007, called "Influence–Exposure–Intensity–Response (IEIR) Analysis," which incorporates salvage data, distributional data from surveys, the location of X2, water temperature data, PTM results, and prior year FMWT data. *Id.* at 358–359, 364–366. "During most conditions, it is expected that maximum negative OMR flows will range between –2000 and –3500. During certain years of higher or lower predicted entrainment risk, flow requirements as low as –1,250 or –5,000 will be recommended to the Service by the SWG." *Id.* at 357, fn. 10; *see also id.* at 360, 363. FWS will set negative OMR flows in a range between –1,250 cfs and –5,000 cfs, depending upon whether entrainment risk is deemed "low," "lesser," or something greater. *Id.* at 359.

> FN4. The SWG is no longer known as the "delta smelt working group" because it now also routinely considers protections for longfin smelt, another pelagic species that became a state candidate for listing under the California Endangered Species Act ("CESA") in 2008. *See* BiOp at 30.

***4** 10. If "available physical and biological real-time monitoring data" indicate a "low-entrainment risk scenario," then OMR flows can be as negative as –5,000 cfs. *Id.* at 358. "Low" entrainment risk is indicated only when "there has been no evidence of delta smelt in the South and Central Delta or larval delta smelt are not yet susceptible to entrainment." *Id.* The BiOp's "high-entrainment risk scenario" arises when any delta smelt have been found in the South and Central Delta from the Spring Kodiak Trawl or the 20 mm survey, or when there is ongoing entrainment at the pumps. BiOp at 358. In these conditions, FWS will be more restrictive than –5,000 cfs. *Id.* at 358–59.

11. Component 2 is designed to "minimize the entrainment of larval/juvenile delta smelt in the Central and South Delta." BiOp at 360. "In recent years, the densest concentrations of both spawners and larvae have been recorded in the Cache Slough/Sacramento Deepwater Ship Channel complex in the North Delta." *Id.* at 148. The BiOp provides that "[w]hen the distribution of delta smelt is in the North or North/Central Delta," minimization of take will be accomplished "by holding entrainment to ~1 percent of the individuals utilizing the Central and South Delta (south and east [upstream] of Station 815, see Map 2) across a 14–day particle modeling interval." *Id.* at 360. FWS calls this 1% entrainment standard its "protectiveness criterion." *Id.* Under this criterion, FWS will seek to limit entrainment to approximately 1% of the larvae and juveniles at Station 815 in the Central Delta, even if only a small portion of the overall recorded population of larvae and juvenile delta smelt is in the Central and South Delta.

12. The BiOp further explains:

> In circumstances where it is known or suspected that the Central Delta or South Delta is a principal source of emerging larvae, as occurred in WY 2003, OMR restrictions might be calculated using reduction of 14–day Station 815 entrainment below 1 percent, or other methods as needed to ensure protection of the larval population in conditions of such severe vulnerability. *The Action utilizes OMR restrictions to achieve the desired end, as OMR flow is a strong predictor of geographical variation in entrainment risk in the Central and North Delta.*

Id. (emphasis added).

13. In addition to the adaptive management framework provided in the BiOp, the RPA also in-

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cludes a provision stating that in consecutive dry or critically dry years, CVP/SWP export rates will never be required to drop below –1,500 cfs "in order to allow the CVP/SWP to provide health and safety needs, critical refuge supplies, and obligation[s] to senior water rights holders." BiOp at 296. The BiOp also allows for the reinitiation of consultation under certain circumstances. *Id.* at 296–297.

14. Since December 15, 2008, FWS and the Bureau have been using the adaptive management framework to implement the BiOp. The SWG has met approximately every week to provide guidance to FWS in setting OMR flow requirements and has based its recommendations on survey, salvage, water quality, and other data sets, in combination with PTM results. *See* Goude Decl. at ¶ 7 & Ex. F (SWG notes).

D. *Current Location of Smelt & Entrainment Risk.*

***5** 15. The Spring Kodiak Trawl surveys completed by the California Department of Fish and Game ("DFG") in January, February, March, and April of 2009 reflect the distribution of adult spawning delta smelt. First Hanson Decl. at ¶ 8. The results of these surveys indicate that, up until May of this year, most of the adult delta smelt spawned in the northern and western reaches of the Delta. *Id.* However, the month of May is historically a period when high numbers of smelt become entrained at the export facilities. Fed. Def. Ex. B (Service Decision May 21, 2009). The April 20–24 20 mm survey results found delta smelt at several stations in the Central and South Delta, including stations 705, 815, 910, and 914, while the May 5–8 20 mm survey results found delta smelt at stations 901, 815, 705, and 801. Goude Decl., Ex. A; Obegi Decl., Attach. 4. As of May 21, 2009, the most recent 20 mm survey again indicates that some delta smelt were caught in the Central Delta. Fed. Def. Ex. B.

16. Salvage has also increased: on May 16, 12 delta smelt were salvaged; 24 on May 17; 20 on May 18; 4 on May 19; 28 on May 20; and 8 on May 21. Fed. Def. Ex C (Central Valley Operations Office, Delta Smelt and Splittal, May–09). Larvae smaller than 20 mm are not counted in these salvage reports. BiOp at 163.

E. *Implementation of Related Actions.*

17. On February 23, 2009, DFG issued a permit to DWR authorizing the legal take of longfin smelt under CESA. Obegi Decl. at ¶ 2 & Attch. 1 (ITP permit). That permit imposes OMR flow restrictions to protect juvenile longfin smelt between January and June, which are very similar to those required by FWS's delta smelt BiOp. When triggered, OMR flows must remain between –1,250 and –5,000 cfs, based on "survey data, including all of the distributional and abundance data, and other pertinent biological factors that influence the entrainment risk of larval and juvenile delta smelt." *Id.* (ITP at 10–11). DFG identified likely flow conditions of –2,000 to –5,000 cfs for April and May, and –5,000 cfs for June. *Id.* (ITP at 11). One reason why DFG has not imposed pumping restrictions to protect longfin smelt is that "Current delta smelt advice will be protective of longfin smelt larvae." *See* Goude Decl., Ex. F (2009 SWG notes from 3/16, 3/23, 3/30, 4/6).

18. Action by the DWR or DFG is not a concern that need be addressed here due to the protections afforded by the RPA.

F. *Socioeconomic and Environmental Effects of Water Shortage, Drought, and Recession.*

19. On February 27, 2009, the Governor of California declared a state-wide drought emergency, based on his finding that "conditions of extreme peril to the safety of persons and property exist in California caused by the current and continuing severe drought conditions and water delivery restrictions." PRJN Ex. B. On April 14, 2009, the Fresno County Board of Supervisors adopted a proclamation declaring an emergency and requesting federal and state assistance to address soaring unemployment and shortages of food. According to the proclamation, due to water shortages "thousands of people who once relied on employment in the agricultural sector are now unemployed and struggling to meet their most basic needs, such as providing food for their family." PRJN Ex. E at 2:8–10. The Community Food Bank has inadequate capacity to meet the overwhelming increase in need. *Id.* at 2:21–3:2.

***6** 20. Plaintiffs' members are trying to compensate for these shortages through the use of groundwater. Doc. 36, Die drich Decl. at ¶¶ 4, 7; Doc. 35, Coburn Decl. at ¶ 4; Doc. 39, First Harris Decl. at ¶¶ 2–3; Doc. 43, Nelson Decl. at ¶¶ 3, 7; Doc. 37, First Freeman Decl. at ¶¶ 7, 11, 12. However, groundwater supplies cannot meet all crop demands, and often contain undesirably high concentrations of salts and

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minerals. *See* First Freeman Decl. at ¶ 12. Pumping of groundwater also entails increased energy usage. *Id.* at ¶ 17. Without replacement water supplies, many farmers' only other option is to fallow land. Harris Decl. at ¶¶ 4–5; Die drich Decl. at ¶ 4; Freeman Decl. at ¶ 11, 12. The water supply situation has resulted in loss of on-farm employment, reduced crop production, destruction of some permanent crops, and may require some farmers to sell their land and abandon farming altogether. Coburn Decl. at ¶¶ 5–7; Allen Decl. at ¶ 5; Harris Decl. at ¶¶ 7–8; Die drich Decl. at ¶ 8.

21. Based on the initial 2009 water year zero percent allocation from the CVP by Reclamation, 220,000 to 250,000 acres (of the total 560,000 normally under production) are expected to be fallowed within Westlands this year. Freeman Decl. at ¶¶ 3, 11. Substantial land fallowing is expected in other districts that depend upon CVP water deliveries for irrigation. Doc. 43, Nelson Decl. at ¶¶ 10–11; Doc. 40, Harrison Decl. at ¶ 11.

22. Plaintiffs submit the declarations of Robert Silva, Mayor of the City of Mendota, and Marcia Sablan, Mayor of the City of Firebaugh, who describe, from their perspective, the impact of agricultural job losses on their communities. These declarations assert that the current unemployment rate in Mendota and Firebaugh is 40 percent. Silva Decl. at ¶ 3; Sablan Decl. at ¶ 4. That reductions in employment and farm and farmworker incomes have resulted in a loss of tax revenue available to fund municipal services, leading to a reduction in staffing of local government. Silva Decl. at ¶ 4; Sablan Decl. at ¶ 6. Ms. Sablan believes that if the City of Firebaugh's tax revenues continue to decrease "it is possible that fire and police protection services will be faced with substantial cuts." Sablan Decl. at ¶ 6. Although the City of Mendota currently has no independent police force, the economic conditions have stalled the City's implementation of plans to start its own police department. Silva Decl. at ¶ 4

23. Local schools are suffering as well. Sablan Decl. at ¶ 7. Families of displaced farm workers are often forced to combine households resulting in crowded and stressful conditions impacting affected students' academic performance. *Id.* Additionally, as families and students relocate from rural areas due to a lack of employment, the rural school districts lose much needed revenue from the State. *Id.; see also* Hernandez Decl., Doc. 41.

***7** 24. Plaintiffs also submit the declaration of Dana Wilkie, the CEO of the Community Food Bank, a non-profit organization that provides food to hungry families in Fresno, Madera, and Kings Counties. Doc. 47. She declares that "[t]he number of people in our service area experiencing food insecurity has recently increased substantially." *Id.* at ¶ 6. In response, the Food Bank is endeavoring to increase its distribution of food to needy members of the community to respond to the increasing number of people requiring such assistance. *Id.* at ¶ 4.

25. There is also a possibility that increased reliance upon groundwater will lead to unsustainable overdraft of the groundwater basin and resulting land subsidence, causing damage to wells and water distribution facilities, as well as increased soil salinity and toxicity as a result of applying water with higher salinity and minerals to the soil. Freeman Decl. at ¶¶ 13–16. Increased land fallowing is also known to cause increased dust emissions which degrade air quality. *Id.* at ¶ 21.

26. Environmental Plaintiffs present the declaration of Jeffrey A. Michael, Ph.D., an economist who analyzes data from California's Employment Development Department regarding recent employment trends in the farm and non-farm sectors around the state. Dr. Michael explains that the San Joaquin Valley, like the rest of the United States, is suffering from the deepest recession since the Great Depression and that the recession is largely caused by foreclosures and the collapse of the real estate market. Doc. 58–2, Michael Decl. at ¶ 2. California has experienced the largest drop in real estate prices in the nation, and the San Joaquin Valley is experiencing among the highest foreclosure rates in the nation. *Id.* at ¶ 3. These factors have contributed to widespread unemployment across the state, particularly in non-farm sectors such as the construction and hospitality sectors. *Id.* at ¶¶ 2–3.

27. Dr. Michael opines that employment in the farm sector has fared "relatively well," with farm employment *increasing* by 2.5% across California between March 2008 and March 2009, and *increasing* in several Valley counties over the same time period, including Fresno (by 3.2%), Kern (by 4.2%)

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Tulare (by 4.3%), and Stanislaus–Merced–Madera–Kings (by 5.8%). *Id.* at ¶ 6 & Ex. 3. These increases in farm employment have buffered the overall decline in employment for metropolitan areas such as Fresno and Bakersfield, which are experiencing lower unemployment rates than eight other large metropolitan areas in the State, including Los Angeles, Sacramento, Oakland, Riverside, San Die go, Orange, San Jose, and San Francisco. *Id.* at ¶ 7 & Ex. 2. Dr. Michael also opines that declining school enrollment and sales tax revenue are being experienced across California and are largely explained by high rates of residential foreclosures and the real estate downturn. *Id.* at ¶ 9.

***8** a. In response to Dr. Michael's declaration, Plaintiffs offer the testimony of Dr. Richard Howitt of the University of California at Davis, an agricultural economics professor, who presents the results of his recent, published research on the predicted impacts of the current drought and fishery related pumping restrictions on the communities of the Central Valley. Doc. 74, Howitt Decl. at ¶ 2. Dr. Howitt opines that more than 34,000 jobs will be lost in the San Joaquin Valley as a result of the water delivery restrictions, and that most of these job losses will be suffered by farm workers and employees of packing houses and processing plants. *Id.* at ¶ 5. He further states that these individuals are typically low-income workers with few alternatives for other work. *Id.*

b. Dr. Howitt opines that Dr. Michael's declaration is "largely irrelevant to the question of measuring the incremental loss in employment due to water reductions to the Westside of the San Joaquin valley," because, among other things, Dr. Michael used employment data that extends only to the start of the current farm year in March 2009 and therefore cannot project the impacts of cuts in water supply; and the data he used is aggregated over all regions of Fresno County, obscuring relative impacts to the Westside. *Id.* at ¶ 9.

c. In light of Dr. Howitt's undisputed criticisms, Dr. Michael's declaration is only marginally relevant, as it measures economic trends at a "macro" scale.

G. *Predicted Impact of OMR Restrictions on Pumping during Late May and June.*

28. Under Reclamation's April forecast of operations, released April 21, south-of-Delta CVP water service agricultural contractors are projected to receive a 10% contract allocation, instead of the zero allocation indicated by the March forecast. Snow Decl. at ¶¶ 13–14; Exs. B, C. However, the volume of water actually delivered will depend, at least in part, upon how FWS regulates negative OMR flows from May 18 through June 30. *Id.* at ¶¶ 15–19.

29. Reclamation's April 2009 forecast of CVP operations, on which the 10% allocation is based, indicates a CVP export pumping for the period beginning May 18 through May 31 of about 65,000 acre-feet. *Id.* at ¶ 15. The forecast indicates an expected volume of CVP pumping of about 150,000 acre-feet during the month of June. *Id.* Reclamation's forecast further indicates that OMR flows will be at about –3,000 cfs during late May, and –3,900 cfs during June. *Id.* It is undisputed that if the CVP were free to pump water at rates unrestricted by the criteria for negative OMR flows prescribed by the BiOp, the allocation of water for south-of-Delta CVP contractors could be increased by approximately 60,000 acre-feet. *Id.* at ¶ 16. This is approximately equivalent to an additional 5% allocation. *Id.*

30. Relatedly, if FWS restricts OMR flows in late May and June more tightly than the April forecast indicates, the Bureau may not be able deliver the 10% allocation. *Id.* ¶ 18. The 10% allocation depends upon the assumed pumping in late May and June, because, under the current forecast, the CVP pumps will already be at maximum capacity beginning on July 1. *Id.* ¶ 19. There would be no opportunity to make up for lost May and June pumping using the CVP facility beginning in July. *Id.* Although the SWP pumps can pump CVP water under the "joint point of diversion" provisions of Decision 1641, this procedure is subject to a number of contingencies, including the Bureau having capacity to hold water in storage for pumping after June 30, whether the SWP will have available capacity at the Banks Pumping Plant, and whether the projects would be able to meet water quality requirements. *Id.* at ¶ 19.

IV. *CONCLUSIONS OF LAW*

A. *Standard of Review.*

***9** 1. In general, the standard for granting a preliminary injunction balances plaintiff's likelihood of success against the relative hardship to the parties.

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The Ninth Circuit previously recognized two different sets of criteria for preliminary injunctive relief. Under the traditional test, "a plaintiff must show: (1) a strong likelihood of success on the merits, (2) the possibility of irreparable injury to plaintiff if preliminary relief is not granted, (3) a balance of hardships favoring the plaintiff, and (4) advancement of the public interest (in certain cases)." *Taylor v. Westly*, 488 F.3d 1197, 1200 (9th Cir.2007). An "alternative" test required that "a plaintiff demonstrate either a combination of probable success on the merits and the possibility of irreparable injury or that serious questions are raised and the balance of hardships tips sharply in his favor." *Id.* "These two formulations represent[ed] two points on a sliding scale in which the required degree of irreparable harm increases as the probability of success decreases. They [were] not separate tests but rather outer reaches of a single continuum." *Id.*

2. The Supreme Court, in *Winter v. NRDC*, —— U.S. ——, 129 S.Ct. 365, 172 L.Ed.2d 249 (2008), rejected the Ninth Circuit's application of that part of the alternative test which permitted an injunction where there was only the "possibility of irreparable injury." *Winter* found this standard "too lenient," and reiterated that its own "frequently reiterated standard requires plaintiffs seeking preliminary injunctive relief to demonstrate that irreparable injury is likely in the absence of an injunction." *Id.* at 375.

3. Following *Winter,* the Ninth Circuit revised its preliminary injunction standard:

> In *Winter,* the [Supreme] Court reversed one of our decisions, which, it determined, upheld a grant of a preliminary injunction by use of a standard that was much too lenient. As the Court explained, an injunction cannot issue merely because it is *possible* that there will be an irreparable injury to the plaintiff; it must be *likely* that there will be....
>
> The Court [defines] the rule ... as follows:
>
> > A plaintiff seeking a preliminary injunction must establish that he is likely to succeed on the merits, that he is likely to suffer irreparable harm in the absence of preliminary relief, that the balance of equities tips in his favor, and that an injunction is in the public interest.
>
> To the extent that our cases have suggested a lesser standard, they are no longer controlling, or even viable.

Am. Trucking Ass'ns., Inc. v. City of Los Angeles, 559 F.3d 1046, 1042 (9th Cir.2009) (emphasis added).[FN5]

> FN5. Although it does not appear to be an issue in this case, district courts within the Ninth Circuit have suggested that the second prong of the alternative test, which permits injunctive relief where plaintiff is able to show "serious questions going to the merits," survived *Winter. See Save Strawberry Canyon v. Dept. of Energy*, 613 F.Supp.2d 1177, 2009 WL 723836, *13 n. 2 (N.D.Cal.2009).

B. *Analysis.*

1. *Likelihood of Success on the Merits.*

a. *Lack of Claims Against Reclamation.*

4. Plaintiffs request Federal Defendants be enjoined "from limiting pumping at the CVP's Jones pumping plant between now and June 30, 2009 pursuant to the provisions of the BiOp" unless FWS provides further justification for its decisions. *See* Doc. 48, Prop'd Order, at 2; Draft Hearing Transcript, May 22, 2009, at 29–30. Federal Defendants object to the issuance of any injunctive relief against the *Bureau* because, although Plaintiffs sued Reclamation, they have not alleged any claims against Reclamation. *See* Complaint, Doc. 1. Plaintiffs name the Bureau as a defendant, Compl. ¶ 18, but do not allege that Reclamation has violated any laws. Instead, their complaint asserts that they have only named Reclamation as a defendant "so that the Court may provide an adequate remedy ... regarding CVP operations...." Compl. at ¶ 51.

***10** 5. To enjoin the Bureau, the court must have jurisdiction over the agency, which requires, at a bare minimum, that Plaintiffs bring claims against the Bureau. *See Or. Natural Desert Ass'n v. Lohn*, 485 F.Supp.2d 1190, 1196 (D.Or.2007), vacated on other grounds, 2007 WL 2377011 (D.Or. June 11, 2007) (denying injunctive relief against an action agency in

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an ESA case where Plaintiffs "brought suit only against the consulting agencies"). However, the preliminary injunction Plaintiffs seek is *directed at how FWS will set OMR flows within the –1,250 to –5,000 cfs range* through June 30, or until the water temperatures reach 25°C in Clifton Court Forebay. Plaintiffs rejoin that "[o]nce FWS sets that limitation, Reclamation will presumably comply and pump what water it can consistent with that limitation to fulfill its contractual and other obligations." Doc. 70 at 12.

6. Component 2's adaptive management process affords the Bureau some say in the setting of OMR flows, but that input is subject to FWS's ultimate authority. Specifically, once FWS receives a recommendation from the SWG that an action should be initiated, changed, suspended, or terminated, FWS "determines whether the proposed action should be implemented, modified, or terminated; and the OMR flow needed to achieve the protection." BiOp at 280. FWS then presents its determination to the WOMT, which is made up of representatives from the *Bureau,* DWR, FWS, NMFS, and DFG. *Id.* at 28, 280. The WOMT may either "concur with the recommendation or provide a written alternative to the recommendation" to FWS within one calendar day. *Id.* at 280. FWS "shall then make a final determination on the proposed action to be implemented, which shall be documented and posted" on the internet. *Id.* If FWS determines that an OMR flow change is required, the Bureau and DWR "shall adjust operations to manage to the new OMR flow within two days of receipt of [FWS's] determination ." *Id.* Because FWS has ultimate control over setting OMR flows, and the Bureau must comply with those recommendations, it is sufficient that Plaintiffs filed suit against and seek to enjoin only FWS's actions.[FN6]

FN6. Under the circumstances, any injunction issued in this case will bind the Bureau's implementation of OMR flow restrictions pursuant to Federal Rule of Civil Procedure 65's provision that "persons who are in active concert or participation" with a properly named defendant can be bound by an injunction.

2. *NEPA Claims Against FWS.*

a. *Does the Issuance of the BiOp Trigger the Need for NEPA Compliance?*

7. Because the admissibility of evidence of economic harm turns on the viability of the NEPA claim, it is appropriate to first evaluate Plaintiffs' likelihood of success on that claim. Plaintiffs argue that FWS was required to prepare an environmental impact statement ("EIS") in connection with the issuance of the BiOp. It is undisputed that no NEPA document was prepared.

8. NEPA requires all federal agencies to prepare an EIS to evaluate the potential environmental consequences of any proposed "major Federal action [ ] significantly affecting the quality of the human environment" 42 U.S.C. § 4332(C). The preparation of an EIS serves a number of purposes:

> ***11** It ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts; it also guarantees that the relevant information will be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation of that decision.
>
> Simply by focusing the agency's attention on the environmental consequences of a proposed project, NEPA ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast. Moreover, the strong precatory language of § 101 of the Act and the requirement that agencies prepare detailed impact statements inevitably bring pressure to bear on agencies "to respond to the needs of environmental quality." 115 Cong. Rec. 40425 (1969) (remarks of Sen. Muskie).
>
> Publication of an EIS, both in draft and final form, also serves a larger informational role. It gives the public the assurance that the agency has indeed considered environmental concerns in its decisionmaking process, and, perhaps more significantly, provides a springboard for public comment.

Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 349, 109 S.Ct. 1835, 104 L.Ed.2d 351 (1989) (internal citations and quotations omitted). "NEPA does not contain substantive requirements that dictate a particular result; instead, NEPA is

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aimed at ensuring agencies make informed decisions and 'contemplate the environmental impacts of their actions.' " *Ocean Mammal Inst. v. Gates,* 546 F.Supp.2d 960, 971 (D.Hi.2008) (quoting *Idaho Sporting Cong. v. Thomas,* 137 F.3d 1146, 1149 (9th Cir.1998)).

9. The Ninth Circuit has held that an agency must prepare an EIS "where there are substantial questions about whether a project may cause significant degradation of the human environment." *Native Ecosystems Council v. U.S. Forest Serv.,* 428 F.3d 1233, 1239 (9th Cir.2005). An agency may choose to prepare an environmental assessment ("EA") to determine whether an EIS is needed. 40 C.F.R. §§ 1501.4, 1508.9(b). The EA must identify all reasonably foreseeable impacts, analyze their significance, and address alternatives. 40 C.F.R. §§ 1508.8, 1508.9, 1508.27. If, based on the EA, the agency concludes that the proposed actions will not significantly affect the environment, it may issue a Finding of No Significant Impact ("FONSI") and forego completion of an EIS. *Bob Marshall Alliance v. Hodel,* 852 F.2d 1223, 1225 (9th Cir.1988); 40 C.F.R. § 1501.4(e).

10. Federal regulations implementing NEPA help to define when "major federal actions" take place:

> Major Federal action includes actions with effects that may be major and which are potentially subject to Federal control and responsibility. Major reinforces but does not have a meaning independent of significantly ([40 C.F.R.] § 1508.27). Actions include the circumstance where the responsible officials fail to act and that failure to act is reviewable by courts or administrative tribunals under the Administrative Procedure Act or other applicable law as agency action.
>
> ***12** (a) Actions include new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; new or revised agency rules, regulations, plans, policies, or procedures; and legislative proposals (§§ 1506.8, 1508.17). Actions do not include funding assistance solely in the form of general revenue sharing funds, distributed under the State and Local Fiscal Assistance Act of 1972, 31 U.S.C. 1221 *et seq.,* with no Federal agency control over the subsequent use of such funds. Actions do not include bringing judicial or administrative civil or criminal enforcement actions.
>
> (b) Federal actions tend to fall within one of the following categories:
>
> (1) Adoption of official policy, such as rules, regulations, and interpretations adopted pursuant to the Administrative Procedure Act, 5 U.S.C. 551 *et seq.;* treaties and international conventions or agreements; formal documents establishing an agency's policies which will result in or substantially alter agency programs.
>
> (2) Adoption of formal plans, such as official documents prepared or approved by federal agencies which guide or prescribe alternative uses of Federal resources, upon which future agency actions will be based.
>
> (3) Adoption of programs, such as a group of concerted actions to implement a specific policy or plan; systematic and connected agency decisions allocating agency resources to implement a specific statutory program or executive directive.
>
> (4) *Approval of specific projects, such as* construction or *management activities located in a defined geographic area.* Projects include actions approved by permit *or other regulatory decision* as well as federal and federally assisted activities.
>
> 40 C.F.R. § 1508.18 (emphasis added).

11. "Whether an action may 'significantly affect' the environment requires consideration of 'context' and 'intensity.' " *Center for Biological Diversity v. Nat'l Highway Traffic Safety Admin.,* 538 F.3d 1172, 1185 (9th Cir.2008) (citing 40 C.F.R. § 1508.27). "Context delimits the scope of the agency's action, including the interests affected." *Id.* (citing *Nat'l. Parks & Conservation Ass'n v. Babbit,* 241 F.3d 722, 731 (9th Cir.2001)).

> Intensity refers to the "severity of impact," which includes both beneficial and adverse impacts, "[t]he degree to which the proposed action affects

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public health or safety," "[t]he degree to which the effects on the quality of the human environment are likely to be highly controversial," "[t]he degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks," and "[w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts."

Id. at 1185–86 (citing 40 C.F.R. § 1508.27(b)(2), (4), (5), (7)). If an agency does not prepare an EIS, the reviewing court must "determine whether the responsible agency has 'reasonably concluded' that the project will have no significant adverse environmental consequences." *Upper Snake River Ch. of Trout Unlimited v. Hodel,* 921 F.2d 232, 234 (9th Cir.1990).

***13** 12. Plaintiffs principally rely on two cases to support their assertion that an EIS was required here: *Westlands v. United States,* 850 F.Supp. 1388 (E.D.Cal.1994) and *Ramsey v. Kantor,* 96 F.3d 434 (9th Cir.1996). The *Westlands* decision denied federal defendants' motion to dismiss water districts' claims that NMFS and the Bureau failed to comply with NEPA by, among other things, not completing an EA or EIS before issuing a biological opinion concerning the effects of coordinated operations on the winter-run Chinook Salmon and implementing the reasonable and prudent alternative articulated in that biological opinion. *Id.* at 1394–95. Federal defendants in *Westlands* argued that the biological opinion was not a "major federal action" because it was merely advisory. *Id.* at 1420 (citing 40 C.F.R. § 1508.18(b) (3)). The district court acknowledged authority in support of this argument, but ultimately concluded that a case-by-case inquiry is required:

Formal plans and official documents that guide or prescribe alternative uses, on which future agency action will be based, are "federal actions" for NEPA purposes. *See* 40 C.F.R. § 1508(b) (2).

Plaintiffs argue that a biological opinion that suggests reasonable and prudent alternatives falls within either definition, because an agency must either follow the alternative suggested or risk violation of ESA § 7(a)(2)....

* * *

A biological opinion is part of the ESA process originated by 16 U.S.C. § 1536(a)(2), which requires federal agencies, with the assistance of the Secretary, to "insure that any action authorized, funded, or carried out by such agency ... is not likely to jeopardize the continued existence of any endangered species or threatened species." The federal agency undertaking such activity must consult the service having jurisdiction over the relevant endangered species. 16 U.S.C. § 1536(a)(3). The U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS), are jointly responsible for administering the ESA. 50 C.F.R. § 402.01(b) (1992). The consulting service then issues a biological opinion that details how the proposed action "affects the species or its critical habitat," including the impact of incidental takings of the species. 16 U.S.C. § 1536(b)(3)(A).

"The agency is not required to adopt the alternatives suggested in the biological opinion; however, if the Secretary deviates from them, he does so subject to the risk that he has not satisfied the standard of Section 7(a)(2)." *Tribal Village of Akutan v. Hodel,* 869 F.2d 1185, 1193 (9th Cir.1988) (citation omitted), cert. denied, 493 U.S. 873, 110 S.Ct. 204, 107 L.Ed.2d 157 (1989). A Secretary can depart from the suggestions in a biological opinion, and so long as he or she takes "alternative, reasonably adequate steps to insure the continued existence of any endangered or threatened species," no ESA violation occurs. *Id.* at 1193–95; *Pyramid Lake Paiute Tribe of Indians v. Department of Navy,* 898 F.2d 1410, 1418 (9th Cir.1990) ("a non-Interior agency is given discretion to decide whether to implement conservation recommendations put forth by the FWS"). The Joint Regulations state:

***14** The Service may provide with the biological opinion a statement containing discretionary conservation recommendations. Conservation recommendations are advisory and are not intended to carry any binding legal force.

50 C.F.R. § 402.14(j) (1992). 50 C.F.R. § 402.15(a) states:

(a) Following the issuance of a biological opinion, the Federal agency shall determine whether and in what manner to proceed with the action in

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> light of its section 7 obligations and the Service's biological opinion.

Courts have attempted to define the "point of commitment," at which the filing of an EIS is required, during the planning process of a federal project. *See Sierra Club v. Peterson,* 717 F.2d 1409, 1414 (D.C.Cir.1983). "An EIS must be prepared before any irreversible and irretrievable commitment of resources." *Conner v. Burford,* 848 F.2d 1441, 1446 (9th Cir.1988), cert. denied 489 U.S. 1012, 109 S.Ct. 1121, 103 L.Ed.2d 184 (1989). 40 C.F.R. § 1502.5(a) similarly provides, "For projects directly undertaken by Federal agencies, the environmental impact statement shall be prepared at the feasibility analysis (go/no go) stage and may be supplemented at a later stage if necessary."

[One of the water agency plaintiffs] points out that the Environmental Review Procedures, under the National Oceanic and Atmospheric Administration ("NOAA") Order No. 216–6, § 6.02.c.2(d), require an EIS for:

> Federal plans, studies, or reports prepared by NOAA that could determine the nature of future major actions to be undertaken by NOAA or other federal agencies that would significantly affect the quality of the human environment.

It is undisputed that the NMFS's actions are subject to an EIS requirement, if those actions are a "major federal action significantly affecting the human environment." Under 40 C.F.R. § 1508.18(b)(2), an activity is a federal action if it "guides," rather than binds, the use of federal resources. CVP water is a federal resource. *The Bureau's options were narrow had it declined to follow the NMFS's reasonable and prudent alternatives. See Tribal Village of Akutan,* 869 F.2d at 1193 (agency need not adopt reasonable and prudent alternatives in biological opinion, so long as it complied with ESA Section 7(a)(2) by taking "alternative, reasonably adequate steps to insure the continued existence of any endangered or threatened species"); *Portland Audubon Society v. Endangered Species,* 984 F.2d 1534, 1537 (9th Cir.1993) (discusses exemptions from ESA, by application to the Committee under 16 U.S.C. §§ 1536(a)(2), (g)(1)-(2)).

The government submits *Bennett v. Plenert,* CV–93–6076, 1993 WL 669429 (D.Or.1993), as authority that biological opinions are not binding on federal agencies, and consequently are not major federal actions. But in Bennett, the court left open the issue that a biological opinion could constitute a major federal action under NEPA. *Id.* at p. 11, n. 4. *Biological opinions are not binding on the Secretary, nor do they invariably require an EIS. The inquiry requires a case by case analysis.*

***15** *Id.* at 1420–22 (emphasis added) (parallel citations omitted). Applying the required case-by-case approach, because "the biological opinion is part of a systematic and connected set of agency decisions which result in the commitment of substantial federal resources for a statutory program, which resulted in reallocation of over 225,000 acre feet of CVP water under the ESA for salmon protection with the environmental impacts alleged," the biological opinion was major federal action.

13. Here, Federal Defendants argue that if anything constitutes a major federal action, it is the *Bureau's* implementation of the OMR flow restrictions, not FWS's adoption of the 2008 BiOp itself. Doc. 56 at 20. Federal Defendants argue that FWS's issuance of the BiOp "by itself, is not an irretrievable commitment of resources," and therefore does not trigger NEPA. *Id.* at 17. In theory, the Bureau had the option to reject FWS's RPA, albeit at its own peril under the ESA. However, in reality, the Bureau is implementing the projects in accordance with the RPA under an adaptive management structure that places ultimate control over OMR flows in the FWS. Although the facts of *Westlands* do not exactly parallel the circumstances here, there is a strong likelihood that Plaintiffs will be able to establish that NEPA was triggered by the issuance of the final biological opinion in this case.[FN7]

> FN7. Environmental Intervenors also correctly point out that the Ninth Circuit reversed the district court's ruling on a related issue; i.e., federal defendants' contention that an irreconcilable conflict between the CVPIA and NEPA existed. *Westlands Water Dist. v. NRDC,* 43 F.3d 457, 460 (9th Cir.1994). The Ninth Circuit found that CVPIA §§ 3406(b)(2) and (d)(1) required implementation of the CVPIA "upon enact-

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ment." *Id.* After this ruling, Plaintiffs voluntarily dismissed their claim that NMFS and the Bureau failed to conduct a NEPA review of the biological opinion concerning CVP impacts on winter-run Chinook salmon. *See Stockton East Water Dist. v. United States,* 75 Fed. Cl. 321, 326 (2007). This does not derogate *Westlands'* substantive NEPA analysis.

14. Federal Defendants argue this case is more like Upper Snake River, 921 F.2d at 234, in which the Ninth Circuit "reaffirmed a long-standing principle that a federal action is not 'major' for NEPA purposes where the agency activity does not change the status quo and was inferentially part of routine management action in the operation of the dam." *Westlands,* 850 F.Supp. 1415 (citing *Upper Snake River,* 912 F.2d at 234). *Westlands* specifically distinguished *Upper Snake River,* determining that whether or not an EIS was required "will, of necessity, depend heavily upon the unique factual circumstances of each case." *Id.* (citing *Westside Property Owners v. Schlesinger,* 597 F.2d 1214, 1224 (9th Cir.1979)).

> To some extent, the finding is based on whether the proposed agency action and its environmental effects were within the contemplation of the original project when adopted or approved. *See* [*Port of Astoria, Or. v. Hodel,* 595 F.2d 467, 476 (9th Cir.1979)]; Robinswood *Community Club [v. Volpel,* 506 F.2d 1366 [(9th Cir.1974)]. The inquiry requires a determination of whether plaintiffs have complained of actions which may cause significant degradation of the human environment. [*City and County of San Francisco v. United States,* 615 F.2, 498, 500 (9th Cir.1980)].

Westlands, 850 F.Supp. at 1415. "[T]he taking of water for non-agricultural purposes is alleged to have changed the operational requirements of the CVP, imposed new standards for reverse flows in the Western Delta, carryover storage in the Shasta reservoir, and caused closure of the Delta cross-channel. Such actions and the environmental effects alleged are not routine managerial changes." *Id.* at 1421.

***16** 15. Federal Defendants maintain that, like in *Upper Snake River* and unlike in *Westlands,* "Reclamation's continued management of the CVP—even after issuance of the Service's biological opinion—is within historical operating parameters." Doc. 56 at 18. *Upper Snake River,* specifically concerned the Bureau's decision to reduce flows belowPalisades Dam and Reservoir. Although it was standard operating procedure since 1956 to maintain flows below that dam above 1,000 cfs, during previous dry periods, the average flow had "been lower than 1,000 cfs for 555 days (or 4.75% of the total days in operation)." *Id.* at 233. Because the challenged flow fluctuations were within historical operational patterns, no NEPA compliance was required:

> The Federal defendants in this case had been operating the dam for upwards of ten years before the effective date of the Act. During that period, they have from time to time and depending on the river's flow level, adjusted up or down the volume of water released from the Dam. *What they did in prior years and what they were doing during the period under consideration were no more than the routine managerial actions regularly carried on from the outset without change.* They are simply operating the facility in the manner intended. In short, they are doing nothing new, nor more extensive, nor other than that contemplated when the project was first operational. Its operation is and has been carried on and the consequences have been no different than those in years past.
>
> The plaintiffs point out that flow rates have been significantly below 1,000 cfs for periods of seven days or more only in water years 1977, 1982, and 1988, all years of major drought. They also note that prior to construction of the dam, the lowest recorded flow rate did not fall below 1400 cfs. From these facts, they argue that the Bureau's reduction of the flow below 1,000 cfs is not a routine managerial action. However, a particular flow rate will vary over time as changing weather conditions dictate. In particular, low flows are the routine during drought years. What does not change is the Bureau's monitoring and control of the flow rate to ensure that the most practicable conservation of water is achieved in the Minidoka Irrigation Project. Such activity by the Bureau is routine.

Id. at 235–36 (emphasis added).

16. Here, unlike in *Upper Snake River,* the OMR restrictions imposed by the 2008 BiOp are *not* "routine managerial actions regularly carried on from the

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outset [of the Project] without change ." It is undisputed that the OMR flow restrictions of Component 2 have the potential to impose restrictions on the CVP's ability to export water south of the Delta above and beyond that which would result from natural conditions and pre-existing legal regimes. *See generally* Doc. 46, Snow Decl; Doc. 56–3, Milligan Decl. As was the case in *Westlands,* "the taking of water for non-agricultural purposes is alleged to have changed the operational requirements of the CVP [and] imposed new standards for reverse flows in the Western Delta...." 850 F.Supp. at 1421. Evidence shows that operation at –1250 cfs during the relevant time period will result in a net reduction of water service to Plaintiffs exceeding 200,000 acre feet ("AF"). There is substantial likelihood that Plaintiffs will be able to establish that these changes substantially depart from the type of routine managerial changes that took place prior to the 2008 BiOp.

***17** 17. Plaintiffs also rely on *Ramsey,* which held that NMFS was required to comply with NEPA when it issued a biological opinion and incidental take statement under ESA § 7, permitting state regulators to issue salmon fishing regulations consistent with the take statement. 96 F.3d at 441–445. *Ramsey* found the biological opinion and incidental take statement constituted "major federal action," triggering NEPA compliance, as it was "clear ... both from our cases and from the federal regulations, *see* 40 C.F.R. § 1508.18, that if a federal permit is a prerequisite for a project with adverse impact on the environment, issuance of that permit does constitute major federal action and the federal agency involved must conduct an EA and possibly an EIS before granting it." *Id.* at 444.

18. *Ramsey* then determined:

> the incidental take statement in this case is functionally equivalent to a permit because the activity in question would, for all practical purposes, be prohibited but for the incidental take statement. Accordingly, we hold that the issuance of that statement constitutes major federal action for purposes of NEPA.

Id.

19. Federal Defendants suggest *Ramsey* has no direct bearing on this case, because, unlikeWashington and Oregon, here, the Bureau does not require a section 10 permit to operate the CVP in compliance with the BiOp:

> Instead, as in the instant case, Section 7 of the ESA provides a procedure whereby federal agencies may obtain an exception to the ESA's 'take' prohibition through the issuance of a biological opinion and incidental take statement; unlike the Section 10 context, if NEPA applies at all in the context of Section 7, it applies when the action agency takes some action.... There is no suggestion in Ramsey that NEPA would apply in the instant case, where the take statement authorized merely the activities of federal agencies, and in no way acts like a Section 10 permit for private parties. The highly unusual circumstances in Ramsey render that holding inapplicable to the case at bar.

Doc. 56 at 18–19.

20. The federal defendants in *Ramsey* argued that there was insufficient federal participation in a state run project to require an EIS. The Appeals Court disagreed: "if a federal permit is a prerequisite for a project with adverse impact on the environment, issuance of that permit does constitute a major federal action...." triggering NEPA. 96 F.3d at 444 (citing *Jones v. Gordon,* 792 F.2d 821, 827–29 (9th Cir.1986); *Port of Astoria v. Hodel,* 595 F.2d 467, 478–79 (9th Cir.1979)). *Ramsey* held that "the incidental take statement in this case is functionally equivalent to a permit because the activity in question would, for all practical purposes, be prohibited but for the incidental take statement." *Id.* Because the incidental take statement was the functional equivalent of a permit, NEPA applied to the issuance of the biological opinion under *Jones* and *Port of Astoria,* despite federal defendants ' contention that the mere issuance of an incidental take statement was insufficient federal participation in a state project. Here, in contrast, the CVP is an entirely federal project, rendering the "functional equivalency" analysis from *Ramsey* largely irrelevant. In a more general sense, *Ramsey* simply stands for the proposition that it may be appropriate to apply NEPA to the issuance of a biological opinion under certain circumstances.

***18** 21. More directly applicable is 40 C.F.R. § 1508.18(4), which provides that major federal actions include:

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Approval of specific projects, such as construction or *management activities located in a defined geographic area.* Projects include actions approved by permit *or other regulatory decision* as well as federal and federally assisted activities.

The BiOp, and specifically Component 2 of the RPA, are management activities located in a defined geographic area that were approved by a regulatory decision.

22. Environmental Intervenors and Federal Defendants cite a number of cases for the proposition that *Ramsey* should be limited to its facts. For example, in *Southwest Center for Biological Diversity v. Klasse,* 1999 WL 34689321 (E.D.Cal. Apr.1, 1999), the court considered whether FWS failed to comply with NEPA when it issued a BiOp and incidental take statement after consultation with the Army Corps of Engineers ("Corps") regarding its operation of a dam on the Kern River. The court rejected this argument, finding that plaintiffs' claim was based on an "overbroad interpretation" of *Ramsey,* which "did not intend to require the FWS to file NEPA documents every time it issues an incidental take statement to a federal agency." 1999 WL 34689321 at *11. *See also P'ship for a Sustainable Future v. U.S. Fish & Wildlife Serv.,* 2002 WL 33883548 at *7 (M.D.Fla. July 12, 2002) ("As a cooperating agency, the FWS is not required to duplicate the work of the Corps by preparing its own EA or EIS"); *City of Santa Clarita v. FWS,* 2006 WL 4743970 at *19 (C.D.Cal. Jan.20, 2006) (finding that ITSs issued by FWS "were not 'major federal action' triggering separate and additional NEPA obligations on the part of the Service"); *Miccosukee Tribe of Indians of Fla. v. U.S.,* 430 F.Supp.2d 1328, 1335 (S.D.Fla.2006) ("To expect or require FWS to submit its own EIS, in spite of the fact that it was not the action agency and that the Corps had already issued one is nonsensical and an utter waste of government resources"). [FN8]

FN8. Plaintiffs point to Federal Rule of Appellate Procedure 32.1 and Ninth Circuit Rule 36–3, which prohibit citation to unpublished *appellate* decisions issued prior to January 1, 2007. However, these rules do not address citation to unpublished district court opinions, which are, like published district court opinions, only persuasive authority. *See Carmichael Lodge No. 2103, Benevolent and Protective Order of Elks of the United States of Am. v. Leonard,* 2009 WL 1118896 (E.D.Cal., Apr.23, 2009) (noting that "there is no prohibition in citing 'unpublished' district court opinions (unless a local rule so provides. They are either persuasive to the case at bar, or they are not. District court opinions, published or not, do not set binding precedent for other cases....") (irony of citing unpublished district court opinion as authority for citing unpublished district court opinion noted).

23. These cases are not persuasive. In three of the four cases cited, *City of Santa Clarita, Partnership for a Sustainable Future,* and *Miccosukee Tribe,* the action agency either had already or was in the process of completing environmental analysis under NEPA. The fourth case, *Klasse,* concerned challenge to the Army Corps of Engineers 'modification of operations at Isabella Reservoir. *Klasse* found that the Corps' modifications, like those at issue in *Upper Snake River,* did not "deviate[ ] from [the Corps'] standard management scheme regarding water levels." 1999 WL 34689321 at *11. [FN9]

FN9. Similarly, federal Defendants cite *Greater Yellowstone Coal v. Flowers,* 359 F.3d 1257, 1276 (10th Cir.2004), for the proposition that *Ramsey* should be limited to its facts. But *Greater Yellowstone* simply cites Ramsey's holding, without limiting its reach or scope. Moreover, the issue in *Greater Yellowstone* was whether the action agency should have prepared an EIS rather than a FONSI, not whether FWS had any NEPA obligations relative to its issuance of a BiOp. Likewise, *Center for Biological Diversity v. Fish and Wildlife Service,* 2005 WL 2000928 (N.D.Cal. Aug.19, 2005) (*"CBD"*), involved a challenge to a rule issued pursuant to section 4(d) of the ESA, which requires the Secretary to "issue such regulations as he deems necessary and advisable to provide for the conservation of [a] threatened species." 16 U.S.C. § 1533(d). *CBD* summarily dismissed the possibility that a section 4(d) regulation could be subject to NEPA because applying NEPA would "confuse matters by overlaying its

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own independent matrix" on top of the ESA's statutorily defined factors for determining that a species should be listed as threatened. 2005 WL 2000928 at *12. There is no parallel set of statutory factors with which NEPA could conflict in this case. Finally, Federal Defendants cite, *Westlands Water District v. United States Department of the Interior,* 275 F.Supp.2d 1157, 1221 (E.D.Cal.2002), which involved a no-jeopardy opinion, in which the court cited *Keasee* with approval for the proposition that "FWS is not required to file NEPA documents every time it issues a biological opinion or an incidental take statement." *Id.* at 1221–22. Nevertheless, Reclamation and FWS did release an Environmental Impact Statement/Report, *id.* at 1171, and the Court ultimately ordered "Interior" to complete a supplemental EIS. *Id.* at 1235.

24. In the final analysis, while the issuance of an incidental take statement does not necessarily require the preparation of an EIS, *Westlands Water Dist. v. United States Dep't of the Interior,* 275 F.Supp.2d 1157, 1221 (E.D.Cal.2002) ("FWS is not required to file NEPA documents every time it issues a biological opinion or an incidental take statement."), rev'd, aff'd, remanded on other grounds, 376 F.3d 853 (9th Cir.2004), factual circumstances may give rise to NEPA obligations in connection with the issuance of a BiOp/ITS, *see Westlands,* 850 F.Supp. at 1422; *Ramsey,* 96 F.3d at 441–445.

***19** 25. FWS's RPA is major federal action that has unquestioned ability to inflict great harm to Plaintiffs and the human environment. The federal action is prescribed by FWS and implemented by Reclamation. These agencies' actions are inextricably intertwined. There is a strong likelihood that Plaintiffs will be able to establish that OMR flow restrictions imposed by the 2008 BiOp will have substantial, detrimental, indirect effects on the Plaintiffs, the community, and the human environment. Because FWS ultimately controls OMR flows, there is a strong likelihood that Plaintiffs will prevail on the merits of their NEPA claim under the specific facts of this case.

b. *Federal Defendants' Reliance on Metropolitan Edison is Misplaced.*

26. Federal Defendants argue that "as a matter of law, NEPA does not impose requirements for an action that does not, by itself, alter the physical environment," citing *Metropolitan Edison Co. v. People Against Nuclear Energy,* 460U.S. 766, 772 (1983). The language from *Metropolitan Edison* to which Federal Defendants refer addressed whether NEPA requires agencies to consider effects on human health, specifically psychological health, as part of the "physical environment." *Id.* at 771. The Supreme Court rejected this argument:

> To paraphrase the statutory language in light of the facts of this case, where an agency action significantly affects the quality of the human environment, the agency must evaluate the "environmental impact" and any unavoidable adverse environmental effects of its proposal. The theme of § 102 is sounded by the adjective "environmental": NEPA does not require the agency to assess every impact or effect of its proposed action, but only the impact or effect on the environment. If we were to seize the word "environmental" out of its context and give it the broadest possible definition, the words "adverse environmental effects" might embrace virtually any consequence of a governmental action that some one thought "adverse." But we think the context of the statute shows that Congress was talking about the physical environment-the world around us, so to speak. NEPA was designed to promote human welfare by alerting governmental actors to the effect of their proposed actions on the physical environment.

Id. at 772.

27. Whether the OMR flow restrictions set forth in the BiOp significantly affect the physical environment is a question of fact on which *Metropolitan Edison* sheds no light. Plaintiffs have submitted undisputed evidence that shows the OMR restrictions may have significant effects on the physical environment, including land fallowing and increased groundwater use, as well as adverse effects on the water table, soil quality, and air quality.

c. *Wrong Lead Agency Argument.*

28. Environmental Intervenors argue that Plaintiffs' NEPA claim must fail because FWS, the only named defendant in that claim, is not the appropriate "lead agency" for NEPA purposes.[FN10] Where more

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than one federal agency is involved in an action, the agencies are required to coordinate their efforts and determine a "lead agency" responsible for NEPA compliance. 40 C.F.R. § 1501.5(c); *see id.* § 1508.16 (defining "Lead agency"). Other agencies involved are designated as "cooperating agencies." *Id.* § 1501 .6; *see id.* § 1508.5 (defining "Cooperating agency"). The lead agency is required to use any environmental analysis from cooperating agencies, which may have jurisdiction by law or expertise in particular areas, in preparing its NEPA documents. § 1501.6.

> FN10. In a related argument Environmental Intervenors attempt to further distinguish *Ramsey* based on the fact that, in that case, NMFS both issued and was one of the recipients of the incidental take statement. In this way, the Ninth Circuit noted in a footnote that *Ramsey* was "factually ... unusual." 96 F.3d at 441 n .11. But, the Ninth Circuit did not assign this unusual factual circumstance any particular weight, other than to note that no party suggested that the agency suffered from a conflict of interest. *Id.*

***20** 29. Applicable regulations allow agencies to share NEPA responsibility if more than one agency is involved in the same action or a group of related actions. *See Sierra Club v. U.S. Army Corps of Eng'rs,* 295 F.3d 1209, 1215 (11th Cir.2002); 40 C.F .R. § 1501.5. Environmental Intervenors correctly point out that, in this case, the Bureau has been designated the "lead Federal agency," at least for the purposes of ESA consultation, concerning coordinated CVP–SWP operations. BiOp at i. The Bureau also prepared the BA regarding impacts of CVP operations on the delta smelt, which is a step often taken as part of an agency's NEPA compliance. *See* 16 U.S.C. § 1536(c)(1) (BA "may be undertaken as part of a Federal agency's compliance with the requirements of [NEPA] section 102").

30. However, FWS nevertheless proceeded as the sole issuing agency of the BiOp, which contains the RPA and incidental take statement, and proscribed the implementation of the adaptive management process, which constitutes and will involve regulated agency actions, in the absence of NEPA compliance. An agency may not justify, post hoc, its failure to comply with NEPA on the basis that some other agency prepared an environmental assessment in the past or may prepare one in the future. *See Anacostia Watershed Soc'y v. Babbit,* 871 F.Supp. 475, 485–486 (D.D.C.1994).

d. *Is Any Requirement to Comply with NEPA Obviated by the Court–Imposed Time Constraints.*

31. Environmental Intervenors argue that "[e]ven if the BO could be considered a major federal action, this Court's previous orders setting a fixed time period for FWS to issue the opinion precluded NEPA compliance." Doc. 58 at 19. The 2004 BiOp was remanded on December 14, 2007, with instructions to complete a new BiOp on or before September 15, 2008. *NRDC* Doc. 560 at 2. On July 29, 2008, the Federal Defendants informed the Court that "the Service no longer believed that it would be possible to complete a scientifically sound and legally defensible biological opinion by September 15, 2008, and moved to extend the deadline to December 15, 2008." *See* Doc. 753, Findings of Fact, Conclusions of Law, and Order Granting Federal Defendants' Motion for Extension of Time, at 1–2. DWR joined in that motion. *Id.* at 2. No other party opposed the extension to provide the agency a full year to complete the new BiOp. *Id.* The district court granted Federal Defendants' request for additional time based on Federal Defendants submission that:

> The consultation between the Bureau of Reclamation ("Reclamation") and the Service on the OCAP will be one of the most complex "in the history of the [Endangered Species Act ('ESA')]." See Declaration of Cay Collette Goude, Docket No. 712–2 (July 29, 2008), ¶ 6. Reclamation's "biological assessment" ("BA") of the effects of these operations itself totals more than 1,000 pages. *Id.* The Service is required by the ESA to review all of the "best scientific and commercial data available," 16 U.S .C. § 1536(a)(2), in preparing this biological opinion, and the statute and its regulations allow the Service 135 days to complete a biological opinion (from the submission and review of the BA). See 16 U.S.C. § 1536(b)(1); 50 C.F.R. § 402.14(e) (allowing 90 days for formal consultation and then 45 additional days to write the biological opinion). For these reasons, holding the Service to the current deadline of September 15, 2008 could result in a biological opinion that was not scientifically sound or legally defensible, and thus result in another cycle of remand, interim remedies, and judicial review that would ultimately delay the completion of

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an adequate biological opinion and tax the resources of the Court, the agencies, and the parties.

***21** *Id.*

32. Environmental Intervenors argue that the expedited timeframe for issuance of a new BO precluded compliance with NEPA. Even recognizing authority in support of this proposition, *see* H. Conf. Rep., No. 765, 91st Cong., 1st Sess. (1969), reprinted in 1969 U.S.C.C.A.N. 2767, 2770 (indicating that NEPA applies unless "the existing law applicable to such agency's operations expressly prohibits or makes full compliance with one of the directives impossible"); *Westlands,* 850 F.Supp.2d. at 1416–17 (acknowledging the possibility that an evidentiary showing by Federal Defendants could establish that NEPA compliance is impossible), Federal Defendants have expressly declined to invoke this exception here, after direct inquiry in open court at the hearing on this motion. This exception does not apply. Draft Hearing Transcript, May 22, 2009, at 68–69.

e. *Consequences of Failing to Comply with NEPA.*

If a full EIS would have been required for the BiOp, FWS and/or the Bureau would have had to evaluate the cumulative and indirect impacts of, and consider a reasonable range of alternatives to the RPA. *See Ctr. for Biological Diversity,* 538 F.3d at 1185. NEPA does not dictate the outcome of agency deliberations; "instead, NEPA is aimed at ensuring agencies make informed decisions and contemplate the environmental impacts of their actions." *Ocean Mammal Inst.,* 546 F.Supp.2d at 971 (citing *Idaho Sporting Cong .,* 137 F.3d at 1149).

3. *ESA Claims against FWS.*

33. The Complaint and motion for preliminary injunction also raise claims under the ESA. Because there is likelihood of success on the NEPA claims, it is unnecessary to evaluate the merit of the ESA claims at this time.

4. *The Requested Injunction.*

34. Plaintiffs request a limited injunction to prohibit FWS, and those acting in concert or participation with FWS, including the Bureau, from setting or implementing the OMR flow restrictions under BiOp RPA Component 2 unless and until FWS further explains why alternative, less restrictive OMR flows would not adequately protect the delta smelt.[FN11]

FN11. Environmental Intervenors note that both the delta smelt and longfin smelt are state-listed species under CESA. *See* 14Cal. Code Regs. § 670.5; Obegi Decl. at ¶ 8 & Attch. 7. The SWG, which includes DFG staff as members, has repeatedly found that "[c]urrent delta smelt advice will be protective of longfin smelt larvae" and has not imposed additional OMR flow restrictions to protect longfin smelt (or to protect delta smelt, in the event FWS failed to do so). Goude Decl. at ¶ 4 & Ex. F (2009 SWG notes from 3/16, 3/23, 3/30, 4/6). If implementation of the RPA is enjoined, Environmental Intervenors argue that DFG likely would have a legal obligation to impose OMR flow restrictions to protect delta smelt and longfin smelt under state law. The nature of the requested injunction largely obviates this concern, as Plaintiffs merely request that FWS further justify any OMR flow restrictions under Component 2. To the extent that the deliberative process engenders any change to the manner in which FWS implements Component 2, FWS is nevertheless obliged to ensure that jeopardy and/or adverse modification is avoided.

35. Plaintiffs maintain that further explanation is warranted because it is not clear from the BiOp or FWS's subsequent Decisions implementing the adaptive management protocol why flows have been set at the chosen, allegedly overprotective levels, without considering the adverse environmental consequences and irreparable injury this major federal action will cause.

5. *Balance of the Harms.*

a. *Potential Harm to the Species.*

36. Federal Defendants and Environmental Intervenors maintain that enjoining implementation of the RPA would irreparably harm the species.[FN12] Federal Defendants argue that, although "[w]e cannot know exactly what effect unlimited pumping would have on the delta smelt this year because it would depend on hydrologic conditions in the Delta and the geographic distribution of the delta smelt popula-

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tion.... unless conditions are favorable, it could entrain up to 50% of delta smelt larvae and cause a severe reduction in production, which would have a 'substantial' effect on the species." Doc. 56 at 21 (citing BiOp at 164–65).

FN12. As a threshold matter, Federal Defendants frame Plaintiffs' proposal as one that would permit "unlimited pumping." Doc. 56 at 20–21. Plaintiffs complain that this "is a straw man argument" insofar as they have not requested "unlimited pumping," because various other legal mandates make truly unlimited pumping out of the question. Doc. 70 at 2. However, it appears that Federal Defendants use the term "unlimited" to mean a pumping regime that is not constrained by Component 2. Federal Defendants' argument that "unlimited pumping could cause irreparable harm to the delta smelt" will be interpreted in this light.

***22** 37. FWS's May 21, 2009 Decision regarding Component 2 implementation indicates that salvage increased during the week prior and that, at the current rate, salvage "may exceed the Concern Level in the 2008 biological opinion of 299 delta smelt." Fed. Def. Ex. B. FWS further noted that delta smelt are "likely just starting to reach a size that they are more effectively detected at the fish salvage facilities. As the fish get larger, they will be detected more frequently. Also, the end of May is historically a period when high numbers of delta smelt become entrained at the export facilities. Salvage usually starts at the CVP before the SWP also salvages delta smelt. Currently, delta smelt have been salvaged at the CVP over the past 4 days." *Id.*

38. The ESA embodies a policy of "institutionalized caution." *Tennessee Valley Auth. v. Hill,* 437U.S. 153, 194 (1978). It is not inappropriate to err on the side of the species when there is substantial uncertainty, and it is reasonable to do so, so long as FWS does not do so arbitrarily or in violation of NEPA, by ignoring irreparable injury from environmental and related harms that will be effectuated by overzealous reductions of CVP flows. FWS must evaluate and avoid, to the extent practicable, irreparable harm to Plaintiffs resulting from unnecessarily overprotective RPA measures.

b. *Harm to Water Users & Dependent Communities.*

39. It is undisputed that current conditions are causing economic hardship for water users and the communities upon which they depend. There is also substantial evidence establishing additional, non-economic hardships, involving dislocation of families and related impacts, loss of school and tax revenue, widespread food insecurity, and adverse impacts to groundwater supply and quality, soil quality, and air quality.

40. Despite the general economic downturn and/or natural hydrologic conditions, as opposed to the BiOp's flow constraints, the Westside service areas are almost exclusively farmlands, and farm-related activities support the communities in that region. The absence of water supply directly impairs and harms all of these interests, even if there are concurrent causes. Federal Defendants "cannot control the weather," and the court "cannot hold [them] responsible for the absence of rain," *Alabama v. U.S. Army Corps of Eng'rs,* 441 F.Supp.2d 1123, 1134 (N.D.Ala.2006), or the effects of economic recession. Here, however, substantial evidence shows that the BiOp and RPA's flow constraints, and specifically Condition 2, if overzealously implemented, will worsen the water shortage, causing increased harm. NEPA required consideration of such agency-caused consequences. Federal Defendants failed to engage in this analysis.

a. Information contained within the declaration of Ronald Milligan, Doc. 56–3, the manager of the Bureau's Central Valley Operations Office, indicates that total pumping by the CVP after May 17 would be reduced from 342,000 AF if OMR flows are set at –5000 cfs, to 90,000 AF if OMR flows are set at –1,250. This difference of 252,000 AF is substantial.

***23** 41. Plaintiffs have shown that irreparable harm will likely occur in the absence of injunctive relief, including loss of water supplies, damage to permanent crops, including orchards and vineyards, crop loss or reduction in crop productivity, job losses, reductions in public school enrollment, limitations on public services, impaired ability to reduce the toxic effects of salt and other minerals in the soil, groundwater overdraft, increased energy consumption, and land fallowing that causes air quality problems

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c. *Balance of the Hardships.*

42. The balance of the harms must be evaluated in light of the nature of the requested injunction. Plaintiffs request, that FWS be required to justify why it sets OMR flows at a particularly restrictive level, instead of at a level that would be less harmful to Plaintiffs' interests as federal contractors. The law does not require FWS to take any action that would imperil the continued survival and jeopardy of the smelt. the requested injunction requires FWS to, on an ad hoc basis, consider the issues it would have evaluated had it engaged in a NEPA review of the BiOp and RPA. Such an injunction will not subject the species to any harm. In this light, the balance of the harms tips strongly in favor of Plaintiffs.

6. *Public Interest.*

43. The public interest favors granting injunctive relief, as the harms cannot be remedied by monetary compensation, the environmental consequences cannot be avoided or reasonably mitigated, and the damage to the community is now occurring and will continue to be exacerbated.

V. *CONCLUSION AND ORDER.*

For the reasons set forth above, Plaintiffs' motion for Preliminary Injunction is GRANTED. FWS, its agents, and those acting in active concert or participation with them, are ENJOINED AND RESTRAINED as follows:

1. The FWS, its agents, and those acting in active concert or participation with them, are ENJOINED from setting and implementing unnecessarily restrictive OMR flow restrictions under BiOp RPA Component 2 unless and until FWS first considers the harm that these decisions and actions are likely to cause humans, the community, and the environment, during the period through June 30, 2009, or three consecutive days when water temperatures exceed 25°C, whichever first occurs. FWS, an agency with expertise in biology, not economics or sociology, need not independently evaluate and/or weigh the harms to humans, the community, and the environment versus any potential harm to the species. Rather, in light of the likelihood that Plaintiffs will succeed on their claim that the BiOp was unlawfully issued without NEPA compliance and the alternatives analysis such compliance would have required, FWS must explain why alternative, less restrictive OMR flows would not adequately protect the delta smelt, considering location, abundance, entrainment, and all other assessment criteria currently in use, to evaluate risk to the species.

2. If FWS, its agents, and those acting in active concert or participation with them, determine that OMR flow restrictions under BiOp RPA Component 2 must be imposed to protect the species, FWS must explain why alternative, less restrictive OMR flows would not adequately protect the delta smelt.

***24** 3. For each decision setting or implementing OMR flow restrictions under BiOp RPA Component 2, FWS, its agents, and those acting in active concert or participation with them shall provide to the Court, and all parties to this lawsuit, a written statement explaining why alternative, less restrictive OMR flows would not adequately protect the delta smelt. These written explanations shall be provided forthwith through the Court's electronic case filing system and by any additional means FWS desires. Such explanation shall be provided no less frequently than weekly, even if FWS maintains the same OMR flow restriction from one week to the next.

SO ORDERED.

E.D.Cal.,2009.
San Luis & Delta-Mendota Water Authority v. Salazar
Not Reported in F.Supp.2d, 2009 WL 1575169 (E.D.Cal.), 70 ERC 1168

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APPENDIX DOC. 7

717 F.Supp.2d 1021
(Cite as: 717 F.Supp.2d 1021)

H

United States District Court,
E.D. California.
The CONSOLIDATED DELTA SMELT CASES.

Nos. 1:09-CV-00407 OWW DLB, 1:09-cv-00480-OWW-GSA, 1:09-cv-00422-OWW-GSA, 1:09-cv-00631-OWW-DLB, 1:09-cv-00892-OWW-DLB.
May 27, 2010.

Background: Water districts, advocacy groups and other interested parties brought actions against United States government, challenging implementation of Reasonable and Prudent Alternative (RPA) addressing impacts of water projects on threatened delta smelt. After actions were consolidated, plaintiffs moved for preliminary injunction.

Holdings: The District Court, Oliver W. Wanger, J., held that:
(1) plaintiffs demonstrated likelihood of success on merits of National Environmental Policy Act (NEPA) claim;
(2) plaintiffs demonstrated likelihood of success on merits of Endangered Species Act (ESA) claim; and
(3) public interest factors favored granting of injunction.

So ordered.

West Headnotes

[1] Environmental Law 149E ⚷701

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek701 k. Preliminary injunction. Most Cited Cases

Water districts challenging implementation of Reasonable and Prudent Alternative (RPA) addressing impacts of water projects on threatened delta smelt demonstrated likelihood of success on merits of claim that government did not take "hard look" at harms of implementing RPA as to human health, safety and environment, as required under National Environmental Policy Act (NEPA), for purposes of preliminary injunction; evidence established significant detrimental effects on human environment via RPA's restrictions on California water supply. National Environmental Policy Act of 1969, § 102(2)(C), 42 U.S.C.A. § 4332(2)(C).

[2] Environmental Law 149E ⚷688

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek677 Scope of Inquiry on Review of Administrative Decision
149Ek688 k. Plants and wildlife; endangered species. Most Cited Cases

Court reviews biological opinion (BiOp) prepared pursuant to Endangered Species Act (ESA) based upon evidence contained in administrative record. Endangered Species Act of 1973, § 2 et seq., 16 U.S.C.A. § 1531 et seq.

[3] Administrative Law and Procedure 15A ⚷676

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(A) In General
15Ak676 k. Record. Most Cited Cases

Judicial review under Administrative Procedure Act (APA) must focus on administrative record already in existence, not some new record made initially in reviewing court; parties may not use post-decision information as new rationalization either for sustaining or attacking agency's decision. 5 U.S.C.A. § 551 et seq.

[4] Administrative Law and Procedure 15A ⚷676

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions

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15AV(A) In General
15Ak676 k. Record. Most Cited Cases

Exceptions to administrative record review for technical information or expert explanation make such evidence admissible only for limited purposes, and those exceptions are narrowly construed and applied.

[5] Administrative Law and Procedure 15A ⚷760

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak754 Discretion of Administrative Agency
15Ak760 k. Wisdom, judgment or opinion. Most Cited Cases

Reviewing court must defer to agency on matters within agency's expertise, unless agency completely failed to address some factor, consideration of which was essential to making informed decision.

[6] Administrative Law and Procedure 15A ⚷760

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak754 Discretion of Administrative Agency
15Ak760 k. Wisdom, judgment or opinion. Most Cited Cases

Reviewing court may not substitute its judgment for that of agency concerning wisdom or prudence of agency's action.

[7] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Action is "jeopardizing" under section of Endangered Species Act (ESA) prohibiting agency action likely to jeopardize continued existence of any endangered or threatened species, if it keeps species recovery far out of reach, even if species is able to cling to survival. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.02.

[8] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under section of Endangered Species Act (ESA) prohibiting agency action likely to jeopardize continued existence of any endangered or threatened species, agency may not take action that will tip species from state of precarious survival into state of likely extinction. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.02.

[9] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under section of Endangered Species Act (ESA) prohibiting agency action likely to jeopardize continued existence of any endangered or threatened species, even where baseline conditions already jeopardize species, agency may not take action that deepens jeopardy by causing additional harm. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.02.

[10] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife

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149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under section of Endangered Species Act (ESA) prohibiting agency action likely to jeopardize continued existence of any endangered or threatened species, failure by agency to utilize best available science is arbitrary and capricious. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[11] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

"Best available science" mandate of section of Endangered Species Act (ESA) prohibiting agency action likely to jeopardize continued existence of any endangered or threatened species sets basic standard that prohibits agency from disregarding available scientific evidence that is in some way better than evidence it relies on. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[12] Administrative Law and Procedure 15A ⚷792

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak784 Fact Questions
15Ak792 k. Technical, expert or scientific evidence. Most Cited Cases

When specialists express conflicting views, agency must have discretion to rely on reasonable opinions of its own qualified experts even if, as original matter, court might find contrary views more persuasive.

[13] Administrative Law and Procedure 15A ⚷741

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak741 k. In general. Most Cited Cases

Administrative Law and Procedure 15A ⚷784.1

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(E) Particular Questions, Review of
15Ak784 Fact Questions
15Ak784.1 k. In general. Most Cited Cases

Mere uncertainty, or fact that evidence may be weak, is not fatal to agency decision.

[14] Administrative Law and Procedure 15A ⚷749

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak749 k. Presumptions. Most Cited Cases

Presumption of agency expertise may be rebutted if agency's decisions, although based on scientific expertise, are not reasoned.

[15] Administrative Law and Procedure 15A ⚷462

15A Administrative Law and Procedure
15AIV Powers and Proceedings of Administrative Agencies, Officers and Agents
15AIV(D) Hearings and Adjudications
15Ak458 Evidence
15Ak462 k. Weight and sufficiency. Most Cited Cases

Agency cannot disregard available scientific evidence better than evidence on which it relies.

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[16] Administrative Law and Procedure 15A ⚷759

15A Administrative Law and Procedure
15AV Judicial Review of Administrative Decisions
15AV(D) Scope of Review in General
15Ak754 Discretion of Administrative Agency
15Ak759 k. Technical questions. Most Cited Cases

Courts are not required to defer to agency conclusion that runs counter to that of other agencies or individuals with specialized expertise in particular technical area.

[17] Environmental Law 149E ⚷701

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek701 k. Preliminary injunction. Most Cited Cases

Water districts challenging implementation of Reasonable and Prudent Alternative (RPA) addressing impacts of water projects on threatened delta smelt demonstrated likelihood of success on merits of claim that government's use of gross salvage numbers to justify quantitative pumping restrictions did not utilize "best available science," as required under section of Endangered Species Act (ESA) prohibiting agency action likely to jeopardize continued existence of any endangered or threatened species, for purposes of preliminary injunction; expert consensus was that best available methodology involved use of normalized salvage data to analyze effect of river flows on smelt population. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8).

[18] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under Endangered Species Act (ESA), avoiding adverse modification of critical habitat is independent statutory basis for promulgation of Reasonable and Prudent Alternative (RPA). Endangered Species Act of 1973, § 7(b)(3)(A), 16 U.S.C.A. § 1536(b)(3)(A).

[19] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Federal action agency may not rely solely on biological opinion (BiOp) to establish conclusively its compliance with its substantive obligations under section of Endangered Species Act (ESA) prohibiting agency action likely to jeopardize continued existence of any endangered or threatened species. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. 402.15(a).

[20] Environmental Law 149E ⚷537

149E Environmental Law
149EXI Plants and Wildlife
149Ek535 Public Plans, Projects, and Approvals; Agency Action
149Ek537 k. Consultation. Most Cited Cases

Under section of Endangered Species Act (ESA) prohibiting agency action likely to jeopardize continued existence of any endangered or threatened species, federal action agency must not blindly adopt conclusions of consultant agency. Endangered Species Act of 1973, § 7(a)(2), 16 U.S.C.A. § 1536(a)(2); 50 C.F.R. 402.15(a).

[21] Environmental Law 149E ⚷700

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek700 k. In general. Most Cited Cases

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Although all harms may be considered in evaluating claim for injunctive relief under National Environmental Policy Act (NEPA), injunction should not issue if enjoining such government action would result in more harm to environment than denying injunctive relief. National Environmental Policy Act of 1969, § 2 et seq., 42 U.S.C.A. § 4321 et seq.

[22] Environmental Law 149E 701

149E Environmental Law
149EXIII Judicial Review or Intervention
149Ek699 Injunction
149Ek701 k. Preliminary injunction. Most Cited Cases

Public interest factors favored granting of preliminary injunction in action brought under National Environmental Policy Act (NEPA) and Endangered Species Act (ESA), challenging implementation of Reasonable and Prudent Alternative (RPA) addressing impacts of water projects on threatened delta smelt; relief would have benefited substantial population of water users in California, with respect to reducing adverse harms of destruction of permanent crops and fallowed lands, as well as increased groundwater consumption. Endangered Species Act of 1973, § 2(a)(3), 16 U.S.C.A. § 1531(a)(3); National Environmental Policy Act of 1969, § 2, 42 U.S.C.A. § 4321.

***1023** Audrey M. Huang, Paul S. Weiland, John J. Flynn, III, Robert C. Horton, Nossaman LLP, Irvine, CA, Christopher J. Carr, Morrison and Foerster LLP, San Francisco, CA, Daniel Joseph O'Hanlon, Hanspeter Walter, William Thomas Chisum, Kronick, Moskovitz, Tiedemann & Girard Eileen M. Diepenbrock, Jonathan R. Marz, Jon David Rubin, Diepenbrock ***1024** Harrison, Brandon Murray Middleton, Damien Michael Schiff, James S. Burling, M. Reed Hopper, Pacific Legal Foundation, Brenda Washington Davis, Leslie R. Wagley, The Brenda Davis Law Group, Sacramento, CA, Charles Wesley Strickland, Brownstein Hyatt Farber and Schrek LLP, Santa Barbara, CA, Mark J. Mathews, PHV, Geoffrey M. Williamson, PHV, Martha F. Bauer, PHV, Michelle C. Kales, PHV, Steve O. Sims, PHV, Brownstein Hyatt Farber Schreck LLP, Denver, CO, Gary William Sawyers, Law Offices of Gary W. Sawyers, Harold Craig Manson, Thomas William Birmingham, Westlands Water District, Fresno, CA, for Plaintiffs.

James A. Maysonett, Srinath Jay Govindan, Charles Ray Shockey, Department of Justice, Ethan Carson Eddy, Govt., U.S. Dept. of Justice, Wildlife & Marine Resources Section, Washington, DC, Jonathan R. Marz, Diepenbrock Harrison, Sacramento, CA, Allison Ernestine Goldsmith, Attorney General's Office for the State of California, Cecilia Louise Dennis, Clifford Thomas Lee, California Attorney General's Office, San Francisco, CA, for Defendants.

FINDINGS OF FACT AND CONCLUSIONS OF LAW RE PLAINTIFFS' REQUEST FOR PRELIMINARY INJUNCTION AGAINST IMPLEMENTATION OF RPA COMPONENT 2 (a/k/a Action 3) (Doc. 433)

OLIVER W. WANGER, District Judge.

I. *INTRODUCTION*

Plaintiffs, San Luis & Delta Mendota Water Authority (the "Authority") and Westlands Water District ("Westlands"), move for a preliminary injunction ("PI") against the implementation of Reasonable and Prudent Alternative ("RPA") Component 2 set forth in the United States Fish and Wildlife Service's ("FWS") December 15, 2008 Biological Opinion, which addresses the impacts of the coordinated operations of the federal Central Valley Project ("CVP") and State Water Project ("SWP") on the threatened delta smelt (*Hypomesus transpacificus*) ("2008 Smelt BiOp" or "BiOp"). Doc. 433.

Plaintiffs State Water Contractors; Metropolitan Water District of Southern California; Kern County Water Agency and Coalition for a Sustainable; Stewart & Jasper Orchards, et al.; and the Family Farm Alliance join in the motion. Docs. 449, 451 & 453. Plaintiff-Intervenor Department of Water Resources ("DWR"), the operator of the SWP, partially joins. Doc. 452.

Federal Defendants and Defendant Intervenors opposed. Docs. 469, 473. Plaintiffs replied. Docs. 487, 491, 495, 497 & 507. The motion came on for an evidentiary hearing on April 2, 5, 6, and 7, 2010. Docs. 644, 652, 653 & 654. The parties were represented by counsel, as noted in the record.

After consideration of the testimony of the witnesses, the exhibits received in evidence, the written briefs of the parties, oral arguments, and the parties'

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proposed findings of fact and conclusions of law, the following findings of fact and conclusions of law concerning the motion for interim relief/preliminary injunction are entered.

To the extent any finding of fact may be interpreted as a conclusion of law or any conclusion of law may be interpreted as a finding of fact, it is so intended.

II. *BACKGROUND*

The 2008 Smelt BiOp, prepared pursuant to Section 7 of the Endangered Species Act ("ESA"), 16 U.S.C. 1536(a)(2), concluded that "the coordinated operations of the CVP and SWP, as proposed, are likely to jeopardize the continued existence of the delta smelt" and "adversely modify delta smelt critical habitat." BiOp at 276-78. ***1025** As required by law, the BiOp includes an RPA designed to allow the projects to continue operating without causing jeopardy to the species or adverse modification to its critical habitat. *Id.* at 279. The RPA includes various operational components designed to reduce entrainment of smelt during critical times of the year by controlling exports out of and water flows into the Delta. *Id. at* 279-85.

Component 1 (Protection of the Adult Delta Smelt Life Stage) consists of two Actions related to Old and Middle River ("OMR") flows.

• *Action 1,* which is designed to protect upmigrating delta smelt, is triggered during low and high entrainment risk periods based on physical and biological monitoring. Action 1 requires OMR flows to be no more negative than -2,000 cubic feet per second ("cfs") on a 14-day average and no more negative than -2,500 cfs for a 5-day running average. *Id. at* 281, 329.

• *Action 2* of Component 1 is designed to protect adult delta smelt that have migrated upstream and are residing in the Delta prior to spawning. Action 2 is triggered immediately after Action 1 ends or if recommended by the Smelt Working Group ("SWG"). Flows under Action 2 can be set within a range from -5,000 to -1,250 cfs, depending on a complex set of biological and environmental parameters. *Id. at* 281-82, 352-56.

At issue here is *Component 2* (Action 3) (Protection of Larval and Juvenile Delta Smelt), which requires OMR flows to remain between -1,250 and -5,000 cfs, beginning when Component 1 is completed, when Delta water temperatures reach 12 Celsius ("C"), or when a spent female smelt is detected in trawls or at salvage facilities. *Id. at* 282, 357-58. Component 2 remains in place until June 30 or when the Clifton Court Forebay water temperature reaches 25° C. *Id. at* 282, 368.

Component 3 (Improve Habitat for Delta Smelt Growth and Rearing) requires sufficient Delta outflow to maintain average mixing point locations of Delta outflow and estuarine water inflow ("X2") from September to December, depending on water year type, in accordance with a specifically described "adaptive management process" overseen by FWS. *Id. at* 282-83, 369.

Under *Component 4* (Habitat Restoration), DWR is to create or restore 8,000 acres of intertidal and subtidal habitat in the Delta and Suisun Marsh within 10 years. *Id. at* 283-84, 379.

Under *Component 5* (Monitoring and Reporting), the Projects gather and report information to ensure proper implementation of the RPA actions, achievement of physical results, and evaluation of the effectiveness of the actions on the targeted life stages of delta smelt, so that the actions can be refined, if needed. *Id. at* 284-85, 328, 375.

III. *SUMMARY OF MOTION*

Plaintiffs' request temporary injunctive relief on the following grounds:

1) the district court has already found that the United States Bureau of Reclamation ("Reclamation") failed to comply with the National Environmental Policy Act ("NEPA") in implementing the 2008 Smelt BiOp RPA; and.

2) the 2008 Smelt BiOp violates the ESA and is arbitrary, capricious, and contrary to law because:

a) various aspects of the BiOp's baseline and effects analysis are flawed, undermining the overall jeopardy conclusion, causing overstatement of the effects of the proposed action and imposition of overly-broad and overly-restrictive RPA

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Components;

***1026** b) the severe OMR flow restrictions in RPA Components 1 and 2 are unsupported by the best available science and the data in the 2008 Smelt BiOp; and

c) Component 3 ("The Fall X2 Action") is arbitraryand capricious, because it is without factual or scientific justification and/or is not supported by the best available science, compelling a finding of likelihood of success on the merits.

Plaintiffs further claim that the implementation of RPA Components 1 and 2 will cause them continuing irreparable harm and that the public interest and balance of hardships favor injunctive relief.

RPA Component 1 has ended for the 2009-2010 water year, mooting any request for injunctive relief against its imposition. Component 3 is not set to begin until September, and Plaintiffs do not presently seek injunctive relief against its operation. Barring unforeseen circumstances, the parties' cross-motions for summary judgment will be heard and decided before September. Components 1 and 3 are not addressed in this decision.[FN1]

FN1. During the evidentiary hearing, Plaintiffs argued that testimony regarding Component 3 should be heard because it is relevant to their likelihood of success on the merits. But, even if Plaintiffs were likely to succeed on their claim that Component 3 is arbitrary and capricious, such a finding would have no bearing on the propriety of issuing an injunction against the operation of Component 2. The factual and legal arguments concerning Component 3 are voluminous. In light of Plaintiffs' request that this motion be resolved with all deliberate haste, Component 3 is not addressed at this time.

Plaintiffs' injunction request has been modified over time. Originally, Plaintiffs sought an injunction against implementation of RPA Component 2 and enforcement of the incidental take limits in the BiOp. *See* Doc. 435 at 2-4.

• In place of Component 2, Plaintiffs sought to require Federal Defendants and DWR to use a Potential Entrainment Index ("PEI") to estimate cumulative entrainment loss of delta smelt. If the PEI estimate of cumulative loss is less than or equal to 7%, no pumping restrictions should be imposed; if the PEI estimate of cumulative entrainment loss exceeds 7%, FWS shall be responsible for setting OMR flows under the range specified in Component 2 of the BiOp. Doc. 435 at 3.

• Plaintiffs requested that the Incidental Take Statement ("ITS") be recalculated based on a higher Cumulative Salvage Index ("CSI") of 11.36 for adults. Doc. 435 at 4.

• In the alternative, if the above remedies are not imposed, DWR requested that that the Court impose the interim remedial operational conditions imposed following summary judgment in *NRDC v. Kempthorne,* 1:05-cv-1207. Doc. 452 at 2.

Although Plaintiffs never filed a written modification of their request for relief, at the evidentiary hearing Plaintiffs withdrew their request to enjoin enforcement of the ITS and their request to implement the PEI in place of RPA Component 2 of the RPA. 4/2/10 Tr. 90:4-12; 4/7/10 Tr. 243:23-244:8. Instead, Plaintiffs now propose that Component 2 be replaced by a flat -5,600 cfs ceiling on negative OMR flows during the remainder of the implementation period for Component 2. *Id.; see* 4/2/10 Tr. 208.

IV. *STANDARD OF DECISION*

Injunctive relief, whether temporary or permanent, is an "extraordinary remedy, never awarded as of right." ***1027***Winter v. Natural Resources Defense Council,* 555 U.S. 7, 129 S.Ct. 365, 376, 172 L.Ed.2d 249 (2008); *Weinberger v. Romero-Barcelo,* 456 U.S. 305, 312, 102 S.Ct. 1798, 72 L.Ed.2d 91 (1982). Four factors must be established by a preponderance of the evidence to qualify for temporary injunctive relief:

1. Likelihood of success on the merits;

2. Likelihood the moving party will suffer irreparable harm absent injunctive relief;

3. The balance of equities tips in the moving parties' favor; and

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4. An injunction is in the public interest.

Winter, 129 S.Ct. at 374; *Am. Trucking Ass'n v. City of Los Angeles*, 559 F.3d 1046, 1052 (9th Cir.2009).

V. *FINDINGS OF FACT*

A. *The Agency Action.*

1. The agency action is the coordinated operation of the CVP and SWP, pursuant to an Agreement for the Coordinated Operation of the two projects ("OCOA").

2. According to the Rivers and Harbors Act of 1937, the dams and reservoirs of the CVP "shall be used, first, for river regulation, improvement of navigation and flood control; second, for irrigation and domestic uses; and, third, for power." 50 Stat. 844, 850.

3. The CVP was reauthorized in 1992 through the Central Valley Improvement Act ("CVPIA"), which modified the 1937 Act and added mitigation, protection, and restoration of fish and wildlife as co-equal project purposes. Pub.L. 102-575 § 3402, 106 Stat. 4600, 4706 (1992). One of the stated purposes of the CVPIA is to address impacts of the CVP on fish and wildlife. 3406(a). The CVPIA made environmental protection and water deliveries co-purposes.

4. This case presents a critical conflict between these dual legislative purposes, providing water service for agricultural, domestic, and industrial use, versus enhancing environmental protection for fish species whose habitat is maintained in rivers, estuaries, canals, and other waterways that comprise the Sacramento-San Joaquin Delta.

5. It is of manifest significance to the public interest that DWR, a co-operator and the State contractual partner of Reclamation, disagrees with at least some portions of the RPA and seeks injunctive relief against the calendar-based ceiling in RPA Component 2.

B. *Facts Relevant to NEPA Claim.*

6. It is undisputed that neither FWS nor Reclamation engaged in any NEPA analysis in connection with preparation or implementation of the 2008 Smelt BiOp.

7. It is also undisputed that on November 13, 2009, 686 F.Supp.2d 1026 (E.D.Cal.2009), the Court entered an Order granting San Luis Plaintiffs' motion for summary judgment on their claim that Federal Defendants violated NEPA when they implemented the 2008 Smelt BiOp without conducting the required NEPA analysis. Doc. 399.

8. FWS did not engage in a systematic consideration of impacts to the human environment and/or consideration of alternatives that took into account those impacts, ordinarily performed as part of a NEPA review.

C. *Facts Relevant to ESA Challenges.*

(1) *Status of the Species.*

9. The delta smelt was listed as a threatened species under the ESA on March 5, 1993. 58 Fed.Reg. 12,584 (March 5, 1993). Critical habitat was designated for the delta smelt on December 19, 1994. 59 Fed.Reg. 65,256 (Dec. 19, 1994).

***1028** 10. The threatened delta smelt, one of the most abundant species in the Bay-Delta ecosystem as recently as thirty years ago, is in imminent danger of extinction. Doc. 94, Findings of Fact Re Plaintiffs' Motion for Preliminary Injunction, 1-2. The experts agree that there is no current population count for delta smelt. 4/2/10 Tr. 174 (Feyrer); 4/5/10 Tr. 67 (Newman); 4/5/10 Tr. 231 (Hilborn); 4/6/10 Tr. 95 (Deriso). However, the species' relative abundance from year-to-year is monitored using the Fall Midwater Trawl index ("FMWT") prepared by the California Department of Fish and Game ("CDFG"), as well as other abundance indices. 4/2/10 Tr. 174-75. The FMWT shows a continuously and precipitously declining trend in delta smelt abundance in recent years, registering a series of record-breaking lows. 4/2/10 Tr. 176-78. That trend has continued in the last two years, with the FMWT declining from 23 in 2008 to 17 in 2009, the lowest value ever recorded. *Id.* The population growth rate for delta smelt has been "quite negative" for the last ten years. 4/5/10 Tr. 232. The stock-recruitment relationship for delta smelt, which shows the relationship between adults (i.e., the "stock" of the population) to juveniles recruited into the population, is "trending toward the origin," the

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opposite direction from recovery. 4/2/10 Tr. 187-88. "There's no question that [the present abundance levels of delta smelt] are very low." 4/5/10 Tr. 232 (Hilborn).

11. FWS recently determined that delta smelt warranted uplisting from threatened to endangered, but that the action was currently precluded by higher priority listing actions. 4/7/10 Tr. 163; 75 Fed.Reg. 17,667 (Apr. 7, 2010). The direct mortality of delta smelt by entrainment at the CVP and SWP pumps, as well as the destruction and adverse modification of its habitat caused by water exports, were important factors in this determination. 75 Fed.Reg. at 17,671 ("The operation of State and Federal export facilities constitute a significant and ongoing threat to delta smelt through direct mortality by entrainment"). As a result of the "immediate and high magnitude threats" confronting the species, the delta smelt was assigned a listing priority number of 2.[FN2] *Id.* at 17,675.

FN2. "Warranted but precluded" species are assigned listing priority numbers from 1 to 12, with 1 being the highest priority. *Id.* at 17,674.

12. Evidence submitted during trial indicates that, as of the dates of the March Spring Kodiak Trawl (March 8-11, 2010) and 20 mm surveys (March 15-18, 2010), delta smelt were collected in the northern and western portions of the Delta, not in the danger zones of the central or south Delta. SWC Exs. 918 & 919. Through March 28, 2010, the SWP had an expanded salvage of 16 delta smelt, and the CVP had an expanded salvage of 28 delta smelt. SWC Ex. 915.

13. Plaintiffs are correct that during the three years that restrictions on spring exports have been in place, the FMWT index has continued to trend downward. 4/7/10 Tr. 94:8-14. However, Mr. Grimaldo testified that improved conditions may not immediately translate into improved survival and population growth. 4/7/10 Tr. 120:9-25.

(2) *Baseline Issues.*

a. *Comparison of CalSim and Dayflow Data.*

14. CalSim II ("CalSim") is a computer model developed jointly by DWR and Reclamation. The model simulates SWP and CVP operations and is the standard planning tool for evaluating project operations. 4/2/10 Tr. 101:24-102:6. The first version of the CalSim model was available in May ***1029** 2002. It is continuously updated. 4/2/10 Tr. 102:7-13.

15. CalSim simulates SWP and CVP reservoir operations, project exports and water deliveries, flow through the Delta, and salinity requirements in the Delta, including the location of X2. 4/2/10 Tr. 102:14-20; BiOp at 207.

16. X2 is the location in the Delta where the salinity is two parts per thousand. It is measured as the distance upstream from the Golden Gate. 4/2/10 Tr. 102:21-24.

17. The CalSim model assumes 82 years of hydrology, 4/2/10 Tr. 101:23-102:3, 103:14-18, 161:2-6, provides the model with data regarding inflow to reservoirs and other information affecting the water supply, 4/2/10 Tr. 103:19-23. The model also assumes a level of development, which reflects water demand resulting from a particular urban population level, agricultural production, and wildlife refuge needs, 4/2/10 Tr. 104:1-7, as well as the existence and effect of environmental regulations and environmental programs, 4/2/10 Tr. 103:14-18. The assumptions used in the CalSim studies were developed by representatives from FWS, the National Oceanic and Atmospheric Administration ("NOAA"), Reclamation, CDFG, and DWR. 4/2/10 Tr. 105:8-12.

18. The CalSim model assists scientists in making planning decisions by allowing comparisons between studies based on differing assumptions. *See* 4/2/10 Tr. 102:25-103:6. According to Aaron Miller, P.E., an expert qualified to offer opinions on the subject of the formulation and application of CalSim, CalSim is not designed, or intended to be used, to compare CalSim study outputs to actual "historic" data or to outputs from different models, including the Dayflow model. 4/2/10 Tr. 95:7-14; DWR Ex. 511 at 8.

19. CalSim study 7.0 was developed as the baseline study for the 2008 OCAP Biological Assessment ("2008 OCAP BA" or "BA"). Study 7.0 represents existing conditions, and assumes a 2005 level of development and a full environmental water account ("EWA"). 4/2/10 Tr. 104:8-20; 123:21-24, 146:3-6; BiOp at 207. Study 7.1 is a near-future conditions study. It assumes a 2005 level of development and a

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limited EWA. 4/2/10 Tr. 104:8-23; 123:21-25; BiOp at 207-08. Study 8.0 is a future conditions study. It assumes a 2030 level of development and a limited EWA. 4/2/10 Tr. 104:8-25; 123:21-124:2; BiOp at 208.

20. CalSim study 6.0 was designed to look at the differences between the prior CalSim model used in the 2004 OCAP BA and the new model used in the 2008 OCAP BA. 4/2/10 Tr. 104:8-15, 157:11-18.

21. Study 6.1 is similar to 6.0, but did not include the EWA and used an older version of the X2 estimate. 4/2/10 Tr. 104:8-17. Study 6.1 was prepared at the request of Reclamation biologists to assess changes in water project operations during the pelagic organism decline ("POD") era. 4/2/10 Tr. 149:18-24, 150:16-151:17, 158:8-13. Reclamation biologists compared study 6.1 against the 7.0 and 8.0 studies on pages 13-10 though 13-17 of the 2008 OCAP BA. 4/2/10 Tr. 149:12-24; AR 011057-011064.

22. Mr. Miller testified that study 6.1 should not have been used for comparison because it was not comparable to the other studies. 4/2/10 Tr. 156:25-157:8. Study 6.1 used the Kimmerer Monismith equation to estimate X2 and it, as well as study 6.0, did not completely reflect the new enhancements in the CalSim model developed after the 2004 OCAP BA. 4/2/10 Tr. 157:10-18; SLDMWA Ex. 12 at 205-206.

23. The CalSim 9.0 series of studies represents climate change scenarios. Study 9.0 represents a future condition to serve as a basis of comparison of the effects of climate change to sea level rise, ***1030** without the inclusion of (b)(2) or EWA. Study 9.1 represents a one-foot sea level rise, without the inclusion of (b)(2) and EWA. Studies 9.2 through 9.5 look at predicted changes in precipitation and temperature for the period 2010 to 2030, relative to conditions for the period 1971 to 2000. The 9.0 climate change scenarios were not intended to be directly compared to studies 7.08.0. 4/2/10 Tr. 105:1-5; BiOp at 208. Such a comparison is not valid because the studies make different assumptions regarding environmental programs. 4/2/10 Tr. 123:10-16.

24. In the BiOp, CalSim studies were compared to simulations of historic conditions generated using the Dayflow model. 4/2/10 Tr. 107:4-7, 142:6-9. Dayflow is a model that estimates historic outflow based on historic precipitation, inflow, and exports, and estimates of delta island diversions. Dayflow also provides an estimate for the location of X2. 4/2/10 Tr. 107:8-14.

25. In the BiOp, FWS purports to quantify adult entrainment by comparing OMR flows from CalSim studies to historic OMR flows during 1967-2007. BiOp at 212-13. The BiOp depicts these results in Tables E-5b and E-5c in the BiOp, which are labeled "difference from historic median value to CalSim II model median value" and "difference from historic median salvage to predicted salvage based on ... CalSim II," respectively. *Id.* at 214. Tables E-5b and E-5c purport to quantify, as effects of the action, changes in OMR flows and entrainment using the Dayflow-generated historic data as the baseline and comparing that to CalSim study results. Based on these comparisons of CalSim data and Dayflow-generated historic data, the BiOp concludes, "adult entrainment is likely to be higher than it has been in the past under most operating scenarios, resulting in lower potential production of early life history stages in the spring in some years." BiOp at 213.

26. In another analysis in the BiOp, FWS purports to quantify the effects of the action on delta smelt habitat by comparing CalSim model projections of the location of X2 under the proposed action to the median location of X2 over the historical period 1967-2007, as simulated by Dayflow. BiOp at 235-36. Based on this comparison, the BiOp concludes "[t]he median X2 [locations] across the CalSim II modeled scenarios were 10-15 percent further upstream than actual historic X2 (Figure E-19)." *Id.* at 235. In reliance on these percent differences between CalSim-created data and historical data, the BiOp concludes "proposed action operations are likely to negatively affect the abundance of delta smelt." *Id.* at 236.

27. In the BiOp, FWS performed similar comparisons of CalSim data to Dayflow-simulated historic baseline data to quantify the effects of the action on larval and juvenile delta smelt. *See, e.g.,* BiOp at 219 (examining effect of action on larval and juvenile entrainment and stating "[t]he analysis is based on comparison of historical (1967-2007) OMR and X2 to the proposed action's predictions of these variables

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provided in ... [CalSim] studies 7.0, 7.1, 8.0, and 9.0-9.5").

28. Mr. Miller explained that outputs from a CalSim study should not be compared to outputs from the Dayflow model because the assumptions used in the two models are significantly different. 4/2/10 Tr. 107:18-23, 136:10-18.

a. The CalSim model assumes a constant level of development. In contrast, the Dayflow model incorporates a continuous change in the level of development because the Dayflow model is using historical information as input. When comparing models to determine the effect of project operations, the best ***1031** scientific practice is to keep the assumed level of development constant. 4/2/10 Tr. 107:15-108:15.

b. A CalSim study also assumes a constant regulatory environment, whereas Dayflow uses a regulatory environment that has changed over time. This difference renders any comparison between CalSim and Dayflow outputs unreliable. 4/2/10 Tr. 108:16-109:23.

c. CalSim also operates on a monthly time step, whereas Dayflow operates on a daily time step. The two models also operate to different guidelines. The Dayflow model incorporates a conservative operation to avoid violating a regulation. In contrast, the CalSim model operates strictly to that regulation. 4/2/10 Tr. 107:23-108:3, 109:24-110:9. Operating conservatively results in higher modeled outflow. 4/2/10 Tr. 110:10-14.

d. The differences in the model assumptions and in the way the models operate, as described above, cannot be quantified to calibrate the models. CalSim does not model or simulate historical conditions, so it cannot be calibrated to history. 4/2/10 Tr. 121:18-122:6, 161:2-6. Calibration would be "very difficult, nearly impossible, to do without [ ] developing a model designed to simulate historical conditions." 4/2/10 Tr. 110:15-111:1. The CalSim model cannot currently predict X2 for historic years because it would require a new model. 4/2/10 Tr. 122:7-16.

e. The Dayflow historic time window that FWS reported using in the BiOp was 1967 to 2007. CalSim studies model water years 1992 through 2003. The BiOp's comparison of CalSim-modeled data to Dayflow-modeled data resulted in comparing different sets of water years. Mr. Miller testified that the best scientific practice regarding years of comparison would have been to use consistent time windows. 4/2/10 Tr. 116:18-117:21; 142:13-15.

f. The artificial neural network ("ANN") and the Kimmerer Monismith equation ("KM equation") are two methods of estimating X2. 4/2/10 Tr. 111:2-16. The CalSim studies used ANN to estimate the position of X2, because ANN can be adapted to address sea level rise. 4/2/10 Tr. 111:19-25. The Dayflow model uses the KM equation to estimate X2. 4/2/10 Tr. 111:2-8; DWR Ex. 510 at Fig. 2; DWR Ex. 511 at 15. The KM equation was developed using historical data, making the KM equation invalid for a sea level rise study. 4/2/10 Tr. 111:19-25.

g. At locations less than 75 kilometers ("km") from the Golden Gate, the KM equation results in an X2 estimate greater than (or farther upstream than) the ANN estimate. In contrast, at locations greater than 75 km from the Golden Gate, the KM equation provides an estimate less than the ANN estimate. 4/2/10 Tr. 112:1-113:18, DWR Ex. 510 at Fig. 2.

29. Mr. Miller calculated the magnitude of error introduced into the BiOp by FWS's application of both the KM and the ANN methods of estimating X2. He replicated the 87 km value as the median estimate of X2 from CalSim study 7.0 using the ANN method, and, consistent with the BiOp, calculated the difference between the reported historic median of X2 [79 km] and the study 7.0 median [87 km] to be 10% [(87 km-79 km)/79]. He then calculated the median X2 for the CalSim 7.0 study using the KM equation (instead of using ANN) to be 84 km (instead of 87 km). Finally, he identified the percent difference between the reported historic median estimate of X2 using the KM equation [79 km] and the CalSim study 7.0 median estimate of X2 using the KM equation***1032** [84 km] to be 6% [(84 km-79 km)/79 km]. 4/2/10 Tr. 114:6-25; DWR Ex. 511 at 14-16; BiOp at 235-36.

30. FWS did not calculate X2 using the KM equation for the CalSim studies, as did Mr. Miller.

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Instead, it undertook a direct comparison. DWR Ex. 511 at 15. The BiOp reported a 10% difference between the reported historic median X2 and the CalSim study 7.0 X2 median. Calculating the percent difference between the historical median X2 and study 7.0 median X2 using the KM equation resulted in only a 6% difference. From this, Mr. Miller concluded that 40% of the difference between X2 as estimated by study 7.0 and the historical X2 baseline reported in the BiOp is error attributed entirely to the use of the KM equation to calculate the historical baseline X2 and the ANN equation to calculate the CalSim study 7.0 baseline. 4/2/10 Tr. 114:6-25; DWR Ex 511 ¶ 15.

31. Mr. Miller testified that the differences in the KM equation and the ANN method of estimating X2 has an effect on the BiOp's analysis of habitat area, which in turn effects the BiOp's prediction of smelt abundance (as measured by the Summer Townet Survey Index). 4/2/10 Tr. 113:19-114:5; BiOp at 235236, 266-269.

32. Mr. Miller explained that correcting for the differences between the use of the KM and ANN methods to estimate X2 does not correct for all the biases inherent in comparing CalSim data to "historic" data. It is unknown which portion of the remaining 60% of difference is attributable to the proposed action, and which portion is due to the other identified biases. 4/2/10 Tr. 115:1-8; DWR Ex. 511 at 16.

33. Mr. Miller testified that when using CalSim study 7.0-designed as a current conditions baseline-instead of the "historical" baseline in the BiOp, and comparing study 7.0 to the near-future 7.1 study, X2 moved upstream 0.7 km. The percentage change in X2 from current to near-current conditions was 0.8%. Further, when comparing study 7.0 to study 8.0 (a 2030 level of development scenario), X2 moved upstream only 1.1 km, with a resultant percentage change in X2 of 1.2% from current to future conditions. 4/2/10 Tr. 128:18-129:11; DWR Ex. 511 at 20; BiOp at 235, 265. The 0.7 km change and the 1.1 km change, respectively, were vastly different from the approximately 8.7 km and 9.1 km changes shown in the BiOp (Figure E-19) using historical Dayflow as the baseline. BiOp at 265; DWR Ex. 511 at 7.

34. Using the equation identified in Figure E-20 in the BiOp, Mr. Miller calculated the reduction in suitable habitat consistent with the change in the position of X2. A comparison of CalSim study 7.0 with study 7.1 yielded a reduction in habitat area of 128 hectares, and a comparison of study 7.0 with study 8.0 yielded a reduction in habitat area of 289 hectares. 4/2/10 Tr. 129:12-130:5; DWR Ex. 511 at 20; BiOp at 266.

35. Plaintiffs assert that, prior to issuance of the BiOp, FWS was put on notice that comparing historical data to CalSim simulated data was an inappropriate and invalid methodology. 4/2/10 Tr. 133:15-134:11, 137:16-138:16, 138:21-139:14; SLDMWA Ex. 351 at 7; SLDMWA Ex. 261 at 5; SWC Ex. 933 at 3.

a. The 2008 OCAP BA did raise some cautionary notes:

> CalSim II is intended to be used in a comparative mode. The results from a "proposed operation" scenario are compared to the results of a "base" scenario, to determine the incremental effects. The model should be used with caution to prescribe seasonal or to guide real-time operations, predict flows or water deliveries for any real-time operations. The results from a single simulation may not necessarily represent the exact operations for a ***1033** specific month or year, but should reflect longterm trends.

DWR Ex. 518.

b. DWR Deputy Director Jerry Johns, on October 24, 2008, submitted comments to FWS on the draft effects analysis, generally cautioning against the comparison of modeled data with actual data:

> USFWS is using historic data for comparison to CalSim II simulations. Great caution should be taken when comparing actual data to modeled data. CalSim II modeling should be used in a comparative mode. In other words, it should be used to compare one set of model runs to another. For example, it would be appropriate to compare CalSim II modeling of one demand alternative to another to analyze the incremental effects.

AR 8671; *see also* AR 8668 (further explaining unreliability problems comparing historic and mod-

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eled data).

c. The State Water Contractors also cited a letter that they sent to FWS before the BiOp was completed. However, that letter only critiqued the comparison of simulated data to historical salvage data, and did not dispute with the comparison of CalSim-simulated to Dayflow-simulated historic data. 4/2/10 Tr. 133-34.

d. Mr. Miller acknowledged that, despite his heavy involvement in the modeling analysis underlying the BiOp, he did not present his *current* criticism of the use of the data to FWS during preparation of the BiOp. 4/2/10 Tr. 115-16.

36. FWS was not on notice of Mr. Miller's critiques regarding comparing simulated CalSim runs to simulated Dayflow runs, and was not put on notice by him that they were improperly using the specialized models. FWS did not have an opportunity to correct its modeling or address Plaintiffs' concerns.

37. The BiOp explains why FWS looked beyond CalSim. When CalSim was used to identify current Project operations, and these results were then compared to the results of a CalSim modeling run purportedly simulating past operations, the results "were nearly identical" despite significant operational changes in current operations as compared to past. BiOp at 204-05. The BiOp explains that "[t]he inaccuracies in CalSim [led FWS] to use actual data to develop an empirical baseline." *Id.* at 206. FWS "also developed historical time series data for hydrologic variables used in this effects analysis based on the Dayflow database ... and OMR data obtained from USGS." *Id.*

38. Mr. Miller asserts that best scientific practice would preclude FWS from comparing CalSim output to historic data generated by Dayflow. However, Mr. Miller acknowledged that in the 2008 OCAP BA, DWR and Reclamation compared CalSim output to historic data, albeit for a different purpose, namely to show that the timing and magnitude of reservoir and export operations were similar to historic operations. 4/2/10 Tr. 119-20. Mr. Miller acknowledged that other modelers involved in preparing the BA expressed concerns about using only CalSim data, and that the BA itself questioned the use of that data alone, as CalSim simulations did not provide "an especially satisfactory representation of pre-POD water project operations." *Id.* at 150-51. The BA, prepared by DWR and Reclamation, states: "While we have not adopted an alternative statistical approach [to the use of CalSim model runs] in this biological assessment, we believe it would be a useful way to further assess changes in water project operations during the POD era and we recommend that [FWS] consider such an analysis as further refinement to this BA." *Id.* Other reputed scientists in the field agree with FWS and the BA that the ***1034** CalSim-generated modeling studies did not "generate[ ] baselines with a high degree of reliability." *Id.* at 160. Neither Mr. Miller nor DWR offered any alternative to Dayflow to FWS to address that serious shortcoming during preparation of the BiOp. *Id.* at 160-61.

39. Mr. Miller acknowledged that, even if the CalSim comparison had been conducted in the manner he recommends, it would have confirmed FWS's conclusions that Project operations as proposed in the BA move X2 further upstream in the fall, reducing the amount of habitat for delta smelt and modifying the quality of critical habitat by shifting the low salinity zone away from higher-quality habitat and further into the central Delta. *Id.* at 130. Mr. Miller did not suggest that this revision would result in a *de minimis* shift of X2.

40. Mr. Miller presents substantive criticisms of the BiOp's CalSim runs. These specific concerns were not raised before the agency prior to the BiOp's issuance. Moreover, FWS expressed legitimate concerns, shared with other scientists, about the exclusive reliance on CalSim runs. Mr. Miller concedes that even if his recommended approach had been taken, the same fundamental result would have obtained: project operations shift the position of X2 upstream.[FN3]

FN3. The magnitude of the shift, not its existence, and what should be done about it may be relevant to the need for and justification of RPA Component 3.

41. This highly technical dispute was not raised before the agency, and there were legitimate concerns about comparing CalSim modeling runs to other CalSim runs. This choice of competing methodologies is not sufficiently clear error to justify the court's intervention.

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b. *Treatment of "Other Stressors."*

42. Plaintiffs raise a generic concern about how the BiOp treated the many other factors that are undeniably contributing to the decline of delta smelt including: (a) presence of aquatic macrophytes (submerged aquatic vegetation such as *Egeria densa* that may overwhelm delta smelt habitat); (b) predation; (c) introduction and propagation of invasive species, including inland silversides and the overbite clam that compete with the delta smelt; (d) presence of contaminants, such as pesticides and wastewater, in the Delta; and (e) presence of large blooms of blue-green algae toxic to the copepods eaten by delta smelt. BiOp at 182-86; 4/7/10 Tr. 148:17-19, 149:20-25.

43. Plaintiffs take particular issue with a statement in the very first paragraph of a section of the BiOp entitled "Effects of the Proposed Action."

> The Status of the Species/Environmental Baseline section of this document described the multitude of factors that affect delta smelt population dynamics including predation, contaminants, introduced species, entrainment, habitat suitability, food supply, aquatic macrophytes, and microcystis. The extent to which these factors adversely affect delta smelt is related to hydrodynamic conditions in the Delta, which in turn are controlled to a large extent by CVP and SWP operations. Other sources of water diversion (NBA, CCWD, local agricultural diversions, power plants) adversely affect delta smelt largely through entrainment (see following discussion), but when taken together do not control hydrodynamic conditions throughout the Delta to any degree that approaches the influence of the Banks and Jones export facilities. *So while many of the other stressors that have been identified as adversely affecting delta smelt were not caused by CVP and SWP operations, the likelihood* ****1035*** *and extent to which they adversely affect delta smelt is highly influenced by how the CVP/SWP are operated in the context of annual and seasonal hydrologic conditions.* While research indicates that there is no single primary driver of delta smelt population dynamics, hydrodynamic conditions driven or influenced by CVP/SWP operations in turn influence the dynamics of delta smelt interaction with, these other stressors (Bennett and Moyle 1996).

BiOp at 202 (emphasis added).

44. The BiOp concludes that "the CVP and SWP have played an indirect role in the delta smelt's decline by creating an altered environment in the Delta that has fostered the establishment of nonindigenous species and that exacerbates these and other stressors that are adversely impacting delta smelt." BiOp at 203; 4/7/10 Tr. 152:5-12. Ms. Goude further testified that it is not possible to quantify the level of effects of those other factors. 4/7/10 Tr. 150:1-3.

45. When asked by the Court to identify any information in the record that supports the BiOp's conclusion that project operations exacerbate the effect of other stressors, Dr. Thomas Quinn, an expert appointed under Federal Rule of Evidence 706, concluded that "there does not appear to be evidence in the record demonstrating that project operations exacerbate the effect/impact of other stressors." Doc. 633, Order Transmitting Responses from 706 Experts, Ex. A, at 20. Ms. Goude testified that she disagreed with this conclusion, but could not identify any evidence from the record to support her assertion. *See* 4/7/10 Tr. 201:22-203:9.

46. Dr. Andre Punt, another court-appointed expert, further explained the BiOp's notion that indirect effects of the Projects may contribute to effects such as high water toxicity, suppression of phytoplankton, increase of overbite clams, and increase in encounters with unscreened agricultural diversions in the Delta are plausible hypotheses, but that "there are no direct data available to test them." Doc. 633 at 21.

47. In contrast to the BiOp's general statements assigning the blame for at least some, unquantified portion of the negative effects cause by these "other stressors" to the projects, elsewhere, the BiOp acknowledges that there is "no single primary driver of delta smelt population dynamics," *id.* at 202, but rather that there are "multiple factors" and that "not all are directly influenced by operations of the CVP/SWP." *Id.* at 328. "Other stressors" are discussed in detail throughout the BiOp. *See, e.g., id.* at 182-88, 198, 201-2. Specifically, FWS considered the effects of "predation, contaminants, introduced species ..., habitat suitability, food supply, aquatic macrophytes, and microcystis." *Id.* at 202, 277. The BiOp expressly recognizes that the long-term decline

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of the species "was very strongly affected by ecosystem changes caused by non-indigenous species invasions and other factors...." *Id.* at 189.

48. Although the BiOp acknowledges that "not all" of the multiple factors negatively impacting the species "are directly influenced" by Project operations, the general assertion in the BiOp that other stressors are the result of (or at least exacerbated by) Project operations is not supported by the record. This error compounds the agency's failure to address alternative approaches to avoiding jeopardy, including whether other stressors can be mitigated or eliminated, which NEPA requires.

(3) *Challenges to Component 2 (Action 3).*

49. Component 2 (Protection of Larval and Juvenile Delta Smelt) requires OMR flows to remain between -1,250 and -5,000 ***1036** cfs beginning when Component 1 is completed, when Delta water temperatures reach 12 Celsius, or when a spent female smelt is detected in trawls or at salvage facilities. *Id. at* 282, 357-358. Component 2 remains in place until June 30 or when Clifton Court Forebay water temperature reaches 25 Celsius, whichever first occurs. *Id. at* 282, 368.

50. The objective of Component 2 (which corresponds to Action 3 in Attachment B of the BiOp), is to "improve flow conditions in the Central and South Delta so that larval and juvenile delta smelt can successfully rear in the Central Delta and move downstream when appropriate." BiOp 282.

51. The most recent smelt working group recommendation for the week of April 12, 2010 recommends OMR flows no more negative than -5,000 cfs because the "risk to larval delta smelt was low, given that no salvage of larvae has occurred so far this year and the latest survey data suggest that the greatest densities of delta smelt are in the Sacramento River and downstream of the confluence, and, therefore, outside the influence of the pumps." FN4

FN4. Judicial notice is taken of the existence and content of the Smelt Working Group Recommendation, dated April 12, 2010, available at: http:// www. fws. gov/ sacramento/ es/ documents/ ds_ working_ group/ 4- 12- 10 % 20notes. pdf.

a. *Use of Raw Salvage to Justify the Quantitative Flow Restrictions.*

52. The BiOp quantitatively analyzed the effects of pumping at the Banks and Jones pumping plants. 4/6/10 Tr. 19:1-3; BiOp at 208-209.

53. The results of that quantitative analysis, which compared OMR flows with gross salvage numbers, are described in Figures B-13 and B-14 of the BiOp. BiOp at 348, 350. These figures were presented as part of a three and-a-half page section of the BiOp entitled "Justification for Flow Prescriptions in Action 1." BiOp at 347-51. It also appears that this analysis was relied upon to set the calendar-based flow prescription in Component 2 (Action 3), as no other basis for the -5,000 cfs ceiling is presented. Because this portion of the BiOp is critical to the present challenge, it is reproduced here in its entirety:

Justification for Flow Prescriptions in Action 1

Understanding the relationship between OMR flows and delta smelt salvage allows a determination of what flows will result in salvage. The OMR-Salvage analysis herein was initiated using the relationship between December to March OMR flow and salvage provided by P. Smith and provided as Figure B-13, below. Visual review of the relationship expressed in Figure B-13 indicates what appears to be a "break" in the dataset at approximately -5,000 OMR; however, the curvilinear fit to the data suggest that the break is not real and that the slope of the curve had already begun to increase by the time that OMR flows reached -5,000 cfs.

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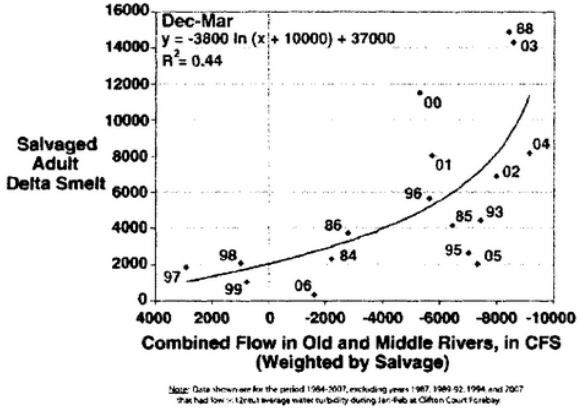

Figure B-13. OMR-Salvage relationship for adult delta smelt. (source, P. Smith). Data from this figure were the raw data used in the piecewise polynomial regression analysis.

Further, a nonlinear regression was performed on the dataset, and the resulting pseudo-R_2 value was 0.44-suggesting that although the curvilinear fit is a reasonable description of the data, other functional relationships also may be appropriate for describing the data. Fitting a different function to the data could also determine the location where salvage increased, i.e. identify the "break point" in the relationship between salvage and OMR flows. Consequently, an analysis was performed to determine if the apparent break at -5,000 cfs OMR was real. A piecewise polynomial regression, sometimes referred to as a multiphase model, was used to establish the change (break) point in the dataset.

A piecewise polynomial regression analysis with a linear-linear fit was performed using data from 1985 to 2006. The linear-linear fit was selected because it was the analysis that required the fewest parameters to be estimated relative to the amount of variation in the salvage data. Piecewise polynomial regressions were performed using Number Cruncher Statistical Systems (© Hintz, J., NCSS and PASS, Number Cruncher Statistical Systems, Kaysville UT).

The piecewise polynomial regression analysis resulted in a change point of -1162, i.e. at-1162 cfs OMR, the slope changed from 0 to positive (Figure B-14). These results indicate that there is a relatively constant amount of salvage at all flows more positive than -1162 cfs but that at flows more negative than -1162, salvage increases. The pseudo-R_2 value was 0.42, a value similar to that obtained by P. Smith in the original analysis.

***1038** To verify that there was no natural break at any other point, the analysis was performed using a linear-linear-linear fit (fitting two change points). The linear-linear-linear fit resulted in two change points, -1,500 cfs OMR and -2,930 cfs OMR. The -1,500 cfs value is again the location in the dataset at which the slope changes from 0 to positive. The pseudo-R_2 value is 0.42 indicating that this relationship is not a better description of the data. Because of the additional parameters estimated for the model, it was determined that the linear-linear-linear fit was not the best function to fit the data, and it was rejected. No formal AIC analysis was performed because of the obvious outcome.

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A major assumption of this analysis is that as the population of Delta smelt declined, the number of fish at risk of entrainment remained constant. If the number of fish in the vicinity of the pumps declined, fewer fish would be entrained and more negative OMR flows would result in lower salvage. This situation would result in an overestimate, i.e. the change point would be more positive. In fact, if the residuals are examined for the relationship in Figure B-13 above, the salvage for the POD years 2002, 2004, 2005, and 2006 are all below the line. 2003 is above the line although the line is not extended to the points at the top of the figure, and these data points occur when the curve becomes almost vertical. The negative residuals could be a result of a smaller population size available for entrainment and salvage. This could be verified by normalizing the salvage data by the estimated population size based on the FMWT data.

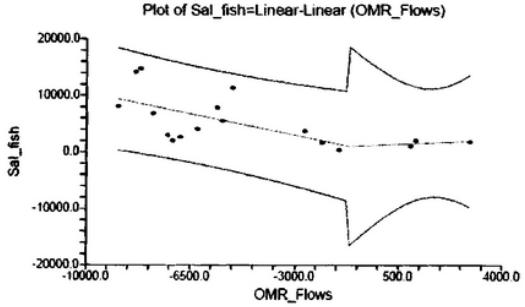

Figure B-14. Piecewise polynomial regression of OMR flows and salvage. The change point is the location at which the two regression lines meet; -1,162 cfs OMR.

The original values of OMR and salvage could have been measured with error due to a number of causes, consequently the values used in the original piecewise polynomial analysis could be slightly different than the "true" values of salvage and OMR flow. Consequently, a second analysis was undertaken to examine the effect of adding stochastic variation to the OMR and salvage values in the ***1039** piecewise polynomial regression analysis. The correlation between OMR and salvage in the original dataset was -0.61 indicating that the more negative the OMR, the greater the salvage. Consequently, it was necessary to maintain the original covariance structure of the data when adding the error terms and performing the regressions. The original covariance structure of the OMR-salvage data was maintained by adding a random error term to both parameters. The random error term was added to OMR and a correlated error term was added to salvage. The expected value of the correlated errors was -0.61.

The error terms were selected from a normal distribution with a mean of 1.0 and a standard deviation of 0.25 which provided reasonable variability in the original data. Operationally this process generated a normal distribution of OMR and salvage values in which the mean of the distributions were the original data points. Additional analyses were performed with standard deviations of 0.075, 0.025, and 0.125. Smaller standard deviations in the error term resulted in estimates of the change point nearer to the original estimate of -1,162 cfs. This is to be expected as the narrower the distribution of error terms, the more likely the randomly selected values would be close to the mean of the distribution. The process was repeated one hundred times, each time a new dataset was generated and a new piecewise polynomial regression was per-

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formed. The software package @Risk (© Palisade Decision Tools) was used to perform the Monte Carlo simulations. Latin hypercube sampling was used to insure that the distributions of OMR and salvage values were sampled from across their full distributions. The parameter of interest in the simulations was the change point, the value of the OMR flow at which the amount of salvage began to increase. Incorporating uncertainty into the analysis moved the change point to -1,800 cfs OMR, indicating that at flows above -1683, the baseline level of salvage occurred but with flows more negative than -1683, salvage increased.

BiOp 347-51 (emphasis added).

54. The BiOp does not use this information to assert that entrainment has a statistically significant effect on the population of delta smelt every year. 4/7/10 Tr. 172. Rather, this information appears to be used to set "break points" above and below which entrainment rates noticeably change. In turn, these break points were utilized in the formation of the flow restrictions in the RPAs.

55. It is undisputed that the use of gross salvage does not account for the size (or relative size) of the smelt population, as estimated by reliable abundance indexes. 4/6/10 Tr. 22:10-11, 23:19. The BiOp admits as much, and concedes that the analysis "assumes that as the population of Delta smelt declined, the number of fish at risk of entrainment remained constant." *See* emphasized text above.

56. Considering gross salvage numbers alone provides no means of distinguishing an event in which 10,000 fish are salvaged out of a population of 20,000 from an event in which 10,000 fish are salvaged from a population of 20 million. 4/6/10 Tr. 24:19-22.

57. FWS was aware of the problems with using gross salvage numbers before the completion of the BiOp. The August 26, 2008, draft meeting notes of FWS's Delta Smelt Action Evaluation Team state:

When analyzing the importance of entrainment to the species population structure or decline, the relevant fact to consider is the percentage of the population being removed via entrainment.***1040** Salvage data, by itself, may not be sufficient to help one understand the percentage of the population being removed via entrainment.

MWD Ex. 633 at 5.

58. The Independent Peer Review of FWS's draft Effects Analysis for the BiOp also recommended to FWS that it "normalize[ ]" salvage to population size:

The panel suggests that the use of predicted salvage of adult smelt should be normalized for population size. Total number salvaged is influenced by a variety of factors, particularly the number of fish in the population.... Expressing salvage as a normalized index may help remove some of the confounding of the temporal trends during the baseline.

MWD Ex. 608 at 8.

59. However, notwithstanding the recommendation of the Independent Peer Review and its own internal staff's recognition that salvage data should be normalized, FWS persisted in using raw salvage data and did not normalize or index the salvage data to the population size. BiOp at 348, 350. As a result, salvage numbers relied upon to justify the RPAs do not relate to any information regarding population-level effects. 4/6/10 Tr. 22:10-11, 23:19. This was unreasonable, not based on the best available science, arbitrary, and capricious.

60. This conclusion was supported by explanatory testimony of the experts. There was agreement among the testifying scientific experts that the use of normalized salvage data rather than gross salvage data is the standard accepted scientific methodology among professionals in the fields of fisheries biology/management. 4/5/10 Tr. 97:4-10, 143:25-144:1; 4/6/10 Tr. 30:15-22; Doc. 633, Ex. A, at 7, 10; 4/6/10 Tr. 31:11-16; MWD Ex. 608 at 6; Fed. Gov't Smelt Ex. 17 at 11.

a. The Federal Defendants' expert on biological statistics, Dr. Kenneth Newman, stated in his declaration that Federal Defendants should have "scale [ed] salvage by some measure of population abundance" and stated in his oral testimony that without indexing salvage to population there is "nothing to go on." Fed. Gov't Smelt Ex. 17 at 11; 4/5/10 Tr.

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143:25-144:1.

b. Dr. Newman went on to state that the relevant factor to consider is the percentage of the smelt population being removed by entrainment and that salvage data by itself is not sufficient. 4/5/10 Tr. 97:4-10. Dr. Newman also stated that because Figure B-13 relates raw salvage to combined OMR flows, it does not enable the agency to determine the effect on the population of a particular OMR flow. 4/5/10 Tr. 100:11-15.

c. Dr. Punt found that "it was unreasonable (given that appropriate data and analysis methods were available to account for population size) to have only relied on the information in Fig. B-13 and Fig. B-14 rather than on an analysis in which salvage is expressed relative to population size." Doc. 633, Ex. A, at 7. Dr. Deriso agreed. 4/6/10 Tr. 30:15-31:2.

d. Dr. Thomas Quinn, the other 706 expert, stated: "it is not clear why such an adjustment [of salvage to population size] was not made for the data examined in this report." Doc. 633, Ex. A, at 10. Dr. Deriso agreed. 4/6/10 Tr. 31:11-19.

61. The BiOp itself recognized the necessity of normalizing raw salvage data:

> To provide context to determine the magnitude of effect of pre-spawning adult direct mortality through entrainment within any given season (as measured by salvage), it is necessary to consider two important factors. ***1041** The second factor to consider when relating salvage to population-level significance is that the total number salvaged at the facilities does not necessarily indicate a negative impact on the overall delta smelt population.

BiOp at 338.

62. August 26, 2008 meeting notes of the Delta Smelt Action Evaluation Team also indicate that FWS recognized and was aware of the need to analyze the percentage of the population removed by salvage, but neither these notes nor the BiOp explain why this analysis was not performed. MWD Ex. 633 at 5; 4/5/10 Tr. 96-97:14-10.

63. The BiOp, in fact, used normalized salvage data for other parts of its analysis, including the Incidental Take Statement, evidencing its ability to do so. BiOp at 386; 4/7/10 Tr. 196:18-20; *see also* 4/7/10 Tr. 199:14-21 (Cay Goude testifying that FWS understood the importance of using normalized salvage data and chose to use it in parts of the BiOp).

64. FWS did not explain its decision in the BiOp to use gross salvage numbers in Figures B-13 and B-14, and did not explain why it selectively used normalized salvage data in some parts of the BiOp but not in others. 4/6/10 Tr. 28:5-8, 32:5-9.

65. FWS presented no credible, scientifically based explanation for the decision to use gross salvage numbers instead of normalized salvage data in Figures B-13 and B14, either in the BiOp or at the hearing. Other than endeavoring to structure a result, there is no explanation for this departure from best available science. This raises the spectre of bad faith.

66. For the purposes of (a) demonstrating the difference between the analysis presented in the BiOp and a population-normalized analysis and (b) identifying an appropriate interim remedy, Dr. Deriso analyzed the relationship between normalized salvage and OMR flows. This analysis revealed that there were no detectable trends in the juvenile salvage rate at flows up to -5,600 cfs, which is the most negative salvage weighted flow rate contained in the data. 4/6/10 Tr. 55:18-24; Fed. Gov't Smelt Ex. 18 at 25.

67. Federal Defendants criticize Dr. Deriso's alternative analysis in a number of ways:

a. Dr. Newman explained that Dr. Deriso's analysis is more appropriately characterized as a "first cut" at an analysis that fails to correct for potentially large "observation errors." 4/5/10 Tr. 73, 77-78. Those "errors" include factors and variability that would tend to confound the results if not accounted for, such as temperature variations, geographic distribution, turbidity, or predation, all of which can "distort[,] confuse or confound" the relationship between the factors one is trying to examine. *Id.* at 51 (Dr. Newman's testimony regarding the factors he will be addressing and including in his forthcoming delta smelt life cycle model). He opined that some of these confounding factors are

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very important and ignoring them could lead one "[e]ither to wrongly assume that there is a relationship or to assume that there is [one] when there is-n't." *Id.* at 82. This concern was reiterated by Dr. Rose in his 2000 paper, and by Dr. Hilborn. *Id.* at 160-61.

b. Dr. Newman ran his own analysis, applying a different standard statistical methodology, on the same cumulative salvage index versus OMR flow data used by Dr. Deriso, and got different results regarding the "inflection point" where OMR flows had an increasing impact on the population-normalized salvage rate. 4/5/10 Tr. 63-64. Ultimately, Dr. Newman testified that he would have performed a statistical analysis different from those performed by both Dr. ***1042** Deriso and in the BiOp. *Id.* at 79-80. Dr. Newman never suggested that an analysis utilizing raw salvage numbers (i.e., not adjusted for relative population size) is scientifically appropriate. This is not just a scientific dispute among experts, particularly in view of FWS's concession in the BiOp.

c. Dr. Deriso admitted that he is not a delta smelt biologist, 4/6/10 Tr. 125, and that his analysis does not account for a number of potentially confounding factors, such as: the large amount of pumping-related mortality that is not measured by salvage, *id.* at 89; 116, pumping-related changes to delta smelt habitat, *id.* at 116, 140; pumping-related impacts on food supply, *id.* at 143; pumping-related impacts of spatial confinement of delta smelt to the Sacramento River, *id.* at 144-45; whether the death of some individuals such as fecund females may have a disproportionate impact on the population (the so-called "big mama" hypothesis) *id.* at 116; and whether the relationship between OMR flows and population abundance could change depending on population size, *id.* at 146.

d. Nor did Dr. Deriso's analysis distinguish between years pre-dating or post-dating the POD, though he acknowledged that there is evidence of drastic changes in the estuary during that period. *Id.* at 123-24, 165. Reputable scientists in the field, including Drs. Peter Moyle and Bill Bennett, have opined that statistical "correlations [in the Delta] seem to be losing some of their former predictive value in recent years for some desirable species (Kimmerer et al.2009). This, in part, may be due to ... the extremely low abundance of desirable fishes, which may not be tracked as effectively by the traditional monitoring programs." *Id.* at 119-20.

e. In the absence of reliable population estimates for delta smelt, Dr. Deriso utilized the FMWT index as a proxy for population when conducting his analysis of the population-level effects of salvage on adult delta smelt. However, Dr. Newman noted that there are several biases in the FMWT data, particularly selection bias, such that he would not rely purely on FMWT data "when it comes to analyzing salvage." 4/5/10 Tr. 118.

e. In addition, Dr. Deriso's analysis accounts in only a very limited way for spatial distribution (by excluding years with low turbidity from the analysis). Spatial distribution reflects the increased vulnerability of delta smelt to entrainment as they move closer to the pumps. 4/5/10 Tr. 80-82. In contrast, Components 1 and 2 of the BiOp account for spatial distribution to a much greater extent by allowing for modification of the level of OMR flows based on the location of delta smelt in the estuary. 4/7/10 Tr. 55-56, 69-71. Dr. Deriso's analysis looks solely at the relationship between population-weighted salvage and OMR flows, excluding all other factors and considerations.

68. Nevertheless, even assuming all of these critiques of Dr. Deriso's opinion are valid, they do nothing to justify the BiOp's election to base its flow prescriptions on an analysis that uses raw salvage numbers. Even if Dr. Deriso's "first cut" needs refinement to address these critiques, the BiOp's analysis in Figure B-13 does not account for any of the issues on which Federal Defendants criticize Dr. Deriso's analysis.

69. Federal Defendants note that Dr. Deriso presented his conclusions and analysis regarding the BiOp to the National Research Council of the National Academy of Sciences panel that peer-reviewed the BiOp. 4/2/10 Tr. 193; 4/6/10 Tr. 137. After reviewing the information presented by ***1043** Dr. Deriso, that panel explicitly disagreed with his conclusion that FWS's analysis in the BiOp was not based on the best available science or one that a "reasonable biologist" would perform. Instead, the NRC Panel confirmed the analysis performed by FWS and its biologists, stating that:

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> Although there are scientifically based arguments that raise legitimate questions about this action, the committee concludes that until better monitoring data and comprehensive life cycle models are available, it is scientifically reasonable to conclude that high negative OMR flows in winter probably adversely affect smelt populations. Thus the concept of reducing OMR and negative flows to reduce mortality of smelt at the SWP and CVP facilities is scientifically justified.

4/2/10 Tr. 194. The NRC analysis justifies its conclusion by recognizing better monitoring is not available, a comprehensive life cycle model does not exist, and that high negative OMR flows in winter "probably" adversely affect smelt populations.

70. The NRC's equivocal conclusion is in no way inconsistent with a finding that the BiOp failed to utilize the best available scientific methods by relying on a quantitative analysis using raw salvage to select the upper ceiling for negative OMR flows under Component 2. The Federal Defendants have not told the whole NRC Panel story. The NRC Panel expressly found that "there is *substantial uncertainty* regarding the amount of flow that should trigger a reduction in exports," (emphasis added) and declined to decide whether alternative RPAs would "provide equal or greater protections for the species while requiring less disruptions of Delta water diversions," concluding that the panel had received insufficient documentation on such alternatives. *Id.* at 200-01. Having failed to perform the required NEPA analysis, it is certain that Federal Defendants could not and did not take the requisite hard look at RPA alternatives.

71. Federal Defendants argue that the district court previously heard and rejected similar statistical analysis of fish population dynamics presented by Mr. B.J. Miller during the 2007 interim remedy hearing.

a. Mr. Miller "concluded that there was no statistical significance in the relationship between Delta smelt abundance and salvage and export operations in the pumps." 4/6/10 Tr. 114. Another of Plaintiffs' witnesses in that proceeding, Dr. Charles Hanson, then explained that even if Mr. Miller's statistical analyses were correct and "reflect the low significance of that salvage mortality to the population," it did not suggest that regulatory action to minimize salvage at the pumps was not justified:

> On the other side, Your Honor, the fact that we are salvaging Delta smelt represents a source of mortality to this population. And one of the approaches that's being made, given the low population abundance, is to identify those sources of mortality that we know of and to try and reduce those. My feeling is that we have such a complex estuary with so many interacting variables that change from year to year and within years, that it's difficult to rely solely on statistical analyses. I think we're at a point where we need to say do we have a substantial source of mortality and is there something we can do to help reduce that.

4/6/10 Tr. 114-15.

b. Plaintiffs' expert, Dr. Hilborn, expressed similar opinions during the most recent evidentiary hearings, acknowledging that, while he criticized the BiOp for lacking "a basis for population level effects of the proposed actions ... it's ***1044** pretty clear that there are viability concerns about Delta smelt." 4/5/10 Tr. 224. Dr. Hilborn also acknowledged "it's very clear that large negative flows have an impact on the number of fish that are impinged and entrained." *Id.* at 228. He did not quantify what he meant by "large negative flows." Dr. Hilborn agrees that there is no doubt that the population size of delta smelt is currently at an historic low and that entrainment at project facilities results in direct mortality. *Id.* at 249-50. Dr. Hilborn explained that he does not deny that a long-term relationship between population growth rate and salvage may exist, only that he has not *see* n "any evidence of that in any of the analysis I've seen so far." *Id.* at 228. Dr. Hilborn acknowledged that he "couldn't exclude the possibility" that a future salvage event could eliminate 100% of the population, even if there was no relationship between the amount of delta smelt salvaged and long-term population dynamics. *Id.* at 229.

c. Assuming, arguendo, the "possibility" cannot be "exclude[d]" that a future salvage event could eliminate 100% of the population, FWS did not justify its selection of -5,000 cfs on the basis of that ceiling's ability to prevent such a catastrophic sal-

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vage event. Faced with express concerns from inside and outside the agency about drawing conclusions from analyses using raw salvage, FWS completely failed to explain why it nonetheless did so. None of the post-hoc rationalizations offered by Federal Defendants, e.g. the "big mama" hypothesis, was mentioned in the BiOp as bases for selecting -5,000 cfs as the ceiling for negative OMR flows.

72. FWS's reliance on analyses that utilize raw (as opposed to population-normalized) salvage data is an undeniable failure to use the best available scientific methodology.

b. *Other Data Supporting the General Conclusion that Negative OMR flows Jeopardize the Smelt.*

73. There is far more dispute over the sufficiency of evidence supporting the BiOp's general conclusion that the negative OMR flows predicted to take place under planned Project operations will jeopardize the smelt (referred to in this subsection as the "jeopardy conclusion").

(1) *Sporadically Significant Take.*

74. One of the key rationales for the jeopardy conclusion is the assertion that entrainment has a "sporadically significant" effect on smelt abundance. BiOp at 210. This assertion was based on the estimates of proportional entrainment in Kimmerer 2008. BiOp at 210; Fed. Gov't Smelt Ex. 38. Kimmerer 2008 states that:

> Delta smelt may suffer substantial losses to export pumping both as pre-spawning adults and as larvae and early juveniles. In contrast to the situation for salmon, pre-salvage mortality has been constrained in the calculations for adult Delta smelt, and its effects eliminated from the calculations for larval/juvenile Delta smelt. Combining the results for both life stages, losses may be on the order of zero to 40 percent of the population throughout winter and spring.

4/7/10 Tr. 42-43; AR 018877.

75. Dr. Grimaldo confirmed that the Kimmerer (2008) and Kimmerer and Nobriga (2008) studies represented the "best available science" when the BiOp was prepared. 4/7/10 Tr. 63-64. The BiOp cites Kimmerer (2008) (and other peer-reviewed studies) for the propositions that entrainment can affect the abundance of delta smelt in certain years; may prevent recovery when habitat conditions are suitable; and that high entrainment of adults in the winter appears to have played a role in the ***1045** decline of delta smelt in the POD years. BiOp at 158-59.

76. Dr. Deriso questions whether Kimmerer (2008) should be interpreted as standing for the proposition that entrainment mortality can kill a substantial portion of the population in some years. For example, he testified that the Kimmerer (2008) article relied on a number of assumptions to calculate the percentage entrainment figures incorporated into the BiOp, including the assumption that a proportional relationship exists between OMR flow levels and entrainment. 4/6/10 Tr. 131:12-16; Fed. Gov't Smelt Ex. 29 at 19; Fed. Gov't Smelt Ex. 38 at 018875-018876. Because the Kimmerer (2008) article began with this assumption, Dr. Deriso opined that it could not reasonably be used by FWS as evidence that a proportional relationship exists between OMR flow level and smelt entrainment. Fed. Gov't Smelt Ex. 29 at 19.

77. But, the BiOp did not rely on Kimmerer (2008) for this purpose. Dr. Grimaldo explained that "what the Kimmerer 2008 paper actually showed was that there was a population response [to entrainment] *within life stages.*" 4/7/10 Tr. 98.[FN5] Dr. Newman explained that this information is "certainly pertinent to understanding what's happening with the population." 4/5/10 Tr. 135-136.

> FN5. Kimmerer (2008) acknowledges that "... despite substantial variability in export flow in years since 1982, no effect of export flow on subsequent midwater trawl abundance is evident," but refuses to "dismiss the rather large proportional losses of delta smelt that occur in some years; rather, it suggests that these losses have effects that are episodic and therefore their effects should be calculated rather than inferred from correlation analyses." Fed. Gov't Smelt 38 at 25 (AR 018878). Dr. Quinn opined that "evidence should have been presented in the BiOp to demonstrate such effects, based on some calculation." Doc. 633 at 2. For example, he asks: "In which years were there large losses that can be directly attrib-

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> uted to the pumping operations, and what were the effects on subsequent recruitment? Because the smelt are largely annual fish, a catastrophe in a single year could put them at great risk of extinction and two bad years in a row could accomplish it. The risk inherent in the statistical and ecological uncertainty is borne heavily by the species but there still should be some evidence in the record to reveal these effects." *Id.* It is not clear whether the BiOp relies on Kimmerer 2008 as evidence of these effects or simply as evidence that these effects may be significant.

78. Dr. Newman, who did not participate in the preparation of the BiOp, agreed that FWS's conclusion in the BiOp that entrainment affects subsequent year abundance of Delta smelt even sporadically is supported by generally accepted scientific standards. 4/5/10 Tr. 89-90. It is undisputed that very large salvage events can and have occurred at OMR flows of less than -5,000 cfs. In May and June of 1999 alone, 58,929 and 73,368 delta smelt, respectively, were salvaged at the Project export facilities. 4/6/10 Tr. 111. Average OMR flows during those months were -1,062 cfs and -3,814 cfs, respectively. *Id.* at 112. While Dr. Deriso testified that the significance of such an event depends on the size of the population, he also could not state whether the current population was large enough to survive similar salvage events, or whether such an event would jeopardize the continued existence of the smelt. *Id.* Dr. Hanson, another of Plaintiffs' expert fish biologist witnesses, testified in 2007 that salvage of 1,300-1,400 delta smelt would be "a very high level of salvage" "under the current population levels." *Id.* at 113. Delta smelt abundance levels have further declined since Dr. Hanson made that statement. *Id.*

79. It was not unreasonable for FWS to conclude that salvage events may be "sporadically significant."

***1046** (2) *Dr. Bennett's Work.*

(a) *Impact of VAMP on Population Dynamics.*

80. Dr. Bennett's unpublished research "demonstrated that the number of larvae that survived to the fall is related to when they hatch in the spring .... [and] that larvae that hatched during the VAMP ... protective period[ ] were the ones that survived to the fall in the period that he examined." 4/7/10 Tr. 93.

81. The BiOp concluded:

> Based on Bennett's unpublished analysis, reduced spring exports resulting from VAMP have selectively enhanced the survival of delta smelt larvae spawned in the Central Delta that emerge during VAMP by reducing their entrainment. Initial otolith studies by Bennett's lab suggest that these spring-spawned fish dominate subsequent recruitment to adult life stages. By contrast, delta smelt spawned prior to and after the VAMP have been poorly-represented in the adult stock in recent years. The data suggests that the differential fate of early, middle and late cohorts affects sizes of delta smelt in fall because the later cohorts have a shorter growing season. *These findings suggest that direct entrainment of larvae and juvenile delta smelt during the spring are relevant to population dynamics.*

BiOp at 170 (emphasis added). Nothing in the record suggests this conclusion was unreasonable.

(b) *Big Mama Hypothesis.*

82. Federal Defendants and Defendant Intervenors also suggest that Dr. Bennett's work provided "evidence" to support the "big mama" hypothesis that Project operations may affect delta smelt abundance by entraining the most fecund individuals in the population, thereby creating a disproportionate impact on the reproductive potential and growth rate of the population.

83. However, the BiOp does not suggest Bennett's work provides *evidence* of this hypothesis; rather, the BiOp consistently indicates that the "big mama" hypothesis is just that-a hypothesis:

> Another possible contributing driver of reduced delta smelt survival, health, fecundity, and resilience that occurs during winter is the "Big Mama Hypothesis" (Bill Bennett, UC Davis, pers. comm. and various oral presentations). As a result of his synthesis of a variety of studies, Bennett proposed that the largest delta smelt (whether the fastest growing age-1 fish or fish that manage to spawn at age-2) *could* have a large influence on population trends. Delta smelt larvae spawned in the South Delta have high risk of entrainment under most hydrologic conditions

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(Kimmerer 2008), but water temperatures often warm earlier in the South Delta than the Sacramento River (Nobriga and Herbold 2008). Thus, delta smelt spawning often starts and ends earlier in the Central and South Delta than elsewhere. This differential warming *may* contribute to the "Big Mama Hypothesis" by causing the earliest ripening females to spawn disproportionately in the South Delta, putting their offspring at high risk of entrainment. Although water diversion strategies have been changed to better protect the 'average' larva, the resilience historically provided by variable spawn timing *may be* reduced by water diversions and other factors that covary with Delta inflows and outflows.

BiOp at 158 (emphasis added). This hypothesis has not been proved.

***1047** (3) *Consideration of Life Stage and Geographic Distribution.*

84. The BiOp considers the life stage of delta smelt and where the population is located in the estuary, to help assess entrainment risk. Dr. Grimaldo explained:

[I]n the fall [and] winter, we have very low entrainment risk. But once the first flush events happen, beginning sometime in mid December, Delta smelt often migrate upstream. So they're vulnerable at this part of the life stage. After they migrate upstream, they stage for a little bit. And they're vulnerable to entrainment during the staging period. And then after the staging period, they spawn. And their progeny are vulnerable to entrainment at this period.

So there's vulnerability to different life stages as-and, in general, as they become distributed closer to the central and south Delta central and south Delta, their entrainment risk goes up.

4/7/10 Tr. 50-51. The RPA takes into account these spatial and life stage factors by breaking actions into different components over different periods of time. *Id.* at 64-65.

85. Mr. Feyrer and Dr. Grimaldo testified that the export pumps affect the geographic distribution of delta smelt, and that preventing the fish from coming near the pumps reduces the risk of entraining those fish. 4/2/10 Tr. 180; 4/7/10 Tr. 64. Larval and juvenile delta smelt, in particular, are "neutrally buoyant" and thus follow the flow in the Delta in a manner similar to particles. 4/7/10 Tr. 54-55. Particle-tracking modeling shows that many of the particles are "lost" to the pumps when export-inflow ratios are increased. *Id.* at 59-60. Kimmerer and Nobriga (2008), relied on in the BiOp, asserts that these studies "suggest a direct link between the position of the smelt population as determined by outflow and losses as determined by export flow" and "may be enough to recommend strong protective measures for Delta smelt in spring (March-May) of low outflow years when they are highly vulnerable to export losses." *Id.* at 60-62. Non-export factors influence entrainment too, "such as river inflows, the position of X2 and where the fish are distributed." *Id.* However, as Mr. Feyrer testified, "essentially the closer [the fish] are, the more vulnerable [they] will be" to the effects of entrainment.[FN6] *Id.*

FN6. Entrainment includes more than just salvage measured at the pumps. As Mr. Feyrer explained, salvage is a small subset of entrainment: "Salvage is essentially the fish that are observed at the ... salvage facilities. Those are the facilities that are located at both the state and federal export operation facilities. And those facilities are designed to essentially filter the fish out of the water before they are entrained into the pumps. And then they're released back into the estuary. And so those are the fish that you actually observe in salvage. However, entrainment refers to the fish that are not observed plus those fish that are observed." 4/2/10 Tr. 180-81. Fish that are not observed include those that suffer from pre-screen mortality at Clifton Court Forebay, *id.* at 182, and those that are not detected due to louver inefficiency. Pumping pulls fish into the Forebay, increasing their exposure to these sources of mortality. *Id.* at 183.

c. *Life Cycle Analysis.*

86. Studies cited in the BiOp failed to demonstrate that water exports affect the delta smelt population growth rate. Kimmerer (2008), for example, noted a "lack of evidence for population-level effects" of the water projects and stated that "no effect of export flow on subsequent midwater trawl is evi-

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dent." AR 018878, 018855; MWD Ex. 600 at 53; MWD Ex. 600 at 28. Bennett (2005) found that "it is unlikely that losses of young fish to the export facilities consistently reflect a direct impact on recruitment success later in the year." AR 017004; MWD Ex. 607; SLDMWA Ex. 240.

***1048** 87. All experts agree that application of a life-cycle model [FN7] is accepted method for evaluating the effects of an action upon a population's growth rate.

FN7. The experts use the term "population dynamics model," "life history model," and "life cycle model" interchangeably. *See, e.g.,* 4/2 Tr. 255; 4/6 Tr. 41.

a. The Delta Smelt Action Evaluation Team recognized that such a model should be developed and utilized. MWD Ex. 633 at 5, 9, 10, 11.

b. Dr. Deriso testified that a population growth rate analysis is the method by which fisheries biologists normally evaluate the impact of a stressor on a population. 4/6/10 Tr. 38:11-18.

c. Dr. Hilborn similarly testified that life-cycle models are the accepted method in population dynamics to evaluate anthropogenic effects on the probability of growth or decline of a species. 4/5/10 Tr. 154:16-24. Dr. Hilborn testified that development of such a model is "standard operating procedure" for fisheries management agencies to evaluate human impacts on fish species. 4/5/10 Tr. 155:20-25.

d. FWS's expert, Dr. Newman, stated in his declaration that he "agreed with the utility of life history models for assessing population level effects of SWP/CVP operations." Fed. Gov't Smelt Ex. 17 at 8.

e. Dr. Newman said he would have developed a life-cycle model for the BiOp. 4/5/10 Tr. 107:21-108:5. Dr. Newman stated the methodology employed in the BiOp was "quite a different way of doing things" from the statistical analysis he was "familiar with" and "comfortable with." 4/5/10 Tr. 107:21-108:5.

f. Federal Defendants' expert, Mr. Feyrer, testified that, once developed, a life-cycle model would be the best available science to evaluate the population-level impacts of the water projects on the delta smelt. 4/2/10 Tr. 253:4-10.

g. According to Mr. Feyrer, use of a life-cycle modeling methodology in the BiOp would have reduced the uncertainty in the RPAs. 4/2/10 Tr. 258:22-259:8.

88. How long it would have taken FWS to develop an appropriate life cycle model is a matter of considerable debate.

a. Life-cycle modeling is an analytical technique that has been known and available to scientists for years. 4/5/10 Tr. 109:19-110:3. Numerous textbooks and reference articles explain how to develop a life-cycle model, which are a standard tool used by fisheries scientists to evaluate population-level impacts. 4/2/10 Tr. 254:23-255:14. Basic growth rate models such as the Ricker model and the Beverton-Holt model were developed in the 1950s. 4/6/10 Tr. 41:22-42:4; 49:16-22.

b. Dr. Deriso testified that sufficient data existed at the time of the creation of the BiOp to enable FWS to perform a quantitative life-cycle modeling analysis. 4/6/10 Tr. 46:16-47:16.

c. Dr. Deriso testified that a basic quantitative life-cycle modeling analysis could be performed in less than an hour, while a more complicated modeling effort could be completed in a few weeks. 4/6/10 Tr. 43:2-7.

d. Mr. Feyrer testified that FWS could have completed a life-cycle modeling analysis within 18 months. 4/2/10 Tr. 263:15-24.

e. In a 2005 research article Dr. Bennett employed a life-cycle model to evaluate a number of impacts on the delta smelt. 4/2/10 Tr. 46:16-47:16.

f. Dr. Hilborn testified that a life-cycle modeling effort could have been performed for the delta smelt within a matter of months. 4/5/10 Tr. 175:5-21. ***1049** He further testified that even an incomplete life-cycle modeling analysis, such as the one

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found in Bennett (2005), would be superior to simply relying on professional or expert opinion without use of any such model. 4/5/10 Tr. 212:23-213:6. However, Dr. Hilborn admitted that when he and Dr. Maunder actually endeavored to build a quantitative population dynamics model for delta smelt over 18 months ago, they abandoned that particular modeling effort as too complicated and time-consuming. *Id.* at 217-18.

g. Dr. Punt stated "[i]t is surprising that a population dynamics model was not developed for delta smelt for the BiOp.... The model developed by Bennett could have been extended to more fully account for the biology of delta smelt and fitted to data to assess the population-level effects of impact of the project." 4/6/10 Tr. 44:16-21; Doc. 633, Ex. A, at 3.

89. Yet, a quantitative population dynamics model for delta smelt is "not something that you go to the store and just buy [like] a piece of equipment," but rather would consist of a large amount of formulas. 4/2/10 Tr. 254; 4/5/10 Tr. 48 (Dr. Newman concurring that "there's not off-the-shelf software to build such models"). Dr. Newman testified that previous efforts to build such models in which he has been involved have taken two to three years, 4/5/10 Tr. 50, and have involved numerous people because you need expertise in biology, statistics, and modeling. *Id.* at 131. Mr. Feyrer stated that "the construction of a full blown high quality life cycle model is no simple task." 4/2/10 Tr. 255, 258.

90. Mr. Feyrer also pointed out the importance of constructing an appropriate and well-calibrated model: "even for individuals with the amazing skills of [Drs. Maunder, Deriso and Hilborn], it still takes a lot of time to develop those to where you have the confidence in them so that you can actually apply them in a situation where, you know, there's obviously a lot at stake here. You don't want to apply something prematurely without really understanding how well it works." *Id.* at 258. Dr. Deriso, in contrast, applied a generic "textbook" version of a life history model in the analysis he presented to the Court, without modifying it to apply specifically to delta smelt biology and characteristics. 4/6/10 Tr. 42. Significant disagreement exists among competent experts as to what constitutes a reliable quantitative population dynamics model for delta smelt.

91. Federal Defendants were aware of the value of a life-cycle model. At a March 8, 2007 meeting regarding the OCAP ESA Re-consultation, attended by a number of FWS employees, the importance of using a life cycle model was recognized and the progress to date was inquired into. 4/7/10 Tr. 183:9-188:4; SWC Ex. 960. Likewise, during the Delta Smelt Action Evaluation Team meeting on August 8, 2008, the Team recognized that population models for delta smelt already had been developed, and that it was possible to use those models as a starting point for quantitative analyses with appropriate assumptions added as bounds to the analysis. 4/7/10 Tr. 188:9-190:22.

92. Nevertheless, it is undisputed that, despite over three years of controversy regarding the species, no quantitative life cycle model adapted to the delta smelt was available to or used by FWS at the time the BiOp was issued. A quantitative population dynamics model for delta smelt does not currently exist, although there are several efforts underway to develop one. 4/2/10 Tr. 189; 4/5/10 Tr. 44. Researchers from a number of universities, including Drs. Wim Kimmerer, Bill Bennett, Kenny Rose and Steve Monismith, have been working on developing such a model for a ***1050** number of years. *Id.* at 189-90; 4/5/10 Tr. 46. Dr. Mark Maunder has also been working on such a model for delta smelt since at least March 2008, with the assistance of Dr. Hilborn and Dr. Deriso. *Id.* at 258; 4/5/10 Tr. 47. Dr. Newman, who has previously developed three quantitative life history models, is currently working with the National Center for Ecological Analysis and Synthesis ("NCEAS") to develop one for delta smelt, an effort that has been underway since October 2007. 4/5/10 Tr. 44-46.

93. No party who participated in the preparation of the BA or commented on the public review drafts of the BiOp submitted a quantitative life cycle model or the results of such an analysis using a life cycle model for delta smelt to FWS during the consultation. 4/5/10 Tr. 16-18.

94. It is notable that FWS did make use of the relatively simple and limited life-cycle model described by Dr. Bennett in his 2005 paper. 4/2/10 Tr. 256-57. It utilized that existing model by conducting the effects analysis in the BiOp according to a similar conceptual life-cycle model. *Id.* at 258. The agency

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then conducted analyses on specific components of those life stages that would be affected by the proposed Project operations. *Id.* Dr. Hilborn asserts that FWS erred by not using the Bennett model to justify the export limitations in the RPA, 4/5/10 Tr. 241, but the Bennett 2005 paper and Dr. Bennett himself cautioned that the life-cycle model it presented is "premature for management purposes." *Id.* at 18, 115, 240-41.

95. In sum, although all agree that a quantitative life-cycle model would help FWS evaluate impacts on delta smelt, FWS had not developed an appropriate model, and no such model was available for FWS's use (or otherwise presented to FWS) prior to the issuance of the BiOp.

d. *Incidental Take Statement.*

96. Plaintiffs included proposed findings of fact concerning FWS's formulation of the Incidental Take Statement ("ITS"). However, at the evidentiary hearing, Plaintiffs abandoned their request to enjoin implementation of the ITS. 4/7/10 Tr. 243-44 ("Plaintiffs do not seek modification of the incidental take limit at this time. Even though the current low ITS limits are not supported by the data and application of quantitative population dynamics analysis, that very conservative limit, Your Honor, plaintiffs believe will serve as a back stop that will provide an additional level of assurance to the Court that during the component two period, which ends in June, the survival of the smelt will not be jeopardized by project operations.").

e. *Critical Habitat.*

97. Federal Defendants and Defendant Intervenors maintain, in the alternative, that negative OMR flows adversely modify critical habitat and Component 2 can be upheld because it addresses this adverse modification. 4/7/10 Tr. 272:8-273:3; 4/6/10 Tr. 93:2-6; 4/5/10 Tr. 225:18-226:22.

98. However, the specific quantitative criteria established for RPA Component 2 are not derived from or justified by any independent analysis of adverse modification of delta smelt critical habitat. BiOp at 344-68.

99. Discussion of habitat in the justifications for RPA Components 2 defines habitat solely in terms of entrainment risk. BiOp at 344-368. The only quantitative analysis of entrainment risk is found in Figures B-13 and B-14 of the BiOp. BiOp at 348, 350.

f. *Indirect Harm.*

100. Federal Defendants claim that Component 2 also protects against indirect harm. However, the quantitative analysis used to derive the flow levels does not ***1051** mention indirect harm as a basis for the flow restrictions imposed.

g. *The Role of RPA Component 2 in Avoiding Jeopardy to the Species and Adverse Modification of Critical Habitat.*

101. All of the experts qualified in delta smelt *biology* concurred that enjoining parts or all of Component 2 would cause jeopardy or adverse impacts to delta smelt and designated critical habitat.

102. Dr. Grimaldo explained that entrainment risk is particularly high from March to May because delta smelt larvae and juveniles are most likely to behave like neutrally buoyant particles during this time period. 4/7/10 Tr. 68.

103. Ms. Goude testified that the Projects exert a direct entrainment effect on delta smelt, as well as indirect impacts upon the species' food supply, risk of predation, and exposure to contaminants and other stressors, and affect critical habitat by changing the amount and location of habitat in winter, spring and fall. *Id.* at 150-51. In her opinion, enjoining Action 3 of the RPA would result in irreparable harm to the delta smelt due to very low abundance levels and the risk of a "huge" entrainment event causing "catastrophic events." *Id.* at 169-70.

104. However, none of these experts offered any quantitative or qualitative analysis, apart from that discussed above, which utilized raw salvage data, to specifically justify the imposition of a -5,000 cfs ceiling on negative OMR flows.

h. *Alternative Proposal to Limit negative OMR Flow to -5,600 cfs.*

105. Plaintiffs suggest imposition of a -5,600 ceiling on OMR flows. This is based entirely on Dr. Deriso's analysis of population-indexed salvage rates versus negative OMR flows. Although Dr. Deriso's analysis corrects for the fundamental error of relying on raw salvage figures, given the large number of variables *not* accounted for in Dr. Deriso's analysis, it

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is unclear whether the -5,600 break-point he suggests is any more or less appropriate as a ceiling than the -5,000 figure utilized in the BiOp.

106. Mr. Feyrer opined that operating the Project pumps to meet OMR flows no less negative than -5,600 cfs, the alternative OMR ceiling proposed by Plaintiffs, during the spring would *not* avoid jeopardy to the delta smelt or adverse modification of its critical habitat. 4/2/10 Tr. 208.

107. Regardless of the appropriate upper limit for negative OMR flows, RPA Component 2 defines a range of OMR flows within which the Projects may operate during designated time periods. This range of flows "provides flexibility in [ ] water operations [and] the ability to be protective when their conditions are not favorable-or when entrainment risk increases.... So it maximizes protection for the species while providing flexibility for water operations." 4/7/10 Tr. 66-67. According to Dr. Grimaldo, operating to a "unitary" flow, as recommended by Plaintiffs, "removes your flexibility from managing that risk":

> So there may be times when the fish become distributed in the south Delta or the central Delta. And perhaps a lot of them, like we saw in April 2002 and April 2003 were large number of the larvae were in the central and south Delta. If you were at a fixed number, that your risk would be high and you would have substantial losses, which were demonstrated in Kimmerer 2008 during that time period.

Id. at 67.

108. Both the BiOp and subsequent peer reviews have acknowledged that the specific OMR flow triggers and the implementation of the OMR-flow related requirements***1052** of the RPA "need[ ] to be accompanied by careful monitoring, adaptive management and additional analyses that permit regular review and adjustment of strategies as knowledge improves." 4/2/10 Tr. 195; BiOp at 279 ("[t]he specific flow requirements, action triggers and monitoring stations prescribed in the RPA will be continuously monitored and evaluated consistent with the adaptive process. As new information becomes available, these action triggers may be modified without necessarily requiring re-consultation on the overall proposed action.").

109. Although the record shows that FWS's -5,000 OMR ceiling is not based on the best available science, the record does not contain sufficient information to conclude that the imposition of Plaintiff's suggested -5,600 OMR ceiling would be sufficiently protective of the smelt, particularly in light of the fact that Plaintiffs do not propose any flexibility in the management regime that would permit greater restrictions if a large salvage event was approaching or ongoing.

110. Providing flexibility to permit adaptive management for delta smelt is justified.

D. *Irreparable Harm.*

111. The record evidence has established a variety of adverse impacts to humans and the human environment from reduced CVP and SWP deliveries, including irretrievable resource losses (permanent crops, fallowed lands, destruction of family and entity farming businesses); social disruption and dislocation; as well as environmental harms caused by, among other things, increased groundwater consumption and overdraft, and possible air quality reduction.

(1) *Water Supply Impacts.*

112. Any lost pumping capacity directly attributable to the 2008 Smelt BiOp will contribute to and exacerbate the currently catastrophic situation faced by Plaintiffs, whose farms, businesses, water service areas, and impacted cities and counties, are dependent, some exclusively, upon CVP and/or SWP water deliveries.

113. Every acre-foot of pumping foregone during critical time periods is an acre-foot that does not reach the San Luis Reservoir where it can be stored for future delivery to users during times of peak demand in the water year.

114. It is undisputed that, in the three water years prior to the 2009-2010 water year, California has experienced three consecutive years of drought conditions. Gov't Salmon Ex. 5 at (internal) Exhibit 1 at 18. This influences the amount of run-off forecasted for 2010 and is indicative of why reservoir storages were at a low state entering the 2009-2010 water year. 4/1/10 Tr. 208:7-15. Hydrologic conditions are not within the control of the parties and have materi-

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ally contributed to water service reductions to contractors.

115. It is also undisputed that other, non-project factors, such as tides, wind events, storm surges, San Joaquin River flows, Contra Costa Water District operations, and diversions by in-Delta water users effect how Reclamation must operate the project to meet flow targets. *See id.* at 202:12-204:1.

116. The projects are subject to export reductions required to protect species listed under the California Endangered Species Act, including longfin smelt, delta smelt, winter-run Chinook salmon, and spring-run Chinook salmon, which subject the water project operators to controls under state law that are similar, and, in some cases, identical to those contained in the 2008 Smelt BiOp and the National Marine Fisheries Service's ("NFMS") June 4, 2009 Biological Opinion ("2009 Salmonid BiOp") concerning various ESA-listed***1053** anadromous and oceanic species. *See id.* at Tr. 212:4-213:8. In the absence of the BiOps' RPAs, those protections are argued to have likely limited export pumping to levels below those allowable under State Water Resources Control Board Decision 1641 ("D-1641"), which also limits Project pumping at certain times of the year. *See, e.g.,* SWC Ex. 938 (DWR's 3/30/10 allocation announcement considered several "SWP operational constraints" including "the incidental take permit for longfin smelt").

117. Plaintiffs' estimates of water losses do not account for or otherwise offset losses attributable to proposed remedies in the consolidated Delta Smelt and Salmon cases. *See* 4/7/10 Tr. 17:10-20:14.

118. The quantity of exportable water has been reduced by the implementation of the Salmonid and Smelt BiOp's RPAs. *Id.* From January 20 through March 24, 2010, Mr. Erlewine testified that potential and actual exports were diminished by 522,561 acre feet ("AF"), of which a 433,000 AF loss was attributable to the SWP and a 89,000 AF loss was attributable to the CVP. 4/6/10 Tr. 185:16-19; SWC Demonstrative Ex. 903.

119. DWR made its initial water supply allocation announcement on November 30, 2009, allocating 5% of Table A contracted amounts for SWP water contractors. 4/6/10 Tr. 240:16-22; SWC Ex. 923, Ex. B. As of March 30, 2010, DWR increased the SWP allocation for 2010 to 20%. 4/6/10 Tr. 189:15-17; SWC Ex. 938; 4/1/10 Tr. 249:22-25. On April 23, 2010, DWR again increased its allocation of SWP deliveries to 30%. *See* Doc. 323-2 (DWR Press Release).

120. Reclamation announced its initial allocation of CVP water on February 26, 2010. Fed. Gov't Salmon Ex. 5 (Third Milligan Decl.) at 11. Under the 90% exceedance forecast, Reclamation allocated CVP agricultural users 5% of their contract amounts, and CVP municipal and industrial ("M & I") contractors 55% of their contract amounts. *Id.* at 12. Under the 50% exceedance forecast, north-of-Delta agricultural and M & I contractors were allocated 100% of their contract amounts, while south-of-Delta agricultural contractors were allocated 30% and M & I contractors 75%. *Id.*

121. CVP water users faced similar reductions to their individual allocations. Farmers on the west side of the San Joaquin Valley have received reduced CVP water supply allocations in the 2007-2008, 2008-2009, and 2009-2010 water years, and face similar reductions in 2010-2011. SLDMWA Ex. 153 at 3; SLDMWA Ex. 154 at 4; SLDMWA Ex. 156 at 4. In 2007-2008, Reclamation allocated to Westlands 40% of its contract supply. In 2008-2009, that allocation was 10%. SLDMWA Ex. 155 at 8. For the 2009-2010 water year, Westlands was advised the initial allocation was zero percent. SLDMWA Ex. 155 at 9.

122. On March 16, 2010, Reclamation raised the allocation for south-of-Delta agricultural users to 25% under a 90% forecast and 30% under a 50% forecast. 4/1/10 Tr. 210:14-22; Fed. Gov't Salmon Exh. 13.

123. These incremental increases do not alter the fact that water deliveries will likely increase further if the two RPAs are enjoined. 4/1/10 Tr. 213:14-20 (acknowledging that deliveries would increase by 5%-10% if the RPAs were enjoined).

124. The quantity of water lost through pumping reductions translates directly into water losses for urban and agricultural water users. In the SWP service area, one acre-foot of water serves about five to seven people for one year. 4/6/10 Tr. 186:25-187:1-3. An SWP loss of 433,000 AF, if available to urban

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users, would have supplied approximately 2.6 million people for one year. 4/6/10 Tr. 187:8-11. Seventy-five***1054** to eighty-five percent of SWP supply is provided for urban uses, with the remainder provided to agricultural users. 4/6/10 Tr. 187:15-17. The Metropolitan Water District of Southern California alone serves approximately 20 million urban users.

125. Water loss for agricultural users results in reduction in the number of acres that may be sustained with actual water supply. Water duty is the amount of water that a crop needs per acre for a growing season. 4/6/10 Tr. 187:21-22. DWR information indicates that for the SWP service area, the water duty is approximately three AF per acre. 4/6/10 Tr. 187:22-25. If 433,000 AF were withheld from almond crops, for example, almond production would be reduced by approximately 140,000 acres. 4/6/10 Tr. 188:1-4.

126. Reduced CVP and SWP water supply allocations have increased the cost of supplemental water. Farmers have been forced to purchase supplemental water at drastically increased cost. SLDMWA Ex. 154 at 7; SLDMWA Ex. 155 at 17; SLDMWA Ex. 156 at 6. Since 2007, the cost of securing supplemental water has more than tripled. SLDMWA Ex. 156 at 6; SLDMWA Ex. 154 at 7. As of January 2010, the cost for buying replacement water for transfer in a dry year is at least $300 per acre foot, plus transportation costs. SLDMWA Ex. 157 at 12.

127. Increased water allocations may lessen this increased cost, and will mitigate anticipated harms from reduced water allocations. Farmers anticipate that increased water allocations would mitigate anticipated damage to crops in proportion to the amount of water received and prevent further layoffs of farm employees. SLDMWA Ex. 156 at 10.

128. In 2009, the Federal Defendants accounted for actions taken under the Delta smelt biological opinion as (b)(2) actions, pursuant to section 3406(b)(2) of the CVPIA. 4/1/10 Tr. 213:24-214:2. Federal Defendants have indicated their intent to follow the same accounting procedure for federal export reductions related to both BiOps in 2010, to the extent that (b)(2) assets are available at the time the action is taken. *Id.* at 214:3-7.

(2) *Other Resource Impacts Caused or Exacerbated by the 2008 Smelt BiOp RPA Actions.*

129. Plaintiffs attribute a number of other human impacts to reductions in the water supply. There is considerable dispute among the parties regarding the extent to which the 2008 Smelt BiOp RPA is responsible for these other impacts. It is undisputed that the RPA is, at the very least, exacerbating the following impacts.

(1) *Permanent Crops.*

130. Reductions in the quantity of water supply deliveries have resulted in changes to farming practices, including an increased reliance on permanent crops. SLDMWA Ex. 154 at 6; SLDMWA Ex. 155 at 18, 22; SLDMWA Ex. 157 at 11.

131. Permanent crops place farmers at greater risk than row crops, as farmers cannot cut back on the water to permanent crops without destroying them. SLDMWA Ex. 154 at 6; SLDMWA Ex. 155 at 18, 22; SLDMWA Ex. 157 at 11.

(2) *Fallowed Lands.*

132. Because of reduced water forecasts and uncertainty regarding future water supply, farmers have fallowed hundreds and thousands of acres of fields. SLDMWA Ex. 155 at 10; SLDMWA Ex. 153 at 3; SLDMWA Ex. 156 at 5.

133. Fallowed lands and reduced water supply have caused the loss of thousands of acres of crops. Todd Allen, a third-generation farmer in Fresno County, was able to salvage and harvest only 40 acres of a wheat crop out of a total arable 616 ***1055** acres on his farm in 2009. SLDMWA Ex. 153 at 3.

134. For every 1,000 AF of water lost by the San Luis Plaintiffs' member agencies, approximately 400 acres of land may remain out of production. SLDMWA Ex. 157 at 13.

135. Fallowing fields also negatively impacts the air quality of the San Joaquin Valley by increasing dust and particulate matter. SLDMWA Ex. 155 at 20. Reduced air quality in turn impairs major transportation routes through the valley. SLDMWA Ex. 155 at 20.

(3) *Lack of Access to Credit.*

136. The more unreliable the water supply, the

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more difficult it is for farmers to secure necessary financing for their farming operations. SLDMWA Ex. 153 at 4; SLDMWA Ex. 154 at 13; SLDMWA Ex. 155 at 26; SLDMWA Ex. 156 at 7; SLDMWA Ex. 157 at 15. In some cases, lenders deny loan applications because of a lack of reliable water supply. SLDMWA Ex. 153 at 4; SLDMWA Ex. 154 at 13; SLDMWA Ex. 155 at 26; SLDMWA Ex. 156 at 7; SLDMWA Ex. 157 at 15. In others, lenders' concerns about availability to lands irrigated by federally-supplied water has required farmers to make a 50% down payment to secure any loans. SLDMWA Ex. 156 at 7.

(4) *Social Disruption and Dislocation.*

137. It is undisputed that farm employees and their families have faced devastating losses due to reductions in the available water supply. The impact on the farm economy from the combination of a three-year drought and diversion limitations relating to the delta smelt has already been severe. SLDMWA Ex. 157 at 14.

138. Lost water supply has decreased the number of productive agricultural acres, which has resulted in reductions in employee hours, salaries, and positions, devastating farm employees and their families. SLDMWA Ex. 154 at 11; SLDMWA Ex. 156 at 8.

139. The removal of 250,000 acres from production translates to a loss of approximately 4,200 permanent agricultural worker positions. SLDMWA Ex. 155 at 19. Water shortages also cause jobs to be lost in agriculture-related businesses, such as packing sheds, processing plants, and other related services. *Id.* The projected agriculture-related wage loss for the San Joaquin Valley stands at $1.6 billion. *Id.*

140. Dr. Michael, Defendant Intervenors' economist with expertise in regional and environmental economics, counters that "[a]lthough water impacts have affected parts of the west side, there is no evidence that reduced water deliveries have had a severe effect on farm or nonfarm employment in the Central Valley as a whole." D-I Exh. 1006 (Michael Decl.) 10. Instead, it is a combination of factors, including the three-year drought, the global economic recession, the foreclosure crisis, and the collapse of the real estate market and construction industry, not RPA Component 3, that are mainly driving crop and job losses, food bank needs, and credit problems in the Central Valley. *Id.* at 6-10. Dr. Michael estimates that ESA-related pumping restrictions have resulted in the loss of less than 2,000 jobs. *See id.* at 4.

141. Unemployment has led to hunger on the west side of the San Joaquin Valley. SLDMWA Ex. 158 at 8. The Community Food Bank, serving Fresno, Madera and Kings Counties, estimates 435,000 people in its service area do not have a reliable source of food. SLDMWA Ex. 158 at 4. The Chief Executive Officer of the Community Food Bank, Dana Wilkie, believes that hunger in the communities served by the Food Bank in the western San Joaquin Valley will continue to increase in 2010 ***1056** because of ongoing water shortages. SLDMWA Ex. 158 at 5. Ms. Wilkie understands that at least 42,000 people served by the Food Bank in October 2009 were employed by farm-related businesses before losing their jobs. SLDMWA Ex. 158 at 8.

(5) *Groundwater Consumption and Overdraft.*

142. Reductions in the available water supply have caused water users to increase groundwater pumping in attempts to make up the difference between irrigation need and allocated water supplies. SLDMWA Ex. 155 at 4, 7; SLDMWA Ex. 157 at 10; 4/6/10 Tr. 216:6-7.

143. However, groundwater is not always available, and cannot be used in all areas or for all crops. SLDMWA Ex. 155 at 11. Increased groundwater pumping reduces the quality of water applied to the soil by increasing soil salinity. SLDMWA *Id.* at 15. Not all fields and crops can be irrigated with groundwater. *Id.* at 11, 15.

144. Increased reliance on and overuse of groundwater has caused groundwater overdraft, which occurs when pumping exceeds the safe yield of an aquifer. *Id.* at 12. Overdraft causes increased land subsidence and potential damage to CVP conveyance facilities, *id.* at 12-13, although it is not clear that any subsidence of Project facilities has occurred as a result of the implementation of the 2008 Smelt BiOp RPA Actions, as the only reported incident of subsidence at a SWP conveyance facility predates current implementation, 4/7/10 Tr. 16:1-13.

145. Increased groundwater pumping also increases demand for energy. SLDMWA Ex. 155 at 16.

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Due to the falling water table, wells require increased amounts of energy. *Id.* Westlands estimates that pumping of groundwater in 2009 required approximately 425,000,000 kWh. *Id.* Adverse environmental impacts are associated with such increased demand for and use of energy. *Id.*

146. Increased groundwater pumping has depleted groundwater reserves. Groundwater reserves that were at 2 million AF in the beginning of 2007 are now less than 900,000 AF. 4/6/10 Tr. 216:21-24. Within MWD's service area, storage levels are at 1.3 million AF, about half of normal storage levels. 4/6/10 Tr. 217:4-8.

(6) *Related, Recent Impacts on Naval Air Station Lemoore.*

147. Captain James Knapp testified as a fact witness on behalf of Naval Air Station Lemoore, which is located approximately 30 miles south of Fresno, eight miles west of the town of Lemoore, California. 4/7/10 Tr. 208:12-14. Its daytime population is approximately 14,000 people, including residents, who are sailors and dependent families. *Id.* at 208:15-21.

148. The air station's location was selected at a time when the Navy was transitioning from propeller-driven aircraft to jet aircraft, the latter being incompatible with urban environments such as the Naval Air Station Alameda in the San Francisco Bay Area. *Id.* at 211:17-212:21. The air station's 18,000 acres of agriculture-compatible land and neighboring land under permanent agricultural easements help to ensure there will be no urban build-out to interfere with the Navy's operations. *Id.* at 211:17-212:21, 213:2-19. From its location, the installation supports aircraft carrier activities along the Pacific Coast. *Id.*

149. Active agricultural operations on the air station's 18,000 acres and in the surrounding areas also serve "to control bird and animal strike hazards, grass fires, rodent activity, dust, and the release of Coccidioidomycosis (Valley Fever) spores carried by dust." SLDMWA Ex. 390 at p. 3. These risks are interrelated; for example, fallowed fields attract rodents and ***1057** predatory birds. 4/7/10 Tr. at 213:10-25. An increased bird presence increases the chances of bird strikes by naval aircraft. *Id.* at 214:1-6.

150. Ongoing agricultural activities are vitally important to the Navy's ability to safely train and support flight operations at Naval Air Station Lemoore. 4/7/10 Tr. at 214:7-24; SLDMWA EX. 390 at p. 2.

151. Lemoore Naval Air Station's principal source of municipal, industrial, and agricultural water is Westlands Water District. 4/7/10 Tr. 208:24-209:2.

152. The past water year began with a zero percent water allocation which increased to a ten percent allocation, resulting in 6,000 acres of fallow fields. SLDMWA Ex. 390 at p. 3. Pilots training at low altitude witnessed an increase in bird activity, with one aircraft suffering thousands of dollars in damage as a result of a bird strike. *Id.*

43. Captain Knapp testified that Naval Air Station Lemoore had requested and received emergency supplemental water allocations from Reclamation for these properties. *Id.* at 210, 217-18; SLDMWA Ex. 391.

44. This post-record evidence is received for the limited purpose of showing the action agency's ability to respond to conditions that pose imminent harm to the human environment.

(3) *Harm to Species.*

45. To the extent such information is in the record, the potential harms to the species of enjoining Component 2 (Action 3) are discussed above.

VI. *CONCLUSIONS OF LAW*

A. *Jurisdiction.*

1. Jurisdiction over claims brought under NEPA exists under 28 U.S.C. 1331 (Federal Question) and the Administrative Procedure Act ("APA"), 5 U.S.C. 702 et seq. Jurisdiction over the ESA claims exists under the ESA citizen-suit provision, 16 U.S.C. 1540(g)(1)(A). Personal jurisdiction over all the parties exists by virtue of their participation in the lawsuit as Plaintiffs, Defendants, and Intervenors.

B. *Likelihood of Success on the Merits: NEPA Claims.*

[1] 2. Plaintiffs have already succeeded on their NEPA claim. *See* Doc. 399.

3. NEPA insures that federal agencies "make in-

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formed decisions and 'contemplate the environmental impacts of [their] actions.' " *Ocean Mammal Inst. v. Gates,* 546 F.Supp.2d 960, 971 (D.Hi.2008) (quoting *Idaho Sporting Cong. v. Thomas,* 137 F.3d 1146, 1149 (9th Cir.1998)).

4. "NEPA emphasizes the importance of coherent and comprehensive up-front environmental analysis to insure informed decision-making to the end that the agency will not act on incomplete information, only to regret its decision after it is too late to correct." *Ctr. for Biological Diversity v. U.S. Forest Serv.,* 349 F.3d 1157, 1166 (9th Cir.2003).

5. Federal Defendants' violations of NEPA prevented the required reasonable evaluation, analysis, "hard look at," and disclosure of the harms of implementing the 2008 Smelt BiOp RPA Actions to human health and safety, the human environment, and other environments not inhabited by the delta smelt.

6. Harms that have been caused by RPA water supply reductions include but are not limited to: destruction of permanent crops; fallowed lands; increased groundwater consumption; land subsidence; reduction of air quality; destruction of family and entity farming businesses; and social disruption and dislocation, such as increased property crime and intra-family crimes of violence,***1058** adverse effects on schools, and increased unemployment leading to hunger and homelessness.

7. Where a federal agency takes action in violation of NEPA, "that action will be set aside." *High Sierra Hikers Ass'n v. Blackwell,* 390 F.3d 630, 640 (9th Cir.2004).

8. However, a court may not issue an injunction under NEPA that would cause a violation of other statutory requirements, such as those found in section 7 of the ESA. *See United States v. Oakland Cannabis Buyers' Co-op.,* 532 U.S. 483, 497, 121 S.Ct. 1711, 149 L.Ed.2d 722 (2001) ("A district court cannot, for example, override Congress' policy choice, articulated in a statute, as to what behavior should be prohibited."). Nor should an injunction issue under NEPA when enjoining government action would result in more harm to the environment than denying injunctive relief. *Save Our Ecosystems v. Clark,* 747 F.2d 1240, 1250 (9th Cir.1984); *Am. Motorcyclist Ass'n v. Watt,* 714 F.2d 962, 966 (9th Cir.1983) (holding public interest does not favor granting an injunction where "government action allegedly in violation of NEPA might actually jeopardize natural resources"); *Alpine Lakes Prot. Soc'y v. Schlapfer,* 518 F.2d 1089, 1090 (9th Cir.1975) (denying injunctive relief in NEPA case where more harm could occur to forest from disease if injunction was granted).

C. *Likelihood of Success on the Merits: ESA Claims.*

(1) *Legal Standards.*

9. The Administrative Procedure Act ("APA") requires Plaintiffs to show that FWS's action was "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. 706(2)(A).

a. *Record Review.*

[2][3] 10. A court reviews a biological opinion "based upon the evidence contained in the administrative record." *Arizona Cattle Growers' Ass'n v. FWS,* 273 F.3d 1229, 1245 (9th Cir.2001). Judicial review under the APA must focus on the administrative record already in existence, not some new record made initially in a reviewing court. Parties may not use "post-decision information as a new rationalization either for sustaining or attacking the agency's decision." *Ass'n of Pac. Fisheries v. EPA,* 615 F.2d 794, 811-12 (9th Cir.1980).

[4] 11. Exceptions to administrative record review for technical information or expert explanation make such evidence admissible only for limited purposes, and those exceptions are narrowly construed and applied. *Lands Council v. Powell,* 395 F.3d 1019, 1030 (9th Cir.2005).

12. Here, the Court has considered expert testimony only for explanation of technical terms and complex subject matter beyond the Court's knowledge; to understand the agency's explanations, or lack thereof, underlying the RPA; and to determine if any bad faith existed.

b. *Deference to Agency Expertise.*

[5][6] 13. The Court must defer to the agency on matters within the agency's expertise, unless the agency completely failed to address some factor, consideration of which was essential to making an

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informed decision. *Nat'l Wildlife Fed'n v. NMFS*, 422 F.3d 782, 798 (9th Cir.2005). The court "may not substitute its judgment for that of the agency concerning the wisdom or prudence of the agency's action." *River Runners for Wilderness v. Martin*, 593 F.3d 1064, 1070 (9th Cir.2010).

> In conducting an APA review, the court must determine whether the agency's decision is "founded on a rational connection between the facts found and the choices made ... and whether [the agency] has committed a clear error of judgment." ***1059***Ariz. Cattle Growers' Ass'n v. U.S. Fish & Wildlife*, 273 F.3d 1229, 1243 (9th Cir.2001). "The [agency's] action ... need be only a reasonable, not the best or most reasonable, decision." *Nat'l Wildlife Fed. v. Burford*, 871 F.2d 849, 855 (9th Cir.1989).
>
> *Id.*

14. Although deferential, judicial review under the APA "is designed to ensure that the agency considered all of the relevant factors and that its decision contained no clear error of judgment." *Arizona v. Thomas*, 824 F.2d 745, 748 (9th Cir.1987) (internal citations omitted). "The deference accorded an agency's scientific or technical expertise is not unlimited." *Brower v. Evans*, 257 F.3d 1058, 1067 (9th Cir.2001) (internal citations omitted). Deference is not owed when "the agency has completely failed to address some factor consideration of which was essential to making an informed decision." *Id.* (internal citations and quotations omitted).

> [An agency's decision is] arbitrary and capricious if it has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.

Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43, 103 S.Ct. 2856, 77 L.Ed.2d 443 (1983); *see also Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416, 91 S.Ct. 814, 28 L.Ed.2d 136 (1971) ("A reviewing court may overturn an agency's action as arbitrary and capricious if the agency failed to consider relevant factors, failed to base its decision on those factors, and/or made a clear error of judgment.").

c. *General Obligations Under the ESA.*

15. ESA Section 7(a)(2) prohibits agency action that is "likely to jeopardize the continued existence" of any endangered or threatened species or "result in the destruction or adverse modification" of its critical habitat. 16 U.S.C. 1536(a)(2).

[7] 16. To "jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. 402.02; *see also Nat'l Wildlife Fed'n v. NMFS*, 524 F.3d 917 (9th Cir.2008) ("*NWF v. NMFS II*") (rejecting agency interpretation of 50 C.F.R. 402.02 that in effect limited jeopardy analysis to survival and did not realistically evaluate recovery, thereby avoiding an interpretation that reads the provision "and recovery" entirely out of the text). An action is "jeopardizing" if it keeps recovery "far out of reach," even if the species is able to cling to survival. *Id.* at 931.

[8][9] 17. "[A]n agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm." *Id.* at 930.

18. To satisfy this obligation, the federal agency undertaking the action (the "action agency") must prepare a "biological assessment" that evaluates the action's potential impacts on species and species' habitat. 16 U.S.C. 1536(c); 50 C.F.R. 402.12(a).

19. If the proposed action "is likely to adversely affect" a threatened or endangered species or adversely modify its designated***1060** critical habitat, the action agency must engage in "formal consultation" with FWS to obtain its biological opinion as to the impacts of the proposed action on the listed species. 16 U.S.C. 1536(a)(2), (b)(3); *see also* 50 C.F.R. 402.14(a), (g). Once the consultation process has been completed, FWS must give the action agency a written biological opinion "setting forth [FWS's] opinion, and a summary of the information on which

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the opinion is based, detailing how the agency action affects the species or its critical habitat." 16 U.S.C. 1536(b)(3)(A); *see also* 50 C.F.R. 402.14(h).

20. If FWS determines that jeopardy or destruction or adverse modification of critical habitat is likely, FWS "shall suggest those reasonable and prudent alternatives which [it] believes would not violate subsection (a)(2) of this section and can be taken by the Federal agency or applicant in implementing the agency action." 16 U.S.C. 1536(b)(3)(A). "Following the issuance of a 'jeopardy' opinion, the agency must either terminate the action, implement the proposed alternative, or seek an exemption from the Cabinet-level Endangered Species Committee pursuant to 16 U.S.C. 1536(e)." *National Ass'n of Home Builders v. Defenders of Wildlife,* 551 U.S. 644, 652, 127 S.Ct. 2518, 168 L.Ed.2d 467 (2007).

d. *Best Available Science.*

[10] 21. Under the ESA, an agency's actions must be based on "the best scientific and commercial data available." 16 U.S.C. 1536(a)(2); 50 C.F.R. 402.14(g)(8) ("In formulating its Biological Opinion, any reasonable and prudent alternatives, and any reasonable and prudent measures, the Service will use the best scientific and commercial data available."). "The obvious purpose of the [best available science requirement] is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise." *Bennett v. Spear,* 520 U.S. 154, 176, 117 S.Ct. 1154, 137 L.Ed.2d 281 (1997). A failure by the agency to utilize the best available science is arbitrary and capricious. *See Pacific Coast Federation of Fishermen's Associations v. Gutierrez II,* 606 F.Supp.2d 1122, 1144 (E.D.Cal.2008).

22. A decision about jeopardy must be made based on the best science available at the time of the decision; the agency cannot wait for or promise future studies. *See Ctr. for Biological Diversity v. Rumsfeld,* 198 F.Supp.2d 1139, 1156 (D.Ariz.2002).

[11] 23. The "best available science" mandate of the ESA sets a basic standard that "prohibits the [agency] from disregarding available scientific evidence that is in some way better than the evidence [it] relies on." *Am. Wildlands v. Kempthorne,* 530 F.3d 991, 998 (D.C.Cir.2008) (citation omitted).

24. What constitutes the "best" available science implicates core agency judgment and expertise to which Congress requires the courts to defer; a court should be especially wary of overturning such a determination on review. *Baltimore Gas & Elec. Co. v. Natural Res. Defense Council,* 462 U.S. 87, 103, 103 S.Ct. 2246, 76 L.Ed.2d 437 (1983) (a court must be "at its most deferential" when an agency is "making predictions within its area of special expertise, at the frontiers of science"). As explained by the en banc panel of the Ninth Circuit in *Lands Council v. McNair,* 537 F.3d 981, 993 (9th Cir.2008), courts may not "impose on the agency their own notion of which procedures are best or most likely to further some vague, undefined public good." *Id.* In particular, an agency's "scientific methodology is owed substantial deference." *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv.,* 378 F.3d 1059, 1066 (9th Cir.2004).

25. This deference extends to the use and interpretation of statistical methodologies.***1061** As explained by the D.C. Circuit in *Appalachian Power Co. v. EPA,* 135 F.3d 791 (D.C.Cir.1998), in reviewing a challenge to a decision of the Environmental Protection Agency ("EPA") under the "arbitrary and capricious" standard of review:

> Statistical analysis is perhaps the prime example of those areas of technical wilderness into which judicial expeditions are best limited to ascertaining the lay of the land. Although computer models are "a useful and often essential tool for performing the Herculean labors Congress imposed on EPA in the Clean Air Act," [citation] their scientific nature does not easily lend itself to judicial review. Our consideration of EPA's use of a regression analysis in this case must therefore comport with the deference traditionally given to an agency when reviewing a scientific analysis within its area of expertise without abdicating our duty to ensure that the application of this model was not arbitrary.

Id. at 802.

[12] 26. More generally, "[w]hen specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive." *Lands Council,* 537 F.3d at 1000 (quoting *Marsh v.*

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Oregon Natural Res. Council, 490 U.S. 360, 378, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989)).

[13] 27. Mere uncertainty, or the fact that evidence may be "weak," is not fatal to an agency decision. *Greenpeace Action v. Franklin,* 14 F.3d 1324, 1337 (9th Cir.1992) (upholding biological opinion, despite uncertainty about the effectiveness of management measures, because decision was based on a reasonable evaluation of all available data); *Nat'l Wildlife Fed'n v. Babbitt,* 128 F.Supp.2d 1274, 1300 (E.D.Cal.2000) (holding that the "most reasonable" reading of the best scientific data available standard is that it "permits the [FWS] to take action based on imperfect data, so long as the data is the best available").

28. The deference afforded under the best available science standard is not unlimited. For example, *Tucson Herpetological Society v. Salazar,* 566 F.3d 870, 879 (9th Cir.2009), held that an agency may not rely on "ambiguous studies as evidence" to support findings made under the ESA. Because the studies did not lead to the conclusion reached by FWS, the Ninth Circuit held that these studies provided inadequate support in the administrative record for the determination made by FWS. *Id.; see also Rock Creek Alliance v. U.S. Fish & Wildlife Service,* 390 F.Supp.2d 993 (D.Mont.2005) (rejecting FWS's reliance on a disputed scientific report, which explicitly stated its analysis was not applicable to the small populations addressed in the challenged opinion); *Greenpeace v. NMFS,* 80 F.Supp.2d 1137, 1149-50 (W.D.Wash.2000) (where agency totally failed to develop any projections regarding population viability, it could not use as an excuse the fact that relevant data had not been analyzed).

[14][15] 29. The presumption of agency expertise may be rebutted if the agency's decisions, although based on scientific expertise, are not reasoned. *Greenpeace,* 80 F.Supp.2d at 1147. Agencies cannot disregard available scientific evidence better than the evidence on which it relies. *Kern County Farm Bureau v. Allen,* 450 F.3d 1072, 1080 (9th Cir.2006); *S.W. Ctr. for Biological Diversity v. Babbitt,* 215 F.3d 58, 60 (D.C.Cir.2000).

30. Courts routinely perform substantive reviews of record evidence to evaluate the agency's treatment of best available science. The judicial review process is not one of blind acceptance. *See, e.g.,* ***1062***Kern County,* 450 F.3d 1072 (thoroughly reviewing three post-comment studies and FWS's treatment of those studies to determine whether they "provide[d] the sole, essential support for" or "merely supplemented" the data used to support a listing decision); *Home Builders Ass'n of N. Cal. v. U.S. Fish and Wildlife Serv.,* 529 F.Supp.2d 1110, 1120 (N.D.Cal.2007) (examining substance of challenge to FWS's determination that certain data should be disregarded); *Trout Unlimited v. Lohn,* 645 F.Supp.2d 929 (D.Or.2007) (finding best available science standard had been violated after thorough examination of rationale for NMFS's decision to withdraw its proposal to list Oregon Coast Coho salmon); *Oceana, Inc. v. Evans,* 384 F.Supp.2d 203, 217-18 (D.D.C.2005) (carefully considering scientific underpinnings of challenge to Service's use of a particular model, including post decision evidence presented by an expert, to help the court understand a complex model, applying one of several record review exceptions articulated in *Esch v. Yeutter,* 876 F.2d 976, 991 (D.C.Cir.1989), which are similar to those articulated by the Ninth Circuit).

[16] 31. Courts are not required to defer to an agency conclusion that runs counter to that of other agencies or individuals with specialized expertise in a particular technical area. *See, e.g., Am. Tunaboat Ass'n v. Baldrige,* 738 F.2d 1013, 1016-17 (9th Cir.1984) (NMFS's decision under the Marine Mammal Protection Act was not supported by substantial evidence because agency ignored data that was product of "many years' effort by trained research personnel"); *Sierra Club v. U.S. Army Corps of Eng'rs,* 701 F.2d 1011, 1030 (2d Cir.1983) ("court may properly be skeptical as to whether an EIS's conclusions have a substantial basis in fact if the responsible agency has apparently ignored the conflicting views of other agencies having pertinent experience [ ]") (internal citations omitted). A court should "reject conclusory assertions of agency 'expertise' where the agency spurns unrebutted expert opinions without itself offering a credible alternative explanation." *N. Spotted Owl v. Hodel,* 716 F.Supp. 479, 483 (W.D.Wash.1988) (citing *Am. Tunaboat Ass'n,* 738 F.2d at 1016).

32. In *Conner v. Burford,* 848 F.2d 1441, 1453-54 (9th Cir.1988), the agency attempted to defend its biological opinions by arguing that there was a lack of sufficient information. In rejecting this defense,

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the court held that "incomplete information ... does not excuse the failure to comply with the statutory requirement of a comprehensive biological opinion using the best information available," and it noted that FWS could have completed more analysis with the information that was available. *Id.* at 1454 (emphasis added). The Ninth Circuit stated:

> In light of the ESA requirement that the agencies use the best scientific and commercial data available ... the FWS cannot ignore available biological info or fail to develop projections of ... activities which may indicate potential conflicts between development and the preservation of protected species. We hold that the FWS violated the ESA by failing to use the best information available to prepare comprehensive biological opinions.

848 F.2d at 1454 (emphasis added).

(2) *Environmental Baseline Challenges.*

33. The relevant regulatory definition of the "environmental baseline" is provided within the definition of the "effects of the action":

> the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline. The environmental baseline ***1063** includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

50 C.F.R. 402.02.

34. When determining the "effects of the action," the agency first must evaluate the status of the species or critical habitat, which will involve "consideration of the present environment" in which the species or habitat exists as well as "the environment that will exist when the action is completed, in terms of the totality of factors affecting the species or critical habitat." 51 Fed.Reg. 19,926, 19,932 (June 3, 1986). This evaluation is to serve as the "baseline" for determining the effects of the action on the species or critical habitat. *Id.* However, all of these elements are to be evaluated together as the "effects of the action."

35. If additional data would provide a better information base from which to formulate a biological opinion, the consulting agency (FWS or NMFS) may request an extension of formal consultation and that the action agency obtain additional data to determine how or to what extent the action may affect listed species or critical habitat. 50 C.F.R. 402.14(f); FWS and NMFS, Endangered Species Consultation Handbook (March 1998) at 4-6.[FN8]

> FN8. Judicial notice may be taken of this Handbook, which is available at: http://www. fws. gov/ endangered/ consultations/ s 7 hndbk/ s 7 hndbk. htm.

36. The Ninth Circuit directs the consulting agency to consider the effects of its actions "within the context of other existing human activities that impact the listed species." *NWF v. NMFS II,* 524 F.3d at 930. "[T]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and future human and natural contexts." *Id.* The relevant jeopardy analysis is whether this Project will tip a species into a state of "likely extinction." 524 F.3d at 930.

> Even under the so-called aggregation approach NMFS challenges, then, an agency only "jeopardize[s]" a species if it causes some new jeopardy. An agency may still take action that removes a species from jeopardy entirely, or that lessens the degree of jeopardy. However, an agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm.

> Our approach does not require NMFS to include the entire environmental baseline in the "agency action" subject to review. It simply requires that NMFS appropriately consider the effects of its actions "within the context of other existing human

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activities that impact the listed species." [citation]. This approach is consistent with our instruction (which NMFS does not challenge) that "[t]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and future human and natural contexts." [citation].

Id. (footnote omitted).

37. Plaintiffs' essential critique of the BiOp's baseline analysis is that the BiOp ***1064** improperly concluded that "CVP and SWP operations exacerbate the effects of other factors, such as food or predation on the delta smelt." *See* Doc. 667, Pltf's Proposed Conclusions of Law 316-18.[FN9] Plaintiffs argue "FWS simply determined that these factors are attributable to CVP and SWP operations" and therefore "based the effects analysis of the 2008 BiOp upon an unreasoned premise." *Id.* at Proposed Conclusion of Law # 343.

FN9. Plaintiffs' motion for preliminary injunction specifically addresses the treatment of hatcheries and gravel loss below Whiskeytown Dam. Doc. 164 at 11-12. However, this issue was not presented or discussed at the evidentiary hearing or in Plaintiffs' proposed findings. These specific arguments appear to have been abandoned.

Plaintiffs also advance an elaborate argument based on the contention that FWS misapplied the "reasonably certain to occur" standard applicable to "indirect effects" analyses. Because Component 2 is not explicitly justified by any indirect effects analysis, this argument is not directly relevant to the resolution of the pending motion for preliminary injunction.

38. Plaintiffs are correct that the general assertion that Project operations exacerbate the effects of these other stressors is unsupported by the record. However, the inclusion of this unsupported assertion does not invalidate the BiOp's baseline analysis. BiOp at 140-189. FWS does discuss "other stressors" at length in the BiOp. *See, e.g., id.* at 182-88, 198, 201-2. Specifically, FWS considered the effects of "predation, contaminants, introduced species ..., habitat suitability, food supply, aquatic macrophytes, and microcystis." *Id.* at 202, 277. The CVP and SWP are not identified as the sole source of the delta smelt's problems. Rather, FWS expressly recognizes that the long-term decline of the species "was very strongly affected by ecosystem changes caused by non-indigenous species invasions and other factors...." *Id.* at 189. The BiOp repeatedly acknowledges that there is "no single primary driver of delta smelt population dynamics," *id.* at 202, but rather that there are "multiple factors" and that "not all are directly influenced by operations of the CVP/SWP." *Id.* at 328.

39. It is undisputed that uncertainty surrounding the measurement of the other stressors makes it difficult (if not impossible) to separate those effects from the effects of joint Project operations. Even if it were possible to separate the quantitative effect of the other stressors, which are part of the environmental baseline, the ESA does not require that FWS quantify and/or parcel out the "proportional share" of harms among the baseline and the proposed action. *See Pacific Coast Fed'n of Fishermen's Ass'ns v. U.S. Bureau of Reclamation,* 426 F.3d 1082, 1093 (9th Cir.2005); *see also Pacific Coast Fed'n of Fishermen's Ass'ns v. U.S. Bureau of Reclamation,* 226 Fed.Appx. 715, 718 (9th Cir.2007) (rejecting water users' argument that agency action must be the "historical cause" of the jeopardy to salmon).

40. FWS's treatment of the "other stressors" in the BiOp did not violate the ESA's baseline analysis requirements because the ESA does not demand a quantitative separation of project stressors from non-project stressors. *See NWF v. NMFS II,* 524 F.3d at 930. ("[T]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and future human and natural contexts."). FWS was required to and did describe the present and future federal, state, and private actions in the action area, which include the "other stressors". Whether it sufficiently justified whether jeopardy might result ***1065** from the agency's proposed actions viewed in this context is a separate question.

41. It is inequitable to put the entire burden of the stressors on the water supply. However, this decision goes beyond science to implicate the Executive's

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(Department of Interior) allocation of resources. A court lacks authority to interfere with such a policy choice by a coordinate branch of government.

a. *Discretionary v. Non-Discretionary.*

42. Plaintiffs complain that the BiOp does not distinguish between discretionary and non-discretionary actions. *Home Builders,* 551 U.S. 644, 127 S.Ct. 2518, held that ESA 7's consultation requirements do not apply to non-discretionary actions. Where an agency is *required* by law to perform an action, it lacks the power to insure that the action will not jeopardize the species. *Id.* at 667, 127 S.Ct. 2518.

43. However, *Home Builders says nothing about whether, once section 7 consultation is triggered, the jeopardy analysis should segregate discretionary and non-discretionary actions, relegating the non-discretionary actions to the environmental baseline.* Home Builders fundamentally concerns whether the section 7 consultation obligation attaches to a particular agency action at all. *See Home Builders,* 551 U.S. at 679-80, 127 S.Ct. 2518 ("duty does not *attach* to actions ... that an agency is required by statute to undertake....") (emphasis added).

b. *Reclamation's Treatment of the Coordinated Operations Agreement.*

The same reasoning applies to Plaintiffs' related argument that Federal Defendants acted unlawfully by attributing to the project the effects of "mandatory" compliance with the Coordinated Operations Agreement ("COA"). Even assuming, *arguendo,* that any mandatory obligation exists under the COA, a proposition that is questionable given the open-ended wording of the COA and language in the CVPIA subjecting project operations to the ESA, *Home Builders* does not require the agency to segregate discretionary from non-discretionary activities during an ESA 7 consultation.[FN10] Moreover, this argument was not presented in Plaintiffs' opening brief. *See Alaska Ctr. for Envt. v. U.S. Forest Serv.,* 189 F.3d 851, 858 n. 4 (9th Cir.1999) (arguments not raised in opening brief are waived).

FN10. To the extent that Plaintiffs suggest that section 7 does not apply to the projects at all under *Home Builders,* this paradigm-shifting argument has not properly been raised or briefed.

c. *Comparison of CalSim Data against Dayflow Data.*

44. Plaintiffs also argue that FWS's analysis is flawed because FWS compared CalSim data to Dayflow Data. As discussed in the Findings of Fact, although Mr. Miller presents some substantive criticisms of the way the BiOp utilized CalSim runs and compared those runs to other types of data, these specific concerns were not raised before the agency prior to the issuance of the BiOp. FWS had legitimate concerns, shared by other scientists, with the exclusive reliance on CalSim data. Finally, Mr. Miller concedes that even if the approach he recommends had been taken, the same fundamental result would have obtained: project operations shift the position of X2 upstream. The magnitude of this shift is relevant to the justification for and design of Component 3, which takes effect in September, but that need not be resolved at this time.

(3) *Effects Analysis Challenges (Food Web).*

45. Plaintiffs' original motion attacked the BiOp's analysis regarding *P. forbesi,* a ***1066** food item for delta smelt during the summer and fall seasons. Doc. 447 at 21-26. Plaintiffs appear to have abandoned this argument, as it was not discussed during the evidentiary hearing or in their proposed Findings of Fact or Conclusions of Law.

(4) *Challenges to Component 2.*

a. *Use of Raw Salvage Numbers.*

[17] 46. The evidence described in the Findings of Fact establishes that FWS's use of gross salvage numbers to justify the quantitative pumping restrictions in RPA Component 2 did not utilize the best available science.

47. There was agreement among all the experts that the best available, scientifically accepted methodology is to use normalized salvage data to analyze the effect of OMR flows on the delta smelt population. Normalized 110 salvage data was available to FWS, but FWS failed to incorporate any analysis of normalized salvage data into its quantitative justification for the specific flow prescriptions imposed by RPA Component 2. To exacerbate this failure, FWS did not explain why it did not.

48. FWS's disregard for an available scientific methodology that was "in some way better than the evidence [the agency] relied on" was a violation of

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the "best available science" standard of the ESA. *Kern County,* 450 F.3d at 1080.

49. Additionally, by entirely failing to explain its use of gross salvage numbers despite internal discussions indicating an awareness of the problem and criticism from the Independent Peer Review, FWS "has entirely failed to articulate a satisfactory explanation for its conclusions." *Gutierrez II,* 606 F.Supp.2d at 1183.

50. Plaintiffs have shown a likelihood of success on the merits of their claim that the use of gross salvage numbers in Figures B-13 and B-14 of the BiOp was a violation of the ESA, and was arbitrary, capricious, and an abuse of discretion.

51. However, Plaintiffs have not demonstrated that Dr. Deriso's alternative -5,600 cfs flow limit is any more valid than the -5,000 cfs limit imposed by RPA Component 2. The condition of the delta smelt continues to be non-viable and precarious, with a likely risk of extinction if protections are not afforded. Plaintiffs must produce evidence that shows otherwise to justify a flow restriction that permits negative OMR flows to exceed -5,000 cfs.

b. *Failure to Use a Quantitative Life Cycle Model.*

52. The agency is not required to generate new studies. For example, in *Southwest Center for Biological Diversity v. Babbitt,* 215 F.3d 58, 60-61 (D.C.Cir.2000), the district court found the available evidence regarding FWS's decision not to list the Queen Charlotte goshawk "inconclusive" and held that the agency was obligated to find better data on the species' abundance. The D.C. Circuit reversed, emphasizing that, although "the district court's view has a superficial appeal ... this superficial appeal cannot circumvent the statute's clear wording: The secretary must make his decision as to whether to list a species as threatened or endangered 'solely on the basis of the best scientific and commercial data available to him....' 16 U.S.C. 1533(b)(1)(A)." *Id.* at 61.

53. The use of a quantitative life cycle model is the preferred scientific methodology. FWS made a conscious choice not to use expertise available within the agency to develop one, nor did it explain why it did not. However, a completed life-cycle model was not available for FWS's use prior to the issuance of the BiOp, and the Court does not have the authority to require the agency to create one.

***1067** (5) *Critical Habitat.*

[18] 54. As required by the ESA, if FWS finds that the proposed agency action will result in "jeopardy or adverse modification [of critical habitat] ... the Secretary shall suggest those reasonable and prudent alternatives which [it] believes would not violate [Section 7(a)(2)] and can be taken by the Federal agency or applicant in implementing the agency action." 16 U.S.C. 1536(b)(3)(A). Avoiding adverse modification of critical habitat is an independent statutory basis for the promulgation of an RPA.

55. The BiOp sets forth extensive findings regarding the adverse effects of export pumping on the critical habitat of the delta smelt. *See* BiOp at 190-202, 239-78. For instance, the BiOp found that the export pumps "alter the hydrologic conditions within spawning habitat throughout the spawning period for delta smelt by impacting various abiotic factors including the distributions of turbidity, food, and contaminants," and further adversely modify spawning habitat by "contribut[ing] to upstream movement of the LSZ [low salinity zone]," which in turn "reduc[es] the amount and quality of spawning habitat available to delta smelt." *Id.* at 239-40.

56. In light of such findings, the BiOp concluded that the operations of the CVP and SWP "are likely to adversely modify delta smelt critical habitat" because "[t]he past and present operations of the CVP/SWP have degraded [delta smelt] habitat elements (particularly PCEs 2-4 ["primary constituent elements" water, water flow, and salinity]) to the extent that their co-occurrence at the appropriate places and times is insufficient to support successful delta smelt recruitment at levels that will provide for the species' conservation." *Id.* at 278.

57. Plaintiffs have not challenged the BiOp's findings on adverse modification of critical habitat in this motion. Plaintiffs' experts Dr. Deriso and Dr. Hilborn stated that their criticisms of the BiOp's OMR flow restrictions did not apply to critical habitat. 4/5/10 Tr. 226; 4/6/10 Tr. 93. Rather, Plaintiffs argue that the only stated rationale for the specific flow prescriptions imposed by Component 2 is to avoid jeopardy, and that Component 2 does not itself indicate that it is necessary to prevent adverse modification. *See* Pls.' Reply (Doc. 491) at 1 n. 1.

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58. Federal Defendants respond that "[t]his argument elevates form over substance and needlessly compartmentalizes portions of the BiOp that are designed to work together as part of the same document." Doc. 666, Proposed Conclusion of Law # 187.

59. As a general matter, Federal Defendants are correct that the BiOp's critical habitat modification finding operates as an independent justification for imposing flow restrictions on the projects. However, the BiOp justifies the *specific* flow prescriptions imposed by Component 2 with a quantitative analysis that says nothing whatsoever about critical habitat. Rather, an improper analysis of raw salvage data is utilized to generate a series of "break points," including a -5,000 cfs ceiling on negative OMR flows. There is no analysis of critical habitat that independently justifies this specific flow prescription, as opposed to the ceiling of -5,600 proposed by Plaintiffs, or any other level.

(6) *Reclamation's ESA Responsibility.*

60. The ESA regulations require the action agency to "determine whether and in what manner to proceed with the action in light of its section 7 obligations and the Service's biological opinion." 50 C.F.R. 402.15(a). Prior to accepting and implementing the 2008 Smelt BiOp RPA, Reclamation had an independent obligation under ESA section 7(a)(2) to ensure that it ***1068** "use[d] the best scientific and commercial data available."

[19][20] 61. Reclamation, as the federal action agency, "may not rely solely on a FWS biological opinion to establish conclusively its compliance with its substantive obligations under section 7(a) (2)." *Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of the Navy*, 898 F.2d 1410, 1415 (9th Cir.1990). "[T]he action agency must not blindly adopt the conclusions of the consultant agency." *City of Tacoma v. Fed. Energy Regulatory Comm'n*, 460 F.3d 53, 76 (D.C.Cir.2006).

62. Reclamation did not ensure that the RPA utilized the best available science. Rather, it uncritically accepted the RPA and did not independently identify and analyze alternative RPA Actions that minimized jeopardy to humans and the human environment while protecting threatened species.

D. *Balancing of the Harms.*

(1) *Balancing of the Harms in ESA Cases.*

63. The Supreme Court held in *TVA v. Hill*, 437 U.S. 153, 194, 98 S.Ct. 2279, 57 L.Ed.2d 117 (1978), that Congress struck the balance in favor of affording endangered species the highest of priorities. In adopting the ESA, Congress intended to "halt and reverse the trend toward species' extinction, *whatever the cost.*" *Id.* at 184, 98 S.Ct. 2279 (emphasis added). *TVA v. Hill* continues to be viable. *See Home Builders*, 551 U.S. at 669-71, 127 S.Ct. 2518; *see also Oakland Cannabis Buyers' Co-op.*, 532 U.S. at 496-97, 121 S.Ct. 1711; *Amoco Prod. Co. v. Village of Gambell*, 480 U.S. 531, 543 n. 9, 107 S.Ct. 1396, 94 L.Ed.2d 542 (1987).

64. Winter does not modify or discuss the *TVA v. Hill standard.*[FN11] Although Winter altered the Ninth Circuit's general preliminary injunctive relief standard by making that standard *more rigorous,* Winter did not address, nor change, the approach to the balancing of *economic* hardships where endangered species and their critical habitat are jeopardized. *See Biodiversity Legal Found. v. Badgley*, 309 F.3d 1166, 1169 (9th Cir.2002) (Congress removed the courts' traditional equitable discretion to balance parties' competing interests in ESA injunction proceedings); *Nat'l Wildlife Fed'n v. Burlington N. R.R., Inc.*, 23 F.3d 1508, 1510-11 (9th Cir.1994) (same).

FN11. Although *Winter* involved ESA-listed species, the *Winter* decision did not address any ESA claims.

65. Prior decisions involving the coordinated projects' operations found that *TVA v. Hill* and related Ninth Circuit authorities foreclose the district court's traditional discretion to balance economic equities under the ESA. There is no such bar in NEPA injunction proceedings.

66. Plaintiffs have advanced a human welfare exception and contend that unlike any of the prior cases, this case juxtaposes species' survival against human welfare, requiring a balancing of the BiOp's threats of harm to humans, health, safety, and protection of affected communities. No case, including *TVA*

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v. Hill, which concerned the competing economic interest in the operation of a hydro-electric project and prohibited federal courts from balancing the loss of funds spent on that project against the loss of an endangered species, expressly addresses whether the ESA precludes balancing of harms to humans and the human environment under the circumstances presented here.

67. This case involves both harm to threatened species and to humans and ***1069** their environment. Congress has not nor does *TVA v. Hill* elevate species protection over the health and safety of humans.

(2) *Balancing the Harms under NEPA.*

[21] 68. Although it is undisputed that all harms may be considered in evaluating a claim for injunctive relief under NEPA, an injunction should not issue if enjoining such government action would result in more harm to the environment than denying injunctive relief. *Save Our Ecosystems,* 747 F.2d at 1250.

E. *The Public Interest.*

69. In adopting the ESA, Congress explicitly found that all threatened and endangered species "are of esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people." 16 U.S.C. 1531(a)(3). The ESA advances a Congressional policy to "halt and reverse the trend toward species extinction, whatever the cost." *TVA v. Hill,* 437 U.S. at 184, 98 S.Ct. 2279.

70. The public policy underlying NEPA favors protecting the balance between humans and the environment. *See* 42 U.S.C. 4321 (declaring a national policy to "encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; [and] to enrich the understanding of the ecological systems and natural resources important to the Nation....").

71. If both these objectives can be realized by astute management, it is the government's obligation to do so.

[22] 72. It is in the public interest that relief be granted to Plaintiffs, who represent a substantial population of water users in California, to enhance the water supply to reduce the adverse harms of destruction of permanent crops; fallowed lands; increased groundwater consumption; reducing groundwater supplies; land subsidence; reduction of air quality; destruction of family and entity farming businesses; and social disruption and dislocation, such as increased property crimes and intra-family crimes of violence, adverse effects on schools, and increased unemployment leading to hunger and homelessness. This must be done without jeopardizing the species and their critical habitat.

VII. *CONCLUSION*

1. Plaintiffs have succeeded on the merits of their NEPA claim.

a. NEPA requires that the responsible agency take a hard look at the environmental consequences of its actions, *Robertson v. Methow Valley Citizens Council,* 490 U.S. 332, 350 [109 S.Ct. 1835, 104 L.Ed.2d 351] (1989), obligating federal agencies to prepare an environmental impact statement ("EIS") for all "major federal actions significantly affecting the quality of the human environment." 42 U.S.C. 4332(2)(C).

b. Federal Defendants are required to evaluate the impact of the coordinated operations of the CVP and SWP, which constitutes major federal action. The evidence overwhelmingly establishes significant detrimental effects visited on the quality of the human environment by implementation of the BiOp's RPA Actions, which impose substantial restrictions on the water supply to California to protect the delta smelt.

c. Where required, an EIS discloses environmental effects of a proposed action and considers alternative courses of action. *Id.* Here, Federal Defendants completely abdicated their responsibility to consider alternative remedies in formulating RPA Actions that would not only protect the species, but would also ***1070** minimize the adverse impact on humans and the human environment.

d. In considering RPA alternatives, the record shows the burden of other causes is allocated to the water supply, without the required analysis whether alternatives, less harmful to humans and the human environment, exist. Although this allocation of resources ultimately is the prerogative of the agency,

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NEPA nevertheless requires a hard look.

2. Plaintiffs have also shown a likelihood of success on the merits of their ESA claim. Although the premise underlying Component 2-that the species may be jeopardized by increased negative flows occasioned by export pumping-has record support, FWS has failed to adequately justify by generally recognized scientific principles the precise flow prescriptions imposed by Component 2. The exact restrictions imposed, which are inflicting material harm to humans and the human environment, are not supported by the record, making it impossible to determine whether RPA Component 2 overly protective. Judicial deference is not owed to arbitrary, capricious, and scientifically unreasonable agency action.

3. It is highly significant that the co-operator of the Projects, DWR, with access to scientific competence in the fields of fish biology and ecology, and project operations, does not oppose the motion for a preliminary injunction.

4. Under the balance of hardships analysis, Defendants' contention that the ESA, under *TVA v. Hill,* precludes equitable weighing of Plaintiffs' interests is not supported by that case, as evidence of harm to the human environment in the form of social dislocation, unemployment, and other threats to human welfare were not present in *Hill.* They are in this case.

5. Defendants argue that jeopardy to the species cannot be avoided without continuing substantial reduction of pumping, with resultant reduction of water supply to Plaintiffs, representing over 20,000,000 persons, affected communities, and the agricultural industry in Northern, Central, and Southern California.

6. Congress created public expectations in the Amended Reclamation Act by instructing Reclamation to contract for water service to hundreds of public-entity water service providers that supply water to millions of people and thousands of acres of productive agricultural land. The agencies have not fully discharged their responsibility to effectively allocate Project water resources. Federal Defendants have acted arbitrarily and capriciously in formulating Component 2 of the RPA, which lacks factual and scientific justification, while effectively ignoring the irreparable harm that pumping restrictions have inflicted and will inflict on humans and the human environment.

7. The species and its critical habitats are entitled to protection under the ESA. The species has been and will be protected. That is the law. Nonetheless, FWS and Reclamation, as the consulting and action agencies, must take the hard look under NEPA at the severe consequences visited upon Plaintiffs, the water supply of California, the agricultural industry, and the residents and communities impacted by the water supply limitations imposed by the Component 2. Federal Defendants have failed to comprehensively and competently evaluate whether RPA alternatives can be prescribed that will be mutually protective of all the statutory purposes of the Projects.

8. This is a case of first impression. The stakes are high, the harms to the affected human communities great, and the injuries unacceptable if they can be mitigated. FWS and Reclamation have not complied with NEPA. This prevented ***1071** in-depth analysis of the potential RPA Actions through a properly focused study to identify and select alternative remedial measures that minimize jeopardy to affected humans and their communities, as well as protecting the threatened species. No party has suggested that humans and their environment are less deserving of protection than the species. Until Defendant Agencies have complied with the law, some injunctive relief pending NEPA compliance may be appropriate, so long as it will not further jeopardize the species or their habitat.

9. Injunctive relief also may be warranted under the ESA, because, although the general premises underlying Component 2 find some support in the record, the precise flow prescriptions imposed on coordinated project operations are not supported by the best available science and are not explained as the law requires.

10. Injunctive relief cannot be imposed without current evidence of the status of the species to assure that altered operations will not deepen jeopardy to the affected species or otherwise violate other laws. The evidence has not sufficiently focused on remedies to provide a confidence level that Plaintiffs' proposed remedy of a flat -5,600 cfs ceiling on negative OMR flows will not jeopardize the continued existence of the species and/or adversely modify its critical habi-

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tat.

11. Legal and equitable grounds for injunctive relief have otherwise been established by a preponderance of the evidence.

12. RPA component 2 suffers from a lack of population scaling in violation of the requirement FWS use the best available science. There is no reliable life cycle model, which best available science calls for, even if the Court cannot require the agency to develop one. Continuing evidence of the extreme risk to the continued existence of the Delta smelt population has been presented by Defendants. Absent a showing by Plaintiffs that Delta smelt are not within imminent risk of entrainment by Project pumping facilities and/or not within hydraulic influence of the pumps in the danger area of the Central and South Delta, the -5,000 cfs flow restriction cannot be enjoined.

13. A telephonic conference to discuss whether Plaintiffs have evidence that imminence of harm to Delta smelt does not exist to justify injunction of pumping restrictions shall be held May 28, 2010 in Courtroom 3 at 10:00 a.m.

SO ORDERED.

E.D.Cal.,2010.
Consolidated Delta Smelt Cases
717 F.Supp.2d 1021

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APPENDIX DOC. 8

DELTA SMELT CONSOLIDATED CASES; SAN LUIS & DELTA-MENDOTA WATER AUTHORITY, et al. v. SALAZAR, et al. (l:09-cv-00407 OWW DLB); STATE WATER CONTRACTORS v. SALAZAR, et al. (1:09-CV-00480- OWW-GSA); COALITION FOR A SUSTAINABLE DELTA, et al. v. UNITED STATES FISH AND WILDLIFE SERVICE, et al. (l:09-cv-00422-OWW-GSA); METROPOLITAN WATER DISTRICT v. UNITED STATES FISH AND WILDLIFE SERVICE, et al. (1:09-cv-00631- OWW-DLB); STEWART & JASPER ORCHARDS et al. v. UNITED STATES FISH AND WILDLIFE SERVICE (l:09-cv- 00892-OWW-DLB); FAMILY FARM ALLIANCE v. SALAZAR, et al. (1:09-CV-01201- OWW-DLB)

l:09-cv-00407 OWW DLB,1:09-CV-00480-OWW-GSA,1:09-CV-00422-OWW-GSA,1:09-CV-00631-OWW-DLB,1:09-CV-00892-OWW-DLBPARTIALLY CONSOLIDATED WITH:1:09-CV-01201-OWW-DLB

UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF CALIFORNIA

760 F. Supp. 2d 855*; *2010 U.S. Dist. LEXIS 132819*; *41 ELR 20053

December 14, 2010, Decided
December 14, 2010, Filed

SUBSEQUENT HISTORY: Summary judgment granted, in part, summary judgment denied, in part by, Remanded by *Delta Smelt Cases v. Salazar, 2010 U.S. Dist. LEXIS 135805 (E.D. Cal., Dec. 23, 2010)*

PRIOR HISTORY: *Consol. Delta Smelt Cases, 717 F. Supp. 2d 1021, 2010 U.S. Dist. LEXIS 62006 (E.D. Cal., 2010)*

JUDGES: Oliver W. Wanger, United States District Judge.

OPINION BY: Oliver W. Wanger

OPINION

[*860] MEMORANDUM DECISION RE CROSS

MOTIONS FOR SUMMARY JUDGMENT (DOCS. 548, 549, 550, 658, & 661) [*861]

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[*863] I. [**10] INTRODUCTION

These consolidated cases arise out of the continuing war over protection of the delta smelt (*Hypomesus transpacificus*), an ESA-threatened species, and associated impacts to the water supply for more than half of the State of California. Plaintiffs, San Luis & Delta Mendota Water Authority ("SLDMWD") and Westlands Water District, Metropolitan Water District of Southern California, State Water Contractors ("SWC"), Coalition for a Sustainable Delta and Kern County Water Agency, Stewart & Jasper Orchards, Arroyo Farms, LLC, and King Pistacho Grove, and Family Farm Alliance, move for summary judgment on their numerous remaining claims against the United States Fish and Wildlife Service's ("FWS") December 15, 2008 Biological Opinion addressing the impacts of the coordinated operations of the federal Central Valley Project ("CVP") and State Water Project ("SWP") on the threatened delta smelt (*Hypomesus transpacificus*). Doc. 550. Plaintiff-in-Intervention, the California Department of Water Resources ("DWR") filed a separate motion for summary judgment on narrower grounds. Docs. 548 & 549. Federal Defendants, the United States Department of the Interior, FWS, and the United States [**11] Bureau of Reclamation ("Reclamation"), and Defendant Intervenors, Natural Resources Defense Council and The Bay Institute, oppose and cross move for summary judgment on all remaining claims. Docs. 658 & 661. Plaintiffs and DWR replied. Docs. 697 & 695. The motion came on for hearing on July 8 & 9, 2010. After oral argument, the parties submitted supplemental briefing on a limited set of issues. Docs. 746-49.

II. PROCEDURAL HISTORY

FWS's 2005 biological opinion ("2005 Smelt BiOp") found that the proposed coordinated operations of the SWP and CVP will have no adverse effect on the continued existence and recovery of the Delta Smelt and its critical habitat. The 2005 BiOp was remanded to FWS as arbitrary and capricious. Order, *NRDC v. Kempthorne, 506 F. Supp. 2d 322 (E.D. Cal. 2007)*, Doc. 323. Following an extensive evidentiary hearing, the Court issued an interim remedial order and Findings of Fact and Conclusions of Law ("Findings"), which covered, among other things, the effects on delta smelt of negative flows in Old and Middle Rivers ("OMR"), two distributary channels of the San Joaquin River. *See* Interim Remedial Order Following Summary Judgment and Evidentiary Hearing ("Int. Rem. [**12] Order"), *NRDC v. Kempthorne*, Doc. 560 (Dec. 14, 2007); Findings re: Delta Smelt ESA Remand and Reconsultation ("Int. Rem. Findings"), *NRDC v. Kempthorne*, Doc. 561 (Dec. 14, 2007). [1]

1 There is limited merit to Plaintiffs' contention that these prior findings are "not relevant." *See*

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Doc. 551 at 91. These findings are not dispositive, but cannot be ignored, as they are based on extensive scientific testimony subject to cross-examination by many of the Plaintiffs in the present case. The order remanded the 2005 BiOp back to FWS "for further consideration consistent with [the] Court's orders and the requirements of law." Int. Rem. Order at 2 (emphasis added).

Reclamation and DWR were ordered, among other things, to implement a winter "pulse flow" in OMR of no more negative than -2,000 cubic feet per second ("cfs"), and to "operate the CVP and SWP to achieve a daily average net upstream (reverse) flow in the OMR not to exceed 5,000 cfs on a seven-day running average" during a defined period in the spring. Int. [*864] Rem. Order at 5-7; *see also* Int. Rem. Findings at 15-20.

FWS issued a new delta smelt biological opinion on December 15, 2008 ("2008 Smelt BiOp" or "BiOp"). *See* Administrative Record [**13] ("AR") at 00001-00411. [2] This BiOp concluded that proposed CVP and SWP operations are "likely to jeopardize the continued existence of" the delta smelt and "adversely modify" its critical habitat. BiOp at 276-79. The BiOp includes a required Reasonable and Prudent Alternative ("RPA") designed to allow the projects' continued operations without causing jeopardy to the species or adverse modification to its critical habitat. *Id.* at 279-85. The RPA includes operational components designed to reduce entrainment of smelt during critical times of the year by controlling (limiting) water exports from the Delta by the Projects. *Id. at* 279-85.

2 Citations to the 2008 delta smelt BiOp will be to the BiOp's original pagination, not Administrative Record page numbers.

Component 1, to protect of the adult delta smelt life stage, consists of two Actions related to OMR flows.

o Action 1, to protect upmigrating delta smelt, is triggered during low and high entrainment risk periods based on physical and biological monitoring. Action 1 requires OMR flows to be no more negative than -2,000 cfs on a 14-day average and no more negative than -2,500 cfs for a 5-day running average. *Id. at* 280-82, 329-51.

o Action [**14] 2, to protect adult delta smelt that have migrated upstream and are present in the Delta prior to spawning. Action 2 is triggered immediately after Action 1 concludes or if recommended by the Smelt Working Group ("SWG"). Flows under Action 2 can be set within a range from -5,000 to -1,250 cfs, depending on a complex set of biological and environmental parameters. *Id. at* 281-82, 352-56.

Component 2 (Action 3), to protect larval and juvenile delta smelt, requires OMR flows to be kept between -1,250 and -5,000 cfs, after Component 1 is completed, when Delta water temperatures reach 12 Celcius ("C"), or when a spent female smelt is detected in trawls or at salvage [3] facilities. *Id. at* 282, 357-58. Component 2 continues until June 30 or when the Clifton Court Forebay water temperature reaches 25 C. *Id. at* 282, 368.

3 It is undisputed that Project pumping "kills Delta smelt by sucking them directly into the pumps; by drawing them into fish 'salvage' facilities which collect fish diverted from entering the pumps, a process that kills the smelt; and drawing smelt into the SWP's Clifton Court Forebay from which the fish cannot escape and where they will die even if they are not drawn into the [**15] salvage facilities or the pumps." Int. Rem. Findings ¶ 19.

Component 3 (Action 4) , to improve habitat for delta smelt growth and rearing, requires sufficient Delta outflow to maintain average mixing point locations of Delta outflow and estuarine water inflow ("X2"[4]) from September to December, depending on water year type, in accordance with a specifically described "adaptive management process" overseen by FWS. *Id. at* 282-83, 369. [5]

4 X2 is the location in the Delta where the salinity is two parts per thousand, measured as the distance upstream from the Golden Gate. *Consolidated Delta Smelt Cases, 717 F. Supp. 2d 1021, 1029 (E.D. Cal. May 27, 2010)*; BiOp at 149.

5 Action 5, which is not formally associated with any "Component" of the RPA, prohibits FWS from installing the Head of Old River Barrier, a physical barrier designed to reduce the number of out-migrating salmon smolts entering Old River, in the spring if delta smelt entrainment triggers are met. BiOp at 175, 377-78.

[*865] Component 4 (Action 6) (Habitat Restoration), requires DWR to create or restore 8,000 acres of intertidal and subtidal habitat in the Delta and Suisun Marsh within 10 years. *Id. at* 283-84, 379.

Component 5 (Monitoring [**16] and Reporting), requires Reclamation and DWR to gather and report in-

No comments

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formation to ensure proper implementation of the RPA actions, achievement of physical results, and evaluation of the effectiveness of the actions on the targeted life stages of delta smelt, so that the actions can be refined, if needed. *Id. at* 284-85, 328, 375.

The first of the six consolidated challenges to the BiOp was filed on March 3, 2009. Doc. 1. Plaintiffs moved for a preliminary injunction on April 24, 2009 to prevent Reclamation from implementing Component 2 of the RPA, alleging that FWS violated the National Environmental Policy Act ("NEPA") and the ESA. *See* Doc. 31.

On May 22, 2009, the Court granted that motion in part, finding that Plaintiffs were likely to succeed on the merits of their NEPA claim and requiring FWS to make specific written findings to justify OMR flow restrictions. *See* Doc. 84; *see also* Doc. 94, Findings re Mot. for Prelim. Inj. (May 29, 2009). Defendants complied with that Order, submitting weekly notices of FWS's OMR flow decisions. *See, e.g.*, Doc. 111, Notice of OMR Flow Decision (June 11, 2009). The Court's May 2009 preliminary injunction ruling was not based on Plaintiffs' ESA claims. [**17] Doc. 94 at 43.

Plaintiffs amended their Complaint, joined and added claims against Reclamation, *see* Doc. 292, and moved for summary judgment on their NEPA claim, *see* Doc. 245. A November 13, 2009, ruling granted summary adjudication in part, based on Reclamation's failure to prepare an environmental impact statement before provisionally accepting and implementing the BiOp and its RPA Actions. Doc. 399.

Summary judgment for Defendants was granted on: (1) Stewart and Jasper Orchards' *Commerce Clause* claim that the ESA did not apply to protect delta smelt, a purely intra-state species, Doc. 339; and (2) claims that the BiOp violated regulations governing formulation of the RPA by not including required information in the BiOp text, Doc. 354.

Plaintiffs then filed three temporary restraining order motions over a six week period -- all of which were denied. *See* Docs. 555 & 583; *see also* 3/16/10 Hrg. Tr. at 86-88. Plaintiffs next sought a preliminary injunction against implementation of RPA Component 3. An evidentiary hearing was held from April 2, 2010 through April 7, 2010. Docs. 644, 652-54. Findings Re Plaintiffs' Request for Preliminary Injunction issued May 27, 2010 ("PI Decision"). Doc. [**18] 704. The PI Decision confirmed Plaintiffs had succeeded on their NEPA claim and found Plaintiffs were likely to succeed on the merits of their ESA claim:

> Although the premise underlying Component 2 -- that the species may be jeopardized by increased negative flows occasioned by export pumping -- has record support, FWS has failed to adequately justify by generally recognized scientific principles the precise flow prescriptions imposed by Component 2. The exact restrictions imposed, which are inflicting material harm to humans and the human environment, are not supported by the record, making it impossible to determine whether RPA Component 2 [is] overly protective. Judicial deference is not owed to arbitrary, capricious, and scientifically unreasonable agency action.

[*866] *Id.* at 122. Plaintiffs presented evidence under NEPA on the balance of the hardships that social dislocation, unemployment, and other threats to human health and safety were caused by interdiction of Plaintiffs' water supply. *See id.* at 123. Countervailing irreparable harm was found, because "the species and its critical habitat[] are entitled to protection under the ESA." *Id.* at 124. Acknowledging the existence of legal and [**19] equitable grounds for injunctive relief, further evidence was requested on the "status of the species to assure that altered operations will not deepen jeopardy to the affected species or otherwise violate other laws." *Id.* at 125. Specifically, to establish "that Plaintiffs' proposed remedy of a flat -5,600 cfs ceiling on negative OMR flows will not jeopardize the continued existence of the species and/or adversely modify its critical habitat." *Id.*

A May 28, 2010 status conference sought to determine whether a mutually-agreeable interim operational plan could be implemented. Doc. 706. On June 22, 2010, the parties stipulated to a joint operational plan to maintain OMR flows so as not to be more negative than -5,000 cfs, unless certain, defined salvage triggers required a further reduction in OMR flows. Doc. 724.

After these dispositive motions were filed, the National Academy of Sciences, completed a comprehensive review of the BiOp, and concluded that the BiOp and the RPA Actions were "scientifically justified." *See* National Academy of Sciences, National Research Council, A Scientific Assessment of Alternatives for Reducing Water Management Effects on Threatened and Endangered Fishes in California's Bay Delta at 3. [**20] Doc. 635. This post-decisional document is not part of the Administrative Record ("AR") and no legal justification exists to supplement the AR to include it.

Additionally, a scientific peer review panel was convened by the private consulting firm, Post Buckley Shuh and Jernigan ("PBS&J"), at the request of Plaintiff

No comments

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Family Farm Alliance ("FFA") in connection with FFA's administrative petition under the Information Quality Act ("IQA"). *See Family Farm Alliance v. Salazar*, 09-cv-1201 OWW-DLB (E.D. Cal.), Doc. 27, Ex. A. This document is part of the administrative record in the *Family Farm Alliance* IQA case, not the smelt AR. There is no basis to consider this document for non-IQA claims.

III. STATUS OF THE SPECIES

The delta smelt was listed as a threatened species under the ESA on March 5, 1993. *58 Fed. Reg. 12,854 (March 5, 1993)*. Critical habitat was designated for the delta smelt on December 19, 1994. *59 Fed. Reg. 65,256 (Dec. 19, 1994)*. Once an abundant species in the Bay-Delta ecosystem as recently as thirty years ago, the delta smelt is now in imminent danger of extinction. PI Decision, Finding of Fact ¶ 10. All the evidence shows a significant decline in smelt abundance since 2000, [**21] recently up to three orders of magnitude below historic lows. *Id.* The latest fall mid-water trawl ("FMWT") abundance index for the species was 17, the lowest level ever recorded. *Id.*

On April 7, 2010, FWS announced that reclassifying the delta smelt from a threatened to an endangered species was warranted, but precluded by higher priority listing actions. *75 Fed. Reg. 17,667 (Apr. 7, 2010)*. The direct mortality of delta smelt by entrainment at the CVP-SWP pumps, as well as the destruction and adverse modification of its habitat in the Delta caused by water exports, were important factors in this determination. *Id. at 17,669, 17,671* ("The operation of State and Federal export facilities constitute a [*867] significant and ongoing threat to delta smelt through direct mortality by entrainment"). As a result of the "immediate and high magnitude threats" confronting the species, the delta smelt was assigned a listing priority number of 2. [6] *Id. at 17,675*.

6 "Warranted but precluded" species are assigned listing priority-numbers from 1 to 12, with 1 being the highest priority. *Id. at 17,674*.

IV. SUMMARY OF MOTION

A. Plaintiffs' Motion.

Plaintiffs' motion advances the following grounds and contentions:

(1) [**22] FWS failed to rely on the "best available science" by making fundamental scientific errors in its analysis of the impacts of Project Operations on the species by:

(a) Relying on raw salvage numbers in quantitative impact analyses;

(b) Failing to conduct a life cycle analysis;

(c) Comparing the results of two entirely different, incompatible flow and salinity models; and

(d) Selectively excluding certain data for one purpose, but then unjustifiably using it for another;

(2) The BiOp's Project Effects Analysis is arbitrary and capricious because FWS:

(a) Assumed that Project operations drive hydrological conditions in the Delta and did not explain or justify this attribution;

(b) Evaluated the impacts of other (i.e., non-Project) stressors erroneously and inconsistently; and

(c) Improperly characterized summer food supply suppression, invasive species, and pollution and contaminants as indirect effects of Project Operations;

(3) The BiOp is arbitrary and capricious because it does not distinguish between discretionary and nondiscretionary actions, improperly inflating the alleged effects of Project Operations;

(4) The BiOp's RPA is unlawful because FWS did not conduct the specific analyses required [**23] by the ESA and FWS' own RPA regulation, *50 C.F.R. § 402.02*, because neither the BiOp nor the AR demonstrate that FWS analyzed or applied the first three (of four) § 402.02 factors;

No comments

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(5) FWS illegally arrogated to itself Project operating authority in derogation of Reclamation and DWR;

(6) FWS acted arbitrarily and capriciously by disregarding the Information Quality Act ("IQA") when preparing and issuing the BiOp;

(7) FWS violated NEPA by not considering the environmental impacts of issuing the BiOp and RPA.

(8) Reclamation violated its legal duties by accepting FWS' inherently flawed BiOp.

B. DWR's Motion.

DWR's attacks three aspects of the BiOp:

(1) By relying on a comparison of CALSIM II model runs with what the BiOp terms "historic" data (which was actually generated by the Dayflow model), the BiOp's analysis of the effects of the proposed action on smelt habitat does not yield meaningful information and violates the ESA's best available science requirement. This analysis further violates the APA because FWS did not adequately articulate any rational connection [*868] between the facts found based on these comparisons, and its conclusions regarding the Projects' effects on the smelt.

(2) Component [**24] 3 of the RPA, also referred to in the BiOp as Action 4, is intended to mitigate the effects of the proposed action on smelt habitat, by requiring the Projects to maintain X2 in specified locations, depending on the type of water year. The BiOp, however, lacks sufficient explanation as to the basis for the specific prescriptions imposed by this Component, in violation of the APA. Moreover, to the extent that the record reveals that these prescriptions are based, even in part, on the methods used in the effects analysis, they violate the ESA's "best available science" mandate.

(3) The Incidental Take Statement ("ITS") is defective. First, its estimates are based on the average take from water years 2006 through 2008, which predicts the ITS will likely be exceeded in half of all years. Second, FWS erroneously misapplied its own data with the result that the BiOp claims that the ITS was only exceeded in five of the previous sixteen years, rather than accurately stating that it was exceeded in eleven of the sixteen years. Third, the ITS take estimate is based on a data sample that is too small to provide a reasonable prediction of take under the RPA. These defects violate the ESA's "best [**25] available science" requirement, the ESA's ITS requirements, and the APA.

V. STANDARD OF DECISION

Summary judgment is appropriate when the pleadings and the record demonstrate that "there is no genuine dispute as to any material fact and that the moving party is entitled to judgment as a matter of law." *Fed. R. Civ. P. 56(c)*. The claims in this case involve FWS's issuance of a biological opinion, which is a final agency action subject to judicial review under the APA, *5 U.S.C. § 702*. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv., 524 F.3d 917, 925 (9th Cir. 2008)* ("*NWF v. NMFS II*"). A court conducting judicial review under the APA may not resolve factual questions, but instead determines "whether or not as a matter of law the evidence in the administrative record permitted the agency to make the decision it did." *Sierra Club v. Mainella, 459 F. Supp. 2d 76, 90 (D.D.C. 2006)* (quoting *Occidental Eng'g Co. v. INS, 753 F.2d 766, 769 (9th Cir. 1985))*. "[I]n a case involving review of a final agency action under the [APA] ... the standard set forth in *Rule 56(c)* does not apply because of the limited role of a court in reviewing the administrative record." *Id. at 89*. In this context, [**26] summary judgment becomes the "mechanism for deciding, as a matter of law, whether the agency action is supported by the administrative record and otherwise consistent with the APA standard of review." *Id. at 90*.

VI. BASIC LEGAL FRAMEWORK

A. Review under the APA.

Administrative Procedure Act ("APA") invalidation of a biological opinion requires Plaintiffs to prove that FWS's action was "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." *5 U.S.C. § 706(2)(A)*.

No comments

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(1) Record Review.

APA review of a biological opinion is "based upon the evidence contained in the administrative record." *Arizona Cattle Growers' Ass'n v. FWS, 273 F.3d 1229, 1245* [*869] *(9th Cir. 2001)* . Judicial review under the APA must focus on the administrative record already in existence, not some new record made initially in a reviewing court. Parties may not use "post-decision information as a new rationalization either for sustaining or attacking the agency's decision." *Ass'n of Pac. Fisheries v. EPA, 615 F.2d 794, 811-12 (9th Cir. 1980)*. Exceptions to administrative record review for technical information or expert explanation make such evidence admissible only for limited purposes, and those [**27] exceptions are narrowly construed and applied. *Lands Council v. Powell, 395 F.3d 1019, 1030 (9th Cir. 2005)*.

Here, as evidentiary rulings explained, *see, e.g.*, Docs. 387, 392 (10/19/09 Hrg. Tr), 406, 407, 462, 740 (7/8/10 Hrg.), 750, expert testimony has been considered only for explanation of technical terms and complex scientific subject matter beyond the Court's knowledge; and to understand the agency's explanations, or lack thereof, and the parties' arguments.

(2) Deference to Agency Expertise.

A Court must defer to the agency on matters within the agency's expertise, unless the agency completely failed to address some factor, consideration of which was essential to making an informed decision. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv., 422 F.3d 782, 798 (9th Cir. 2005)* ("*NWF v. NMFS I*"). A court "may not substitute its judgment for that of the agency concerning the wisdom or prudence of the agency's action." *River Runners for Wilderness v. Martin, 593 F.3d 1064, 1070 (9th Cir. 2009)*:

> In conducting an APA review, the court must determine whether the agency's decision is "founded on a rational connection between the facts found and the choices made ... and whether [the agency] [**28] has committed a clear error of judgment." *Ariz. Cattle Growers' Ass'n v. U.S. Fish & Wildlife, 273 F.3d 1229, 1243 (9th Cir. 2001)*. "The [agency's] action ... need be only a reasonable, not the best or most reasonable, decision." *Nat'l Wildlife Fed. v. Burford, 871 F.2d 849, 855 (9th Cir. 1989)*.

Id.

Although deferential, judicial review under the APA is designed to "ensure that the agency considered all of the relevant factors and that its decision contained no clear error of judgment." *Arizona v. Thomas, 824 F.2d 745, 748 (9th Cir. 1987)* (internal citations omitted). "The deference accorded an agency's scientific or technical expertise is not unlimited." *Brower v. Evans, 257 F.3d 1058, 1067 (9th Cir. 2001)* (internal citations omitted).

> [An agency's decision is] arbitrary and capricious if [it] has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.

Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mat. Auto. Ins. Co., 463 U.S. 29, 43, 103 S. Ct. 2856, 77 L. Ed. 2d 443 (1983); [**29] *see also Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 416, 91 S. Ct. 814, 28 L. Ed. 2d 136 (1971)* (reviewing court may overturn an agency's action as arbitrary and capricious if the agency failed to consider relevant factors, failed to base its decision on those factors, and/or made a "clear error of judgment"), *overruled on other grounds by Califano v. Sanders, 430 U.S. 99, 105, 97 S. Ct. 980, 51 L. Ed. 2d 192 (1977))*.

More generally, "[u]nder the APA 'the agency must examine the relevant data and articulate a satisfactory explanation [*870] for its action including a rational connection between the facts found and the choice made.'" *Humane Soc. of U.S. v. Locke, 626 F.3d 1040, 2010 U.S. App. LEXIS 24047, 2010 WL 4723195, *5 (9th Cir. 2010)* (quoting *Motor Vehicle Mfrs. Ass'n, 463 U.S. at 43*). "The reviewing court should not attempt itself to make up for an agency's deficiencies: We may not supply a reasoned basis for the agency's action that the agency itself has not given." *Id.*

(3) General Obligations Under the ESA.

ESA Section 7(a)(2) prohibits agency action that is "likely to jeopardize the continued existence" of any endangered or threatened species or "result in the destruction or adverse modification" of its critical habitat. *16 U.S.C. § 1536(a)(2)*.

To "jeopardize [**30] the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the

No comments

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likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." *50 C.F.R. § 402.02*; *see also NWF v. NMFS II, 524 F.3d 917* (rejecting agency interpretation of *50 C.F.R. § 402.02* that in effect limited jeopardy analysis to survival and did not realistically evaluate recovery, thereby avoiding an interpretation that reads the provision "and recovery" entirely out of the text). An action is "jeopardizing" if it keeps recovery "far out of reach," even if the species is able to cling to survival. *NWF v. NMFS II, 524 F.3d at 931*. "[A]n agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm." *Id. at 930*.

To satisfy this obligation, the federal agency undertaking the action (the "action agency") must prepare a "biological assessment" that evaluates the [**31] action's potential impacts on species and species' habitat. *16 U.S.C. § 1536(c)*; *50 C.F.R. § 402.12(a)*. If the proposed action "is likely to adversely affect" a threatened or endangered species or adversely modify its designated critical habitat, the action agency must engage in "formal consultation" with FWS to obtain its biological opinion as to the impacts of the proposed action on the listed species. *See 16 U.S.C. § 1536(a)(2), (b)(3)*; *see also 50 C.F.R. § 402.14(a), (g)*. Once the consultation process has been completed, FWS must give the action agency a written biological opinion "setting forth [FWS's] opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat." *16 U.S.C. § 1536(b)(3)(A)*; *see also 50 C.F.R. § 402.14(h)*.

If FWS determines that jeopardy or destruction or adverse modification of critical habitat is likely, FWS "shall suggest those reasonable and prudent alternatives which [it] believes would not violate subsection (a)(2) of this section and can be taken by the Federal agency or applicant in implementing the agency action." *16 U.S.C. § 1536(b)(3)(A)*. "Following the issuance of [**32] a 'jeopardy' opinion, the agency must either terminate the action, implement the proposed alternative, or seek an exemption from the Cabinet-level Endangered Species Committee pursuant to *16 U.S.C. § 1536(e)*." *Nat'l Ass'n of Home Builders v. Defenders of Wildlife, 551 U.S. 644, 652, 127 S. Ct. 2518, 168 L. Ed. 2d 467 (2008)*.

(4) Best Available Science.

Under the ESA, an agency's actions must be based on "the best scientific [*871] and commercial data available." *16 U.S.C. § 1536(a)(2)*; *50 C.F.R. § 402.14(g)(8)* ("In formulating its Biological Opinion, any reasonable and prudent alternatives, and any reasonable and prudent measures, the Service will use the best scientific and commercial data available....". A failure by the agency to utilize the best available science is arbitrary and capricious. *See Pac. Coast Fed'n of Fishermen's Assns. v. Gutierrez, 606 F. Supp. 2d 1122, 1144 (E.D. Cal. 2008)*.

"The obvious purpose of the [best available science requirement] is to ensure that the ESA not be implemented haphazardly, on the basis of speculation or surmise." *Bennett v. Spear, 520 U.S. 154, 176, 117 S. Ct. 1154, 137 L. Ed. 2d 281 (1997)*.

> While this no doubt serves to advance the ESA's overall goal of species preservation, we think it readily apparent that another objective [**33] [of the best available science requirement] (if not indeed the primary one) is to avoid needless economic dislocation produced by agency officials zealously but unintelligently pursuing their environmental objectives. That economic consequences are an explicit concern of the ESA is evidenced by *§ 1536(h)*, which provides exemption from *§ 1536(a)(2)*'s no-jeopardy mandate where there are no reasonable and prudent alternatives to the agency action and the benefits of the agency action clearly outweigh the benefits of any alternatives. We believe the "best scientific and commercial data" provision is similarly intended, at least in part, to prevent uneconomic (because erroneous) jeopardy determinations.

Id. at 176-77.

A decision about jeopardy must be made based on the best science available at the time of the decision; the agency cannot wait for or promise future studies. *See Ctr. for Biological Diversity v. Rumsfeld, 198 F. Supp. 2d 1139, 1156 (D. Ariz. 2002)*. The "best available science" mandate of the ESA sets a basic standard that "prohibits the [agency] from disregarding available scientific evidence that is in some way better than the evidence [it] relies on." *Am. Wildlands v. Kempthorne, 530 F.3d 991, 998, 382 U.S. App. D.C. 78 (D.C. Cir. 2008)* [**34] (citation omitted).

What constitutes the "best" available science implicates core agency judgment and expertise to which Congress requires the courts to defer; a court should be especially wary of overturning such a determination on review. *Baltimore Gas & Elec. Co. v. Natural Res. Defense*

No comments

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Council, 462 U.S. 87, 103, 103 S. Ct. 2246, 76 L. Ed. 2d 437 (1983) (a court must be "at its most deferential" when an agency is "making predictions within its area of special expertise, at the frontiers of science"). As explained in the *en banc* decision in *Lands Council, 537 F.3d at 993*, courts may not "impose on the agency their own notion of which procedures are best or most likely to further some vague, undefined public good." In particular, an agency's "scientific methodology is owed substantial deference." *Gifford Pinchot Task Force v. U.S. Fish & Wildlife Serv., 378 F.3d 1059, 1066 (9th Cir. 2004)*.

When specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive." *Lands Council, 537 F.3d at 1000* (quoting *Marsh v. Oregon Natural Res. Council, 490 U.S. 360, 378, 109 S. Ct. 1851, 104 L. Ed. 2d 377 (1989))*. Mere [**35] uncertainty, or the fact that evidence may be "weak," is not fatal to an agency decision. *Greenpeace Action v. Franklin, 14 F.3d 1324, 1337 (9th Cir. 1992)* (upholding biological opinion, despite uncertainty about the effectiveness of management [*872] measures, because decision was based on a reasonable evaluation of all available data); *Nat'l Wildlife Fed'n v. Babbitt, 128 F. Supp. 2d 1274, 1300 (E.D. Cal. 2000)* (holding that the "most reasonable" reading of the best scientific data available standard is that it "permits the [FWS] to take action based on imperfect data, so long as the data is the best available"). FWS "must utilize the 'best scientific ... data available,' not the best scientific data possible." *Building Indus. Ass'n v. Norton, 247 F.3d 1241, 1246, 345 U.S. App. D.C. 426 (D.C. Cir. 2001)*, cited with approval in *Kern County Farm Bureau v. Allen, 450 F.3d 1072, 1080-81 (9th Cir. 2006)* ("Absent superior data occasional imperfections do not violate" the ESA best available data standard); *see also Defenders of Wildlife v. Babbitt, 958 F. Supp. 670, 680 (D.D.C. 1997)* (best available science standard does not require "conclusive evidence," only that agency use best science available and not ignore contrary [**36] evidence).

The deference afforded under the best available science standard is not unlimited. For example, *Tucson Herpetological Society v. Salazar, 566 F.3d 870, 879 (9th Cir. 2009)*, held that an agency may not rely on "ambiguous studies as evidence" to support findings made under the ESA. Because the studies did not lead to the conclusion reached by FWS, the Ninth Circuit held that these studies provided inadequate support in the administrative record for the determination made by FWS. *Id.; see also Rock Creek Alliance v. U.S. Fish & Wildlife Service, 390 F. Supp. 2d 993, 1008 (D. Mont. 2005)* (rejecting FWS's reliance on a disputed scientific report, which explicitly stated its analysis was not applicable to the small populations addressed in the challenged opinion). Alternatively, the presumption of agency expertise may be rebutted if the agency's decisions, although based on scientific expertise, are not reasoned, *Greenpeace v. NMFS, 80 F. Supp. 2d 1137, 1147 (W.D. Wash. 2000)*, or if the agency disregards available scientific evidence better than the evidence on which it relies, *Kern County Farm Bureau, 450 F.3d at 1080*.

Courts routinely perform substantive reviews of record evidence [**37] to evaluate the agency's treatment of best available science. The judicial review process is not one of blind acceptance. *See, e.g., Kern County, 450 F.3d at 1078-79* (thoroughly reviewing three post-comment studies and FWS's treatment of those studies to determine whether they "provide[d] the sole, essential support for" or "merely supplemented" the data used to support a listing decision); *Home Builders Ass'n of N. Cal. v. U.S. Fish and Wildlife Serv., 529 F. Supp. 2d 1110, 1120 (N.D. Cal. 2007)* (examining substance of challenge to FWS's determination that certain data should be disregarded); *Trout Unlimited v. Lohn, 645 F. Supp. 2d 929 (D. Or. 2007)* (finding best available science standard had been violated after thorough examination of rationale for NMFS's decision to withdraw its proposal to list Oregon Coast Coho salmon); *Oceana, Inc. v. Evans, 384 F. Supp. 2d 203, 217-18 (D.D.C. 2005)* (carefully considering scientific underpinnings of challenge to FWS's use of a particular model, including post decision evidence presented by an expert to help the court understand the complex model, applying one of several record review exceptions articulated in *Esch v. Yeutter, 876 F.2d 976, 991, 278 U.S. App. D.C. 98 (D.C. Cir. 1989)*, [**38] which are similar to those articulated by the Ninth Circuit).

Courts are not required to defer to an agency conclusion that runs counter to that of other agencies or individuals with specialized expertise in a particular technical area. *See, e.g., Am. Tunaboat Ass'n v. Baldrige, 738 F.2d 1013, 1016-17 (9th Cir. 1984)* (NMFS's decision under the [*873] Marine Mammal Protection Act was not supported by substantial evidence because agency ignored data that was product of "many years' effort by trained research personnel"); *Sierra Club v. U.S. Army Corps of Eng'rs, 701 F.2d 1011, 1030 (2d Cir. 1983)* ("court may properly be skeptical as to whether an EIS's conclusions have a substantial basis in fact if the responsible agency has apparently ignored the conflicting views of other agencies having pertinent experience[]") (internal citations omitted). A court should "reject conclusory assertions of agency 'expertise' where the agency spurns unrebutted expert opinions without itself offering a credible alternative explanation." *N. Spotted Owl v. Ho-*

No comments

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del, 716 F. Supp. 479, 483 (W.D. Wash. 1988) (citing *Am. Tunaboat Ass'n, 738 F.2d at 1016*).

In *Conner v. Burford, 848 F.2d 1441, 1453-54 (9th Cir. 1988)*, the [**39] agency attempted to defend its biological opinions by arguing that there was a lack of sufficient information to perform additional analysis. In rejecting this defense, the Ninth Circuit held that "incomplete information ... does not excuse the failure to comply with the statutory requirement of a comprehensive biological opinion using the best information available," and noted that FWS could have completed more analysis with the information that was available. *Id. at 1454*.

> In light of the ESA requirement that the agencies use the best scientific and commercial data available ... the FWS cannot ignore available biological info or fail to develop projections of ... activities which may indicate potential conflicts between development and the preservation of protected species. We hold that the FWS violated the ESA by failing to use the best information available to prepare comprehensive biological opinions.

Id. (emphasis added).

(5) Best Available Science Standards and the Application of Analytical/Statistical Methodologies.

The above-described standards apply with equal force to the use and interpretation of statistical methodologies. As the D.C. Circuit in *Appalachian Power Co. v. EPA, 135 F.3d 791, 328 U.S. App. D.C. 379 (D.C. Cir. 1998)*, [**40] explained in reviewing a challenge to a decision of the Environmental Protection Agency ("EPA") under the "arbitrary and capricious" standard of review:

> Statistical analysis is perhaps the prime example of those areas of technical wilderness into which judicial expeditions are best limited to ascertaining the lay of the land. Although computer models are "a useful and often essential tool for performing the Herculean labors Congress imposed on EPA in the Clean Air Act," [citation] their scientific nature does not easily lend itself to judicial review. Our consideration of EPA's use of a regression analysis in this case must therefore comport with the deference traditionally given to an agency when reviewing a scientific analysis within its area of expertise without abdicating our duty to ensure that the application of this model was not arbitrary.

Id. at 802.

The model must fit the available data. *See Nat'l Wildlife Fed'n v. EPA, 286 F.3d 554, 565, 351 U.S. App. D.C. 42 (D.C. Cir. 2002)* ("*NWF v. EPA*") (a court will only reject the choice of a model "when the model bears no rational relationship to the characteristics of the data to which it was applied"). For example, *Oceana, 384 F. Supp. at 220*, rejected a [**41] challenge to NMFS's use of a particular analytical model that used data drawn from existing literature, even though experts [*874] "suggested that reliable take limits cannot be established without quantitative data gathered from 'in-water' surveys." Although NMFS conceded "a thorough quantitative analysis based on empirical estimates of population size would be a superior way to analyze the impact [] on [the species]," it was undisputed that "given the paucity of information on sea turtles and the difficulties of using the data that does exist, '[a] different or more complex model [than that used by NMFS] was not available and could not even be constructed.'" *Id.* Likewise, "the fact that a given model has some imperfections does not prevent it from constituting the 'best scientific information available.'" *Oceana v. Evans, 2005 U.S. Dist. LEXIS 3959, 2005 WL 555416, *16-*17 (D.D.C. Mar. 9, 2005)*(citing *16 U.S.C. § 1851(a)(2)*)(approving NMFS's use of a model despite known limitations, where it was the only model available and the agency supplemented its analysis with other sources to address areas where the model was unable to make accurate predictions).

VII. ANALYSIS

A. Challenges to the Effects Analysis & Related Challenges [**42] to the RPA Actions.

(1) Legal Requirements for a Project Effects Analysis.

Under section 7(a)(2) of the ESA and the Joint Consultation Regulations, FWS must "[e]valuate the effects of the action and cumulative effects on the listed species or critical habitat." *50 C.F.R. § 402.14(g)(3)*. FWS must then "[f]ormulate its biological opinion as to whether the action, taken together with cumulative effects, ? is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat." *§ 402.14(g)(4)*. The effects of the action are defined as:

> the direct and indirect effects of an action on the species or critical habitat, to-

No comments

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gether with the effects [*875] of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline.

§ 402.02.

7 Cumulative effects are "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." *50 C.F.R. § 402.02*.

The environmental baseline includes:

the past and present impacts of all Federal, State, or private actions and other [**43] human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

Id. The baseline is described in FWS and NMFS's Joint Consultation Handbook [8] as:

an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem, within the action area. The environmental baseline is a "snapshot" of a species' health at a specified point in time. It does not include the effects of the action under review in the consultation.

Consultation Handbook 4-22.

8 FWS and NMFS issued their final joint Endangered Species Handbook ("Handbook" or "Consultation Handbook") in 1999. *64 Fed. Reg. 31,285 (June 10, 1999)*. The entire Handbook is available at http://www.fws.gov/endangered/esa-library/pdf/esa section7 handbook.pdf.

Once the baseline, the "direct and indirect effects" of the action, and the "effects of other activities that are interrelated or interdependent with that action" are [**44] determined, *50 C.F.R. § 402.02*, FWS then is required to consider whether, in light of the environmental baseline, the effects of the action, taken together with cumulative effects, are likely to jeopardize the continued existence of the listed species, *50 C.F.R. § 402.14(g)*.

[An] agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm.

....[The agency must] appropriately consider the effects of its actions "within the context of other existing human activities that impact the listed species." *ALCOA [v. Administrator, Bonneville Power Admin], 175 F.3d [1156,] 1162 n. 6 [(9th Cir. 1999)]*(citing 50 C.F.R. § 402.02's definition of the environmental baseline). This approach is consistent with our instruction ... that "[t]he proper baseline analysis is not the proportional share of responsibility the federal agency bears for the decline in the species, but what jeopardy might result from the agency's proposed actions in the present and future human and natural contexts." [*PCFFA v. U.S. Bureau of Reclamation], 426 F.3d [1082,] 1093 [(9th Cir. 2005)]*(emphasis [**45] added).

NWF v. NMFS II, 524 F.3d at 930 (emphasis in original).

To jeopardize means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species." *50 C.F.R. § 402.02*. The Consultation Handbook further provides that to "appreciably diminish the value: [means] to considerably reduce the capability of designated [critical habitat]." Consultation Handbook at 4-36. A related case found:

interpretation of "appreciably" to mean any "perceptible" effect would lead to irrational results, making any agency action that had any effects on a listed species a "jeopardizing" action. This is not the law, as such an interpretation conflicts with other provisions of the ESA that permit incidental take of listed species.

No comments

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PCFFA v. Gutierrez, 1:06-cv-00245 OWW GSA, Doc. 367 at 23-24 (citing *16 U.S.C. 1536(b)(4), 1539(a)(1)(B)*).

(2) Best Available Science Challenges to the Effects Analysis and Related Challenges to the Justification Provided for the RPA Actions.

Plaintiffs argue that the project effects analysis is predicated upon scientific errors that render the BiOp and its conclusion that project [**46] operations jeopardize the delta smelt arbitrary, capricious and an abuse of discretion:

> The Project Effects Analysis is the heart of the section 7 consultation process, providing the basis for FWS' jeopardy and adverse modification determinations and for formulating the RPA. In this case, FWS began the Project Effects Analysis of the 2008 Smelt BiOp with a remarkable assumption: "The following analysis assumes that the proposed CVP/SWP operations affect delta smelt throughout the year either directly through entrainment or indirectly through influences on its food supply and habitat suitability." BiOp at 203 (AR 000218.) This assumption plainly violates the "best available science" required by the ESA. The science, including the reports that FWS purports to rely on, shows that OMR flows and entrainment do not have any statistically [*876] significant effect on the delta smelt's population growth rate. Restricting flows has no effect on the delta smelt population's survival--such restrictions are a costly, but meaningless gesture. The same is true for [restrictions designed to control the position of] X2 [in the Fall].

Doc. 551 at 8.

Plaintiffs maintain that the best available science does not [**47] support FWS' "assumption" that "CVP/SWP operations affect delta smelt throughout the year either directly through entrainment or indirectly through influences on its food supply and habitat suitability." BiOp at 203. Plaintiffs maintain that the science demonstrates:

> (a) OMR flows have no statistically significant effect on the delta smelt population growth rate;
>
> (b) With respect to the adult population, only OMR flows more negative than -6,100 cfs will correlate to an increase in entrainment; [9]
>
> (c) The location of Fall X2 does not determine the extent and quality of suitable smelt habitat -- as with OMR flows, Fall X2 has no statistically significant effect on the population growth rate; and,
>
> (d) The CVP/SWP projects do not indirectly govern abiotic and biotic factors in the Delta that affect delta smelt abundance.

Doc. 551 at 11. Plaintiffs also maintain that there is no scientific support for the BiOp's assumption that the Projects control hydrodynamic conditions in the Delta, or for the BiOp's classification of non-Project causes of harm as "indirect effects" of Project Operations. *Id.*

> 9 As this argument was supported exclusively by portions of the declaration of Dr. Richard B. Deriso [**48] that have been stricken, Doc. 750 at ¶ 3, this argument cannot be considered.

a. The BiOp's General Conclusion that Entrainment by Project Operations Adversely Affects Smelt Survival & Recovery is Supported by the Record.

The magnitude of diversions at the CVP and SWP pumping facilities influences flows throughout the Delta, including in the Old and Middle Rivers ("OMR"). BiOp at 160. When the level of diversion at the pumps is high, Old and Middle Rivers may flow backwards (in the opposite direction than they would under natural hydrological conditions) and toward the CVP and SWP natural conditions (called "negative" flows). *Id.* Negative OMR flows draw delta smelt present in the central and south Delta toward the pumps, and high negative flows increase the risk that they will be entrained at the pumps. *Id.* at 163, 253 (Figure E-7)

Unlike larger fish species, entrainment is lethal for weak-swimming delta smelt. *Id.* at 145. Relying on estimates of proportional entrainment presented by Dr. Wim Kimmerer in a 2008 paper entitled "Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta," published in the journal, San [**49] Francisco Estuary & Watershed Science ("Kimmerer

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(2008)"), the BiOp concludes that "[t]otal annual entrainment of the delta smelt population (adults and their progeny combined) ranged from approximately 10 percent to 60 percent per year from 2002-2006." *Id.* at 210. In years when low flows and high exports coincide with a spawning distribution of the delta smelt that includes the San Joaquin River, the loss of larval delta smelt due to entrainment can exceed 50% of the population. *Id.* at 164-65. Such losses do not occur every year, but FWS concluded the effect of these large larval loss events [*877] is "substantial when it does," particularly in light of the fact that the delta smelt is an annual fish. *Id.* at 165. Even one year where its spawning occurs "within the footprint of entrainment by the pumps" can lead to "a [severe] reduction in that year's production." *Id.*

The BiOp's Effects Analysis concludes that Project pumping operations have a "sporadically significant" adverse effect on smelt abundance:

> The population-level effects of delta smelt entrainment vary; delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics. Kimmerer (2008) [**50] estimated that annual entrainment of the delta smelt population (adults and their progeny combined) ranged from approximately 10 percent to 60 percent per year from 2002-2006. Major population declines during the early 1980s (Moyle et al. 1992) and during the recent POD years (Sommer et al. 2007) were both associated with hydrodynamic conditions that greatly increased delta smelt entrainment losses as indexed by numbers of fish salvaged. However, currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out (Bennett 2005; Manly and Chotkowski 2006; Kimmerer 2008).

BiOp at 210 (emphasis added). This passage was based in large part on Kimmerer (2008), which states:

> Delta smelt may suffer substantial losses to export pumping both as pre-spawning adults and as larvae and early juveniles. In contrast to the situation for salmon, pre-salvage mortality has been constrained in the calculations for adult Delta smelt, and its effects eliminated from the calculations for larval/juvenile Delta smelt. Combining the results for both life stages, losses may [**51] be on the order of zero to 40 percent of the population throughout winter and spring. The estimates have large confidence limits, which could be reduced by additional sampling, particularly to estimate 0 in Equation 18. If there is interest in improving these estimates further, some attempts should be made to examine the assumptions not fully tested above, particularly those used in extrapolating larval abundance to hatch dates.

AR 018877.

Plaintiffs argue that the BiOp misinterprets and misapplies Kimmerer's work. Dr. Bryan Manly, Plaintiffs' expert in the fields of biostatistics and population survey design, addressed the BiOp's statement that "delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics." Manly Decl., Doc. 397, at ¶ 7. Manly opines that "[t]his statement is unclear and confusing," and explains:

> If the Service meant only that abundance at a point in time during a single year may vary depending upon entrainment, then Kimmerer's estimates support that statement. But if, as appears more likely, the Service was relying upon Kimmerer's estimates to support a conclusion that entrainment sometimes causes abundance to vary [**52] significantly later in the same year or in following years, then the statement in the BiOp has no scientific basis.

Id. Kimmerer (2008) only estimated percentage losses of delta smelt within single year classes, and did not conclude that such losses reduce population abundance from one year to the next. *Id.* at ¶ 8. In fact, Kimmerer (2008) contains a number of disclaimers, including the caveat that [*878] "export effects" on smelt are small relative to other factors affecting survival:

> Although the upper bound of [the 0-40% loss] range represents a substantial loss, the effect of this loss is complicated by subsequent variability in survival (Figure 17). If this variability is uncorrelated

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with entrainment losses, then these losses will contribute little to the variability in fall abundance index. The simplest way to evaluate this is by regression of fall midwater trawl index on winter-spring export flow, but this relationship is contaminated by the downward step change in abundance in approximately 1981--1982, together with the long-term upward trend in export flow (mainly up to the mid-1970s, see Kimmerer 2004). Including this step in a regression model eliminates the effect of export flow [**53] on the fall midwater trawl index (coefficient = -1.5 ± 2.4, 95% CL, 36 df). It seems unlikely that the downward step change was due to the earlier increase in export flow; furthermore, despite substantial variability in export flow in years since 1982, no effect of export flow on subsequent midwater trawl abundance is evident.

This is not to dismiss the rather large proportional losses of delta smelt that occur in some years; rather, it suggests that these losses have effects that are episodic and that therefore their effects should be calculated rather than inferred from correlative analyses. In the absence of density dependence, using means in Figure 15 with natural mortality, fall abundance should have been reduced by ~ 10% during 1995-2005. This would have an equivalent effect of reducing the summer-fall survival index by 10%. This would have made little difference to fall abundance in the context of the approximately 50-fold variation in summer-fall survival (Figure 17), and would be difficult to detect through correlation.

Although summer-fall survival appears to dominate variability in abundance of delta smelt in fall (Figure 17), this does not imply that control of export effects [**54] would be fruitless, as these effects can be considerable during dry years. Management of delta smelt should incorporate any opportunities that arise to improve habitat or food supply and to reduce any negative impacts of predation or toxic contamination. However, current evidence does not provide a clear path toward improving the status of delta smelt using these factors. Manipulating export flow (and, to some extent, inflow) is the only means to influence [*879] the abundance of delta smelt that is both feasible and supported by the current body of evidence, even though export effects are relatively small. The results presented here can be used to suggest when, and under what conditions, control of export effects would be most helpful.

AR 018878. Kimmerer (2008) concludes that even though correlative analysis revealed "no effect of export flow on subsequent midwater trawl abundance," there is reason to be concerned about episodic effects caused by "large proportional losses of delta smelt that occur in some years." *Id.* As a result, according to Kimmerer (2008), population level effects should be calculated, rather than inferred from correlative analysis. *Id.* After performing such a calculation, [**55] Kimmerer (2008) concluded that entrainment reduced "the summer-fall survival index by ~10%" during 1995-2005. *Id.* Although this 10% figure was small in the context of the 50-fold variation in summer-fall survival, Kimmerer (2008) nonetheless recommended controlling export effects on smelt because "[m]anipulating export flow (and to some extent, inflow) is the only means to influence the abundance of delta smelt that is both feasible and supported by the current body of evidence, even though export effects are relatively small." *Id.* (emphasis added).

Dr. Manly is correct that Kimmerer (2008) does not support the position that entrainment has a "sporadically significant" effect on delta smelt abundance from one year to the next. However, contrary to Dr. Manly's suggestion, the BiOp does not rely on Kimmerer (2008) for this premise. The BiOp qualifies its reliance on Kimmerer (2008), consistent with the narrow scope of Kimmerer's findings:

> The population-level effects of delta smelt entrainment vary; delta smelt entrainment can best be characterized as a sporadically significant influence on population dynamics. Kimmerer (2008) estimated that annual entrainment of the delta smelt population [**56] (adults and their progeny combined) ranged from approximately 10 percent to 60 percent per year from 2002-2006. Major population declines during the early 1980s (Moyle et al. 1992) and during the recent POD years (Sommer et al. 2007) were both associated with hydrodynamic conditions that greatly increased delta smelt entrainment losses as indexed by numbers of fish sal-

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> vaged. However, currently published analyses of long-term associations between delta smelt salvage and subsequent abundance do not support the hypothesis that entrainment is driving population dynamics year in and year out (Bennett 2005; Manly and Chotkowski 2006; Kimmerer 2008).

BiOp at 210 (emphasis added). It was not unreasonable for FWS to rely on Kimmerer (2008) to conclude that salvage events may be "sporadically significant." Plaintiffs' argument that FWS misinterpreted Kimmerer (2008) is unfounded. Kimmerer (2008) explains why, despite the absence of a statistically significant correlation between export pumping and the subsequent year's smelt population (i.e., between export pumping and the population growth rate), the demonstrated "sporadically significant" loss of smelt within year classes could significantly [**57] contribute to the species' jeopardy. FWS reasonably relied on Kimmerer (2008) for this finding.

Applying Kimmerer's estimates of entrainment and other data, the BiOp analyzed the effect Project operations have on the frequency of relatively large loss events. For larval and juvenile delta smelt:

> Kimmerer (2008) proposed a method for estimating the percentage of the larval-juvenile delta smelt population entrained at Banks and Jones each year. These estimates were based on a combination of larval distribution data from the 20-mm survey, estimates of net efficiency in this survey, estimates of larval mortality rates, estimates of spawn timing, particle tracking simulations from DWR's DSM-2 particle tracking model, and estimates of Banks and Jones salvage efficiency for larvae of various sizes. Kimmerer estimated larval-juvenile entrainment for 1995-2005. We used Kimmerer's entrainment estimates to develop multiple regression models to predict the proportion of the larval-juvenile delta smelt population entrained based on a combination of X2 and OMR....

BiOp at 220. The BiOp predicts that "the proposed action will decrease the frequency of years in which estimated entrainment is [less than [**58] or equal to] 15 percent. Thus, over a given span of years, the project as proposed will increase larval-juvenile entrainment relative to 1995-2005 levels. This will have an adverse [*880] effect on delta smelt based on their current low population levels." BiOp at 222.

For adult delta smelt:

> The median OMR flows from the CALSIM II modeled scenarios were more negative than historic OMR flow for all WY types except critically dry years (Figure E-3; see Table E-5b for all differences). Overall, proposed OMR flows are likely to generate increases in population losses compared to historic years (Figure E-5 and Figure E-6). For example, the frequency of years when population losses are less than 10 percent from most modeled studies (except studies 7.0 and 8.0) is less than 24 percent compared to historic estimates that only exceed 10 percent in approximately half of the years.
>
> The most pronounced differences occur during wet years, where median OMR flows are projected to be approximately 400 to 600 percent (-7100 to -3678 cfs) higher than historical wet years (-1032 cfs). Generally, wet years are marked by low salvage and population losses. However, the proposed operations during wet year are predicted [**59] to cause up to a 65 percent increase in smelt salvage and lower probability that population losses will be below 10 percent.
>
> The proposed operation conditions likely to have the greatest impact on delta smelt are those modeled during above normal WYs. The modeled OMR flows for the above normal WYs ranged between -8155 and -6242 cfs, a 33 to 57 percent decrease from the historic median of -5178 cfs. Though the predicted salvage would only be about 15-20 percent higher than historic salvage during these years (Table E-5c), the modeled OMR flows in these years would increase population losses compared to historic years.
>
> In below normal and dry WYs, proposed OMR flows are also modeled to decrease from historic medians. Predicted salvage levels are likely to increase between 2 and 44 percent. More importantly, the modeled median flows from all studies in these WY types range between -

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5747 and -7438 cfs. Modeled OMR flows at these levels are predicted to increase salvage and increase the population losses from historic levels as well.

During critically dry years, the median OMR flows for studies 7.0, 7.1, 8.0, 9.1, 9.4, and 9.5 are less than -5,000 cfs. These studies have predicted salvage [**60] lower than historic salvage and are not likely to generate larger population losses compared to historic years. The models might overestimate salvage during critical dry years when smelt are unlikely to migrate towards the Central Delta due to lack of turbidity or first flush. Thus, the effects of critical dry operations on delta smelt take are probably small and lower than estimated.

In summary, adult entrainment is likely to be higher than it has been in the past under most operating scenarios, resulting in lower potential production of early life history stages in the spring in some years. While the largest predicted effects occur in Wet and Above Normal WYs, there are also likely adverse effects in Below Normal and Dry WYs. Only Critically Dry WYs are generally predicted to have lower entrainment than what has occurred in the recent past.

BiOp at 212-13.

This approach is consistent with Kimmerer (2008). The BiOp does not focus on whether there is a statistically significant correlation between OMR flows and the [*881] population growth rate. [10] Rather, following Kimmerer (2008), the BiOp focuses on predicting the frequency of large salvage events and concluded that Project operations increase [**61] their frequency. It was not arbitrary, capricious, or clear error for FWS to base its jeopardy conclusion in part on these predictions of relative increases in entrainment. *See* BiOp at 276.

10 FWS did rely on a study by Manly and Chotkowski that found a statistically significant correlation between OMR flows and smelt abundance, albeit a small one. *See* BiOp at 159 ("Manly and Chotkowski (2006; IEP 2005) found that monthly or semi-monthly measures of exports or Old and Middle rivers flow had a reliable, statistically significant effect on delta smelt abundance; however, individually they explained a small portion (no more than a few percent) of the variability in the fall abundance index of delta smelt across the entire survey area and time period.").

b. Population Level Analysis/Life-Cycle Modeling.

Plaintiffs maintain the BiOp's failure to employ a life-cycle model ignored the best available science. Doc. 551 at 21-22. Using a quantitative [11] life-cycle model [12] is a recognized (the best) method to evaluate the effects of an action upon a fish population's growth rate. Dr. Richard B. Deriso [13] opined that a population growth rate analysis is the generally accepted method utilized by fisheries [**62] biologists to evaluate the impact of a stressor on a fish species' population. Declaration of Dr. Richard B. Deriso, Doc 401, at ¶ 36; *see also* Declaration of Dr. Ray Hilborn[14], Doc. 393, at ¶¶ 7-16 (agreeing that life-cycle models are the accepted method in population dynamics to evaluate anthropogenic effects on the probability of growth or decline of a species); Declaration of Ken B. Newmanv[15] , Doc. 484, at ¶ 8 (agreeing with "utility of life history models for assessing population level effects of SWP/CVP operations."). Dr. Hilborn explained that a quantitative population dynamics/life cycle model can help distinguish human actions that have a significant impact on population size from those that have little impact on population size, because competition for a resource that is independent of the human activity may cause significant mortality at one stage in the species' life cycle, meaning that human actions that kill fish at that life stage may have little impact on the population level later in the life history. Hilborn Decl., Doc. 393 at ¶ 15.

11 The BiOp used a relatively simple, non-quantitative, conceptual life-cycle model. *See* BiOp at 203. It is undisputed that no quantitative [**63] life cycle model was employed.

12 The experts use the term "population dynamics model," "life history model," and "life cycle model" interchangeably.

13 Dr. Deriso is an expert in the field of quantitative ecology and its application to fisheries management. Deriso Decl., Doc. 396, at ¶¶ 5-10.

14 Dr. Hilborn is an expert in aquatic and fishery sciences. Hilborn Decl., Doc. 393, at ¶ 1.

15 Dr. Newman is an expert in mathematical statistics employed by FWS in Stockton, California.

Federal Defendants knew of the value of life-cycle modeling. At a March 8, 2007 meeting on the OCAP ESA Re-consultation, attended by FWS employees, the importance of using a life cycle model was emphasized and inquiry made about the progress to date. AR 016016 - 016017. During the Delta Smelt Action Evaluation

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Team meeting on August 8, 2008, that Team recognized that population models for delta smelt already had been developed, and that those models were a starting point for quantitative analyses when [*882] combined with appropriate assumptions. AR 011381-011382; *see also* AR 010023, 010027-010029.

There is considerable dispute over whether an appropriate life-cycle model (i.e., one sufficient to perform the types of analyses [**64] that would be helpful in the BiOp) existed at the time the BiOp issued. Dr. Newman declares:

> Despite the utility of life history models and despite the information that the various surveys provide about different life history stages, an adequately realistic quantitative delta smelt life history model that has been fit using fish survey data does not exist. The BiOp did in many places (e.g., pp 146, 184, 203) consider the full life history of delta smelt but considerations were via conceptual models in contrast to quantitative models with parameters estimated from data. Part of the difficulty is that there are currently no off-the-shelf computational programs for fitting such a model to data and one must develop customized, computer intensive software. The need to model the spatial and temporal changes in population abundances and to account for the different sources of uncertainty makes model formulation and fitting complex. In particular, uncertainty in survey data, due to random sampling error and bias, complicates model fitting. Capture probabilities differ between surveys, the probabilities are largely unknown (despite efforts made to estimate them, for example, for FMWT data, see [**65] Newman 2008 (Administrative Record "AR" at 19782-19799)), and capture and fish presence probabilities are thus confounded. Furthermore, given the patchiness and heterogeneity of the spatial and temporal distribution of delta smelt and the relatively low capture probabilities (whatever they might be), the sampling errors associated with survey data can be quite large (Newman 2008 (AR at 19782-19799)). Failure to account for sampling errors may result in biased parameter estimates (including wrongly concluding density dependence; Shenk et al. 1998). *The difficulties are not insurmountable, but concentrated research efforts are required.* I know of three such efforts currently underway and at varying stages of development: (1) an individual-based model with a spatial component by Drs. Wim Kimmerer, San Francisco State University, William Bennett, University of California at Davis, Stephen Monismith, Stanford University, and Kenneth Rose, Louisiana State University; (2) a population-level life history model using information from multiple surveys by Dr. Mark Maunder, Inter American Tropical Tuna Commission; (3) similar to Maunder, a life history model with a spatial component based on multiple [**66] surveys' data has been conceptually sketched by me and others in the NCEAS POD working group. Given sufficient time and appropriate technical resources, including personnel, to focus on model formulation and fitting, these models might be available within a year.

Newman Decl., Doc. 484 at ¶ 5.

All of the experts agreed with Dr. Newman that, at the time the BiOp was issued, there was no "off-the-shelf" life-cycle model to apply to delta smelt. Considerable dispute exists over how long it should have taken FWS to develop a competent model. It is undisputed that basic life-cycle models such as the Ricker model can be applied to fisheries data sets in relatively short order. Deriso Decl., Doc. 605, at ¶ 52. Dr. Deriso opined that FWS had all the data necessary to perform a life-cycle analysis. Deriso Decl., Doc. 401, at ¶ 70. Dr. Hilborn stated that a relatively complex life-cycle model that "follow[s] the size [*883] structure of delta smelt through their life history and fit this into the observed size structure" would "require no more than a few months time to construct, evaluate and use in a biological opinion." Hilborn Decl., Doc. 600 at ¶ 14. Dr. Punt, a 706 Expert with expertise in fish [**67] population dynamics and biostatistics, see Doc. 394 at 2, stated "[i]t is surprising that a population dynamics model was not developed for delta smelt for the BiOp.... The model developed by Bennett could have been extended to more fully account for the biology of delta smelt and fitted to data to assess the population-level effects of impact of the project." Doc. 633-1 at 3.

Federal Defendants' expert, Mr. Feyer disagrees:

> Developing a quantitative population model is a challenging and complex exercise that could not have been completed

No comments

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by USFWS within the timeframe required to issue the 2008 BiOp. The work requires a substantial investment of resources and individuals with very specialized skills. The process to develop, test, peer-review, and apply such models often takes years. For instance ... the development of models for Columbia River salmon ... took no less than three years to complete.

Because of the recognized urgent need for such tools, there are on-going efforts to develop quantitative population models for delta smelt. For instance, Bennett (2005) presented preliminary results from a stage-structured model he is developing to examine tradeoffs among sources of mortality [**68] acting on different cohorts and life stages. *See* AR at 17004-74. The development of this model is part of a broader comprehensive effort by a team of researchers including Dr. Kenneth Rose of Louisiana State University, Dr. Wim Kimmerer of San Francisco State University, Dr. William Bennett of the University of California at Davis, and Dr. Stephen Monismith of Stanford University, who are in the early stages of developing, testing, and applying particle-tracking models, an individual-based model, and a matrix projection model. The development of these particular models is very promising but has also been faced with many challenges. Perhaps the most critical challenge has been a freeze on project funding by the State of California; it is uncertain if the funding will be reinstated. Another example is the work I have been personally involved with at NCEAS. The NCEAS team has used Bayesian changepoint techniques and multivariate autoregressive modeling to identify factors contributing to the decline of delta smelt and other species. The results of this work will be published in two papers in an upcoming issue of the journal Ecological Applications. I am aware of at least two other independent [**69] efforts of modeling the effects of various stressors on delta smelt that are also under development. Unfortunately, none of the work I mention above was available when the 2008 BiOp was being prepared. To my knowledge, no comprehensive quantitative population dynamics model for the delta smelt has been developed, subjected to peer-review, and published.

...[Quantitative population models are grounded in what is known about the biology of a species, and processes that may plausibly affect its abundance.... Although there is a substantial amount of data available on delta smelt, a key problem is that much of the sample data has increasingly contained zero values. These zeros are a reflection of declining population abundance. Such low numbers make it more difficult to acquire more recent information about the factors that drive delta smelt population [*884] dynamics, such as survival probabilities by life history stage, movement patterns and spatial distribution, and fecundity or reproductive success. It is thus becoming increasingly difficult to not only simply estimate such factors, but also increasingly difficult to model how these factors are affected by environmental and anthropogenic processes [**70] such as those considered in the 2008 BiOp. The estimation of delta smelt population size exemplifies this problem. Newman (2008), see AR at 19782-99, recently published a sample design-based procedure for estimating the population abundance of pre-adult and adult delta smelt. However, the resulting estimates of population size were quite imprecise. This was caused, in part, by limitations of the available data to estimating capture probabilities and gear efficiency.

... I agree ... that population dynamics models have been used to evaluate consequences of various stressors on a wide range of species and human impacts. I also agree that there is sufficient data to develop such a model for delta smelt, as demonstrated by the examples I provided above. However, although some are in development, the fact remains that no such model has been fully developed, peer-reviewed and made available for application. Thus, in the absence of such models, I disagree that that the techniques used by USFWS were inconsistent with generally-accepted scientific standards and practices. To the contrary, in the absence of such a model, and because one could not be developed during the time al-

No comments

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lowed for this [**71] consultation, the techniques used by USFWS do reflect generally-accepted scientific standards and practices.

Decl. of Frederick V. Feyrer[16] , Doc. 541, at ¶¶ 30-33. Plaintiffs do not suggest any party that participated in the preparation of the OCAP Biological Assessment ("OCAP BA" or "BA") or commented on the public review drafts of the BiOp during the consultation submitted to FWS a quantitative life cycle model or the results of such an analysis using a life cycle model for delta smelt.

16 Mr. Feyrer is a Reclamation Fish Biologist with an M.S. in biology. He has extensive experience researching and advising on fisheries management issues in the San Francisco Estuary. Feyrer Decl., Doc. 481, at ¶ 1.

The ESA does not require FWS's to generate new studies. In *Southwest Center for Biological Diversity v. Babbitt, 215 F.3d 58, 342 U.S. App. D.C. 58 (D.C. Cir. 2000)*, the district court found "inconclusive" the available evidence regarding FWS's decision not to list the Queen Charlotte goshawk, and held that the agency was obligated to find better data on the species' abundance. The D.C. Circuit reversed, emphasizing that, although "the district court's view has a superficial appeal ... this superficial appeal [**72] cannot circumvent the statute's clear wording: The secretary must make his decision as to whether to list a species as threatened or endangered 'solely on the basis of the best scientific and commercial data available to him....' *16 U.S.C. § 1533(b)(1)(A)*." *Id. at 61* (emphasis added); see *also American Wildlands v. Kempthorne, 530 F.3d 991, 998, 382 U.S. App. D.C. 78 (D.C. Cir. 2008)* (the "best available data" standard "requires not only that the data be attainable, but that researchers in fact have conducted the tests").

Plaintiffs advocate a narrow reading of both Southwest *Center* and *American Wildlands*, arguing these cases only mean that the agency is not required to gather new data in the field regarding a species if such information is not already available. [*885] Doc. 697 at 22. Plaintiffs object that "[n]either of these cases supports Defendants' position that FWS could disregard the smelt abundance data that were already in its possession and fail to undertake the necessary statistical analyses to satisfy its statutory mandate to determine 'whether the action ... is likely to jeopardize the continued existence of the species.' *50 C.F.R. § 402.14(g)(4)*." *Id.*

Plaintiffs cite no authority suggesting that the [**73] non-existence of an analytical model should be treated any differently from the non-existence of raw field data. FWS did not have an off-the-shelf form of "statistical analysis" it could apply to determine the effects of Project Operations on the delta smelt population. Although life-cycle modeling is standard practice in the field of fisheries biology, and a life-cycle model is being (and should have been) developed for delta smelt, it is undisputed that an appropriate life cycle model had not been developed at the time the BiOp issued. FWS must apply the best "available" science; not the best science possible. FWS's failure to apply a life cycle model did not per se violate the ESA or the APA.

It is undisputed that application of a quantitative life cycle model is the preferred scientific methodology. Based on the preponderating expert testimony, FWS had the time and ability to prepare the necessary life-cycle model. FWS made a conscious choice not to use expertise available within the agency to develop one. A court lacks authority to require completion of a life-cycle model. In light of uncontradicted expert testimony that life-cycle modeling is necessary and feasible, FWS's failure [**74] to do so is inexplicable.

c. FWS' Use of Raw Salvage Numbers.

Plaintiffs argue that FWS's use of raw salvage numbers in its quantitative justification for the flow prescriptions in Actions 1 and 2 constitutes a failure to apply the best available science. Action 1, designed to protect upmigrating delta smelt, is triggered during low and high entrainment risk periods based on physical and biological monitoring. Action 1 requires OMR flows to be no more negative than -2,000 cubic feet per second ("cfs") on a 14-day average and no more negative than -2,500 cfs for a 5-day running average. BiOp at 280-81, 329-30. Action 2, designed to protect adult delta smelt that have migrated upstream and are residing in the Delta prior to spawning, is triggered immediately after Action 1 ends or if recommended by the Smelt Working Group ("SWG"). Flows under Action 2 can be set within a range from -5,000 to -1,250 cfs, depending on a complex set of biological and environmental parameters. *Id. at* 281-82, 352-56.

The BiOp provides a quantitative justification for these specific flow prescriptions in Attachment B, entitled "Supplemental Information related to the Reasonable and Prudent Alternative." The following [**75] subsection entitled, "Justification for Flow Prescriptions in Action 1," is critical to the present challenge and is reproduced here in its entirety:

Justification for Flow Prescriptions in Action 1 Understanding the relationship between OMR flows and delta smelt sal-

No comments

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vage allows a determination of what flows will result in salvage. The OMR-Salvage analysis herein was initiated using the relationship between December to March OMR flow and salvage provided by P. Smith and provided as Figure B-13, below. Visual review of the relationship expressed in Figure B-13 indicates what appears to be a "break" in the dataset at approximately -5,000 OMR; however, the curvilinear fit to the data suggest that the break is not real and [*886] that the slope of the curve had already begun to increase by the time that OMR flows reached -5,000 cfs.

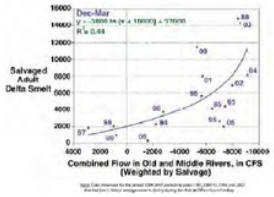

Figure B-13. OMR-Salvage relationship for adult delta smelt. (source, P. Smith). Data from this figure were the raw data used in the pieceivise polynomial regression analysis.

Further, a nonlinear regression was performed on the dataset, and the resulting pseudo-R2 value was 0.44--suggesting [**76] that although the curvilinear fit is a reasonable description of the data, other functional relationships also may be appropriate for describing the data. Fitting a different function to the data could also determine the location where salvage increased, i.e. identify the "break point" in the relationship between salvage and OMR flows. Consequently, an analysis was performed to determine if the apparent break at -5,000 cfs OMR was real. A piecewise polynomial regression, sometimes referred to as a multiphase model, was used to establish the change (break) point in the dataset.

A piecewise polynomial regression analysis with a linear-linear fit was performed using data from 1985 to 2006. The linear-linear fit was selected because it was the analysis that required the fewest parameters to be estimated relative to the amount of variation in the salvage data. Piecewise polynomial regressions were performed using Number Cruncher Statistical Systems (© Hintz, 1, NCSS and PASS, Number Cruncher Statistical Systems, Kaysville UT).

The piecewise polynomial regression analysis resulted in a change point of-1162, i.e. at -1162 cfs OMR, the slope changed from 0 to positive (Figure B-14). These results [**77] indicate that there is a relatively constant amount of salvage at all flows more positive than -1162 cfs [*887] but that at flows more negative than -1162, salvage increases. The pseudo-R2 value was 0.42, a value similar to that obtained by P. Smith in the original analysis.

To verify that there was no natural break at any other point, the analysis was performed using a linear-linear-linear fit (fitting two change points). The linear-linear-linear fit resulted in two change points, -1,500 cfs OMR and -2,930 cfs OMR. The -1,500 cfs value is again the location in the dataset at which the slope changes from 0 to positive. The pseudo-R2 value is 0.42 indicating that this relationship is not a better description of the data. Because of the additional parameters estimated for the model, it was determined that the linear-linear-linear fit was not the best function to fit the data, and it was rejected. No formal AIC analysis was performed because of the obvious outcome.

A major assumption of this analysis is that as the population of Delta smelt declined, the number offish at risk of entrainment remained constant. If the number offish in the vicinity of the pumps declined, fewer fish would be entrained [**78] and more negative OMR flows would result in lower salvage. This situation would result in an overestimate, i.e. the change point would be more positive. In fact, if the residuals are examined for the relationship in Figure B-13 above, the salvage for the POD years 2002, 2004, 2005, and 2006 are all below the line. 2003 is above the line although the line is not extended to the points at the top of the figure, and these data points occur when

No comments

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the curve becomes almost vertical. The negative residuals could be a result of a smaller population size available for entrainment and salvage. This could be verified by normalizing the salvage data by the estimated population size based on the FMWT data.

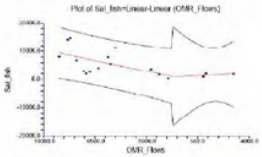

Figure B-14. Piecewise polynomial regression of OMR flows and salvage. The change point is the location at which the two regression lines meet; -1,162 cfs OMR.

The original values of OMR and salvage could have been measured with error due to a number of causes, consequently the values used in the original piecewise [*888] polynomial analysis could be slightly different than the "true" values of salvage and OMR flow. Consequently, a second analysis [**79] was undertaken to examine the effect of adding stochastic variation to the OMR and salvage values in the piecewise polynomial regression analysis. The correlation between OMR and salvage in the original dataset was -0.61 indicating that the more negative the OMR, the greater the salvage. Consequently, it was necessary to maintain the original covariance structure of the data when adding the error terms and performing the regressions. The original covariance structure of the OMR--salvage data was maintained by adding a random error term to both parameters. The random error term was added to OMR and a correlated error term was added to salvage. The expected value of the correlated errors was -0.61.

The error terms were selected from a normal distribution with a mean of 1.0 and a standard deviation of 0.25 which provided reasonable variability in the original data. Operationally this process generated a normal distribution of OMR and salvage values in which the mean of the distributions were the original data points. Additional analyses were performed with standard deviations of 0.075, 0.025, and 0.125. Smaller standard deviations in the error term resulted in estimates of the change point [**80] nearer to the original estimate of-1,162 cfs. This is to be expected as the narrower the distribution of error terms, the more likely the randomly selected values would be close to the mean of the distribution. The process was repeated one hundred times, each time a new dataset was generated and a new piecewise polynomial regression was performed. The software package @Risk (© Palisade Decision Tools) was used to perform the Monte Carlo simulations. Latin hypercube sampling was used to insure that the distributions of OMR and salvage values were sampled from across their full distributions. The parameter of interest in the simulations was the change point, the value of the OMR flow at which the amount of salvage began to increase. Incorporating uncertainty into the analysis moved the change point to -1,800 cfs OMR, indicating that at flows above -1683, the baseline level of salvage occurred but with flows more negative than -1683, salvage increased.

BiOp 347-51 (emphasis added).

The analyses contained in Figures B-13 and B-14 serve, *inter alia*, as justification for Action 1: setting "break points" above and below which entrainment rates noticeably change. These break points are the foundation [**81] for the tiered flow restrictions in RPA Action 1. Cay Collette Goude [17] stated in her expert declaration that the analysis conducted by Dr. Michael Johnson, set forth in Figure B-13, found inflection points where entrainment started to increase with more negative OMR flows, and that the inflection point "was -1,800 cfs OMR when uncertainty was factored into the analysis." Doc. 470, at ¶ 22. The BiOp does not explain in the "Justification for Flow Prescriptions in Action 1" or elsewhere how or why this -1,800 cfs figure relates to the -2,000 cfs upper limit imposed by Action 1. [18]

17 Ms. Goude is the Assistant. Field Supervisor for the Endangered Species Program in the Sacramento Fish and Wildlife Office, U.S. Fish and Wildlife Service. Goude Decl., Doc. 470, at ¶ 1.

No comments

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18 In explaining actions designed to protect juvenile smelt, Ms. Goude makes reference to another portion of Appendix B, which sets forth the justification for Action 3's restrictions to protect larval smelt. There, the BiOp states that "entrainment risk grows exponentially at OMR flows increasingly more negative than -2,000 cfs." BiOp at 381 (cited in Goude Decl. at ¶ 24). This conclusion appears to be based upon computer [**82] modeling using the Particle Tracking Method ("PTM"). The BiOp does not state that PTM modeling was used to formulate the flow prescriptions imposed by Action 1.

[*889] Action 2 calls for flows to be set within a range from -5,000 to -1,250 cfs, depending on a complex set of biological and environmental parameters. BiOp at 281-82, 352-56. Although Appendix B describes and justifies Action 2 separately from Action 1, there is no independent section justifying the flow prescriptions imposed by Action 2. Instead, there is a subsection entitled "Justification for Guidelines in Setting Prescriptions of Action 2" which fixes biological and environmental parameters the SWG is to use in setting flows within the -5,000 cfs to -1,250 cfs range. *See* BiOp at 355. There is no independent quantitative or qualitative justification for the upper and lower limits of that range. In fact, the "Justification for Guidelines in Setting Prescriptions of Action 2" section contains the following statement:

> Flow requirements defined within Action 2 follow the same protectiveness criterion established during Action 1, as adjusted to reflect real-time conditions and predicted entrainment risk relative to the anticipated [**83] distribution and abundance of year-class delta smelt; and reflecting their behavioral propensity to hold in their chosen spawning habitat. These are allowed to vary based upon assessment of available data as described in the adaptive process described in the Introductions to Actions section above.

BiOp at 356.

Plaintiffs complain that the "Justification for Flow Prescriptions in Action 1" section does not represent the best available science because it is based upon analyses of gross (or "raw") salvage (i.e. the absolute number of fish salvaged over a given time period). The use of raw salvage data, as opposed to salvage data scaled to population size, is problematic because raw salvage figures do not account for the size (or relative size) of the smelt population. Deriso Decl., Doc. 401, at ¶ 28. The BiOp admits as much, and concedes that the analysis assumes that "as the population of Delta smelt declined, the number of fish at risk of entrainment remained constant." BiOp at 349. Considering raw salvage numbers alone provides no means of distinguishing an event in which 10,000 fish are salvaged out of a population of 20,000 from an event in which 10,000 fish are salvaged from a population [**84] of 20 million. Deriso Decl., Doc. 401, ¶ 28.

There is widespread agreement among the scientific experts that the use of normalized salvage data rather than gross salvage data is the standard accepted scientific methodology among professionals in the fields of fisheries biology/management. Doc. 633-1 at 7, 10 (the 706 experts concluded that, although it is not inherently unreasonable to consider the analysis in Figure B-13, it would be unreasonable to rely on that analysis as the only basis for imposing flow restrictions); Deriso Decl., Doc. 401 at ¶¶ 51-56 (FWS's reliance on Figure B-13 to conclude that as negative OMR flows increase, more adults are salvaged is "scientifically flawed because raw salvage numbers do not have a directly proportional effect on population and do not take into account the overall size of the population...."); Newman Decl., Doc. 484 at ¶ 11 (concurring with Dr. Deriso's "general notion of scaling salvage by some measure of population size.").

[*890] FWS was aware that raw salvage data posed this obvious problem. The BiOp itself recognized the necessity of normalizing raw salvage data:

> To provide context to determine the magnitude of effect of pre-spawning adult direct [**85] mortality through entrainment within any given season (as measured by salvage), it is necessary to consider two important factors ¶ The second factor to consider when relating salvage to population-level significance is that the total number salvaged at the facilities does not necessarily indicate a negative impact on the overall delta smelt population.

BiOp at 338. The August 26, 2008, draft meeting notes of FWS's Delta Smelt Action Evaluation Team state:

> When analyzing the importance of entrainment to the species population structure or decline, the relevant fact to consider is the percentage of the population being removed via entrainment. Salvage data, by itself, may not be sufficient to

No comments

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> help one understand the percentage of the population being removed via entrainment.

AR 010023. The Independent Peer Review of FWS's draft Effects Analysis for the BiOp also recommended to FWS that it "normalize[]" salvage to population size:

> The panel suggests that the use of predicted salvage of adult smelt should be normalized for population size. Total number salvaged is influenced by a variety of factors, particularly the number of fish in the population.... Expressing salvage as a normalized index [**86] may help remove some of the confounding of the temporal trends during the baseline.

AR 008818. FWS used normalized salvage data in other parts of the BiOp, including the calculation of the Incidental Take Limit, evidencing its ability to do so. *See* Deriso Decl., Doc. 401, at ¶ 55 (citing BiOp at 386).

FWS nowhere explains its decision in the BiOp to use gross salvage numbers in Figures B-13 and B-14, and does not explain why it selectively used normalized salvage data in some parts of the BiOp but not in others. *See* Doc. 633-1 at 10 (Dr. Thomas Quinn, a 706 Expert with expertise in fisheries biology, estuarine ecology, and fish migration and movement, *see* Doc. 394 at 2, stated: "it is not clear why such an adjustment [of salvage to population size] was not made for the data examined in this report."). This was arbitrary, capricious, and represents a failure to utilize the best available science in light of universal recognition that salvage data must be normalized. This significant error must be corrected on remand.

(1) Federal Defendants' Argument that the Flow Prescriptions in Actions 1 and 2 are Otherwise Justified.

Federal Defendants argue that the specific flow prescriptions in Actions [**87] 1 and 2 are supported by more than just Figures B-13 and B-14. By portraying a negative as a positive, Federal Defendants point out that nothing in the BiOp suggests Figures B-13 and B-14 are in fact being used to draw conclusions about what is happening to the delta smelt population as a whole. Doc. 660 at 32. The BiOp concedes that "when relating salvage data to population-level significance [ ] the total number salvaged at the facilities does not necessarily indicate a negative impact upon the overall delta smelt population." BiOp at 338. Instead, Federal Defendants suggest that the raw salvage numbers are used in "tandem" with other population-based analyses. Other sections of the BiOp demonstrate that salvage by the Project pumping facilities can have a "sporadically significant" effect on the delta smelt population.

[*891] However, Federal Defendants concede that neither the research supporting the "sporadically significant" finding nor any related discussion in the BiOp generate the kind of "operational metric... needed so that Project pumping can be managed to prevent the entrainment numbers that these other population analyses deem necessary for avoiding population level effects." [**88] Doc. 660 at 32-33. Federal Defendants argue that the raw salvage analyses contained in Figures B-13 and B-14 are used solely to generate these "operational metrics":

> That is where raw salvage comes in -- it works in tandem with these other population-based analyses, which Plaintiffs disregard. Specifically, Figures B-13 and B-14 are included to illustrate that the Projects quickly lose the ability to manage entrainment and salvage risk once OMR flows become more negative than -5000 cfs. This is the level at which it is believed that entrainment losses or the take level can be effectively managed. *See* BiOp at 366 (explaining that the function of the OMR flow targets is to manage entrainment risk).

Id. at 33. This argument does absolutely nothing to overcome the fact that the use of raw salvage in the analyses depicted in figures B-13 and B-14 is scientifically unacceptable. Those figures cannot accurately depict when the Projects "lose the ability to manage entrainment and salvage risk," because they do not scale salvage to population size. These figures do not take into account the possibility that one data point used to generate the curves depicted may have been collected in a year when [**89] the delta smelt population was 1,000,000, making it more likely that larger numbers of smelt would be present near the pumps to be salvaged, while another data point might have been collected during a year in which the population was 10,000, making it inherently less likely that large numbers of smelt would be found in salvage. The present record suggests that such metrics are meaningless as management tools. They cannot be used to set specific flow prescriptions. FWS was offered the opportunity to, but has not justified its approach.

At the same time, Federal Defendants contend that at least some of the "break points" reflected in the specific flow prescriptions of Components 1 and 2 are based

No comments

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on information unrelated to Figures B-13 and B-14. For example, in the justification for Action 3, which is designed to protect larval & juvenile smelt, the BiOp relies upon Particle Tracking Model ("PTM") results to explore the likelihood of entrainment of particles in the south Delta (used to represent that portion of the smelt population located in the south Delta) that would likely be entrained at various levels of negative OMR flow. This is referenced as "entrainment risk":

> The most efficient [**90] protective measure for protecting the resilience and not precluding the recovery of the delta smelt population specific to the larval/juvenile lifestage is to prevent entrainment of fish in as large a portion of the Central Delta as is practical. Results of PTM modeling focusing on protections at station 815 (Prisoner's Point) indicates that precluding entrainment of larval/juvenile delta smelt at this station would also protect fish at station 812 (Fisherman's Cut) and other stations north and west (downstream) of station 815. While the target entrainment at station 815 would ideally also be zero, there appears to be little additional entrainment protection (less than 5 percent) at OMR flows at -750 cfs (the strictest level addressed by Interim Remedies). However, entrainment risk grows exponentially at OMR flows increasingly more negative than -2000 cfs.
>
> [*892] Figure B-16 displays injection points for modeled particle tracking runs that were conducted in February 2008 with injection points at Stations 711, 809, 812, 815, 902, 915. This figure plots projected relationships for OMR flows by injection point, including entrainment probabilities for station 815 (over 30 days).
>
> The results from [**91] these runs indicate an approximate <5 percent entrainment risk at OMR flow not more negative than -2000 cfs. At a requirement of -3,500 cfs OMR flow, entrainment risk at station 815 is roughly 20 percent over each 30 day interval. Assuming cumulative entrainment is additive, over a roughly four month (~120 days) interval in which Action 3 would be under effect, consistently operating at -3,500 OMR would yield a net entrainment probability placing at risk approximately 80 percent of the larval/juvenile subpopulation utilizing the South Delta at and below Station 815. If immigration of larval smelt from the Central or North Delta into the zone of entrainment during spring were to occur, the population-level risk would be even greater. Such entrainment levels are potentially a significant adverse risk to delta smelt population.

BiOp at 366-68.

Although it seems logical that the PTM results and the "entrainment risk" PTM attempts to estimate have some applicability to the protection of adult smelt, the BiOp does not rely upon these results to justify Actions 1 or 2. *NWF v. NMFS II, 524 F.3d at 932, n.10* (a court "may not consider [a] post hoc justification, or infer 'an analysis that is [**92] not shown in the record.'")(quoting *Gifford Pinchot Task Force, 378 F.3d at 1074*, and citing *PCFFA v. U.S. Bureau of Reclamation, 426 F.3d 1082, 1091 (9th Cir. 2005)* ("[W]e cannot infer an agency's reasoning from mere silence," and "an agency's action must be upheld, if at all, on the basis articulated by the agency.")).

Federal Defendants also point out that Action 1 is based on "the historical observation that the first 'winter flush' moves delta smelt into portions of the delta where they are particularly vulnerable to entrainment, for biological and hydrological reasons that are well documented." Doc. 660 at 23 (citing BiOp at 333-36). Federal Defendants argue:

> As the multiple sources of information relied upon by the BiOp on this point demonstrate, pumping reductions during these critical vulnerability periods will demonstrably reduce entrainment and entrainment risk. *See id.* According to the BiOp, the piece-wise regression set forth in Figure B-14 of the BiOp was used to provide some indication of what level of exports would reduce entrainment during these first flush events, and not, as Plaintiffs assert, to analyze the impacts of salvage relative to the population. *See* BiOp at 350.

Doc. [**93] 660 at 23. The BiOp arguably supports the assertion that a "winter flush" can move smelt into areas of the delta where they are particularly vulnerable.

No comments

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See BiOp at 331. However, nothing in the discussion of the timing, characteristics, or indicators of the winter flush explains why -5,000 cfs was set as the ceiling on negative OMR flows, rather than some other figure. That justification appears to come exclusively from Figures B-13 and B-14, which rely upon the flawed analyses of raw salvage.

Finally, Federal Defendants attempt to justify the use of raw salvage numbers in calculating the -5,000 cfs ceiling by a convoluted argument that Kimmerer's work proves raw salvage trends generally follow population trends. Kimmerer's work did [*893] evaluate the population-level effects of project operations. The BiOp explains:

> This effects analysis evaluates the proposed action operations by exploring long-term trends in Delta outflow, or X2, and OMR flows during March-June and comparing these to hydrodynamic conditions expected based on CALSIM II modeling presented in the biological assessment. The analysis uses the larval-juvenile entrainment estimates provided by Kimmerer (2008) and flow and export [**94] projections from the biological assessment to estimate the annual percentages of the larval/juvenile delta smelt population expected to be entrained . . . .
>
> Kimmerer (2008) proposed a method for estimating the percentage of the larval-juvenile delta smelt population entrained at Banks and Jones each year. These estimates were based on a combination of larval distribution data from the 20-mm survey, estimates of net efficiency in this survey, estimates of larval mortality rates, estimates of spawn timing, particle tracking simulations from DWR's DSM-2 particle tracking model, and estimates of Banks and Jones salvage efficiency for larvae of various sizes. Kimmerer estimated larval-juvenile entrainment for 1995-2005. We used Kimmerer's entrainment estimates to develop multiple regression models to predict the proportion of the larval/juvenile delta smelt population entrained based on a combination of X2 and OMR.

BiOp at 219-220 (emphasis added). The BiOp used a similar approach for adult delta smelt:

> Kimmerer (2008) calculated that entrainment losses of adult delta smelt in the winter removed 1 to 50 percent of the estimated population and were proportional to OMR flow, though the high [**95] entrainment case might overstate actual entrainment. Given there are demonstrated relationships between smelt entrainment and salvage with OMR flows (Kimmerer 2008; Grimaldo et al. accepted manuscript), this effects analysis evaluates the proposed action operations by comparing the long-term trends in OMR flows to OMR flows in the CALSIM II modeling presented in the biological assessment. For both approaches, predictions of salvage and total entrainment losses were made using OMR flow since it was the best explanatory variable of each. The effects of proposed operations were determined by comparing actual salvage and entrainment losses with predictions of these parameters under modeled OMR flows.

BiOp at 211 (emphasis added). Kimmerer did calculate proportional population-level losses for both adults and juveniles. *See id.; see also* BiOp at 212, 250-252, 262 (presenting model simulation results in Figures E4-E6 and E16 which estimate proportional population losses based on entrainment). It is undisputed, however, that Kimmerer did not generate any operational metrics or attempt to calculate the point above or below which OMR flows would have particular effects on the smelt population. [**96] As a result, there was no basis to rely on Kimmerer's work alone to justify the specific OMR flows imposed by Actions 1 and 2. Federal Defendants point to a section of the BiOp's Effect's Analysis that concludes that because "over a given span of years, the project as proposed will increase larval/juvenile entrainment relative to 1995-2005 levels," "[t]his will have an adverse effect on delta smelt based on their current low population levels." BiOp at 222. However, this conclusion references Figure E-18, which attempts to estimate the likelihood of having an event that would entrain a significant proportion of the smelt population, thereby evaluating the effect of particular circumstances [*894] on the smelt population. *See* BiOp at 264. This language provides no support for Federal Defendants' assertion that the BiOp connects population level effects to raw salvage figures.

Federal Defendants assert "Kimmerer (2008), like the BiOp, concluded that once raw entrainment numbers

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approach a certain level, population-level effects will occur." Doc. 660 at 25 (citing BiOp at 159, 164-65, 210; AR at 18854-18880). Federal Defendants describe this as the "Kimmerer Approach," and argue:

> The Kimmerer [**97] (2008) study shows that salvage trends generally follow population loss trends. *See* BiOp at 206-207; *see also* AR at 18854-18880. Salvage data is then used to ascertain the pumping level at which entrainment risk can no longer be managed to a level that prevents harm to the population as a whole. *See* BiOp at 338. Using the Kimmerer approach, by managing salvage, the BiOp manages population-level losses.

Doc. 660 at 25. This description is not supported by the record. The BiOp does not rely upon Kimmerer (2008) or any other source to conclude that salvage trends generally follow population loss trends. This is FWS's invention to support its arbitrary flow limit.

FWS nowhere explains in the BiOp or the AR how the sporadically significant population-level effects identified in Kimmerer (2008) factored into the quantitative analysis that led to the -5,000 cfs OMR flow limit imposed in RPA Action 2. Nowhere does the BiOp or the record explain how the analysis in Fig. B-13 "works in tandem" with the purported numeric results of Kimmerer (2008), and nowhere does the BiOp or the record state that Fig. B-13 was intended to create an "operational metric" to manage pumping to avoid "certain raw [**98] entrainment numbers." This is an abdication of the duty to satisfy the basic APA requirement that the agency "articulate[] a rational connection between the facts found and the choice made." *Ariz. Cattle Growers' Ass'n, 273 F.3d at 1236.*

Federal Defendants argue that, even if FWS had used a scaled salvage index to calculate the OMR flow ceiling, the results would not have been appreciably different. For the purposes of demonstrating the difference between the analysis presented in the BiOp and a population-normalized analysis, Dr. Deriso analyzed the relationship between normalized salvage and OMR flows. He initially concluded that there is "no statistically significant relationship between OMR flows and adult salvage for flows less negative than -6,100 [cfs] at the very least." Deriso Decl., Doc. 401 at ¶¶ 62-65. [19] Federal Defendants' expert criticized Dr. Deriso's alternative analysis in a number of ways, including that Dr. Deriso failed to correct for potentially large sampling errors. Newman Decl., Doc. 484, at ¶ 12. Dr. Newman ran his own analysis, applying a different standard statistical methodology to the same data used by Dr. Deriso, and got different results regarding the [**99] "inflection point" where OMR flows had an increasing impact on the population-normalized salvage rate. *Id.* & Ex. C (identifying inflection point at -4,000 cfs, which is within the OMR flow target [*895] ranges established in the BiOp). Ultimately, however, Dr. Newman agreed that an analysis utilizing raw salvage numbers (i.e., not adjusted for relative population size) is scientifically inappropriate. *Id.* at ¶ 11. That other researchers were able to produce generally consistent inflection points through the use of more appropriate statistical methodologies does not excuse FWS's failure to do so. The difference between a -6,100 cfs ceiling and a -4,000 cfs ceiling is very substantial in the amount of lost annual water supply, with resulting adverse effects on human welfare and the human environment. FWS was required to perform an accurate scientific analysis and justify its ultimate decision regarding the imposition of a water flow ceiling. [20]

> 19 Dr Deriso testified: "specifying that the ceiling on [OMR] flows should have been set at no lower than negative 6100 cfs" was stricken as post hoc extra record evidence. However, no party moved to strike Dr. Newman's similar, post hoc analysis. Dr. [**100] Deriso's analysis is considered here only as a counterpoint to Dr. Newman's, not to prove the validity of -6,100 as the appropriate ceiling.
>
> 20 Federal Defendants point out that the BiOp also relied on the 2006 Manly and Chotkowski study, which found a statistically significant relationship between exports and smelt abundance as measured by Fall Midwater Trawl ("FMWT") catches, *see* AR 019672 (cited in BiOp at 156), as well as the Interagency Ecological Program's 2007 Synthesis Report on the Pelagic Organism Decline Team, which stated that "... entrainment of adults and larvae (top-down effects) are particularly important to the delta smelt population...." AR 016922 (emphasis added); *see also* Goude Decl., Doc. 470, at ¶¶ 6-7. However, none of these studies correlate raw salvage to population-level losses, nor do they otherwise justify the imposition of the particular flow regime the BiOp imposes.

(2) Use of Raw Salvage Analyses in Justification for Action 3.

Action 3, which is designed to "[m]inimize the number of larval delta smelt entrained at the facilities by managing the hydrodynamics in the Central Delta...," limits net daily OMR flow to no more negative than -1,250 to -5,000 cfs, [**101] based on a 14-day running average with a simultaneous 5-day running average

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within 25 percent of the applicable requirement for OMR. BiOp at 357. Action 3 establishes guidelines the SWG is to use when recommending where to set the OMR flow level within this range. *Id.* The BiOp anticipates that during most conditions, OMR flows will range between -2,000 and -3,500 cfs. *Id.* at n. 10. During certain years of higher or lower predicted "entrainment risk," flows as low as -1,250 or as high as -5,000 may be recommended. *Id.*

Plaintiffs do not challenge the basis for the low end of the range (-1,250 cfs) or the criteria used to formulate recommendations within the middle of the range. Plaintiffs do argue that the upper end of the range (-5,000 cfs) is based solely on FWS's raw salvage analysis and should be invalidated.

The BiOp explains in the section of Attachment B addressing Action 3 that "[t]wo scenarios span the range of circumstances likely to exist during Action 3":

> First, *the* low-entrainment risk scenario. There may be a low risk of larval/juvenile entrainment because there has been no evidence of delta smelt in the South and Central Delta or larval delta smelt are not yet susceptible [**102] to entrainment. *In this scenario, negative OMR flow rates as high as -5,000 cfs may occur as long as entrainment risk factors permit.*
>
> The second scenario, the high-entrainment risk *scenario*, is one in which either (a) there is evidence of delta smelt in the South and Central Delta from the SKT and/or 20mm survey, or (b) there is evidence of ongoing entrainment, regardless of other risk factors. In this case, OMR should be set to reduce entrainment and/or the risk of entrainment as the totality of circumstances warrant.
>
> Usually, if the available distributional information suggests that most delta smelt are in the North or North/Central Delta, then OMR flow can be chosen to [*896] minimize Central Delta entrainment. However, if the distributional information suggests there are delta smelt in the Central or South Delta, then OMR flows will have to be set lower to reduce entrainment of these fish. If delta smelt abundance is low, distribution cannot be reliably inferred. Therefore, the adaptive process is extremely important. The SWG may recommend any specific OMR flow within the specified range above.

BiOp at 358 (underlined emphasis in original; emphasis in italics added). The Action 3 discussion [**103] does not provide an independent justification for the choice of -5,000 cfs as the upper limit for OMR flows under the low entrainment risk scenario. Federal Defendants suggest that the upper limit is justified in the Delta Smelt OCAP Team's notes, which indicate that "[a]t -5,000 OMR, the model shows 40% entrainment at station 815." AR 009459. This is a reference to the PTM model results. There are two major problems with Federal Defendants' reliance on this statement. First, it is contained within a section of the Delta Smelt OCAP Team notes entitled "Actions 1 and 2." AR 009457-60. Even if this statement was made in reference to Action 3, it does not justify using -5,000 cfs as the upper limit. The PTM study assumed an upper limit of -5,000 cfs and never considered any flow ranges above that. Nor is it made clear why 40% particle entrainment is a rational threshold of significance, as opposed to some lower or higher threshold. In sum, the PTM study does not justify the imposition of -5,000 cfs as an upper limit in Actions 1, 2, or 3.

The "Action #3" section of the Team's notes does contain an explanatory statement regarding the source of the -5,000 cfs upper boundary for Action 3: [**104] "The -5,000 OMR cap was established by Wanger." AR 009463; *see also* AR 009462 ("[t]he group discussed the merits of using the -5,000 OMR per Wanger Order"). It is unclear how FWS can rely directly on a provisional court order, entered as a remedial stopgap measure pending comprehensive scientific analysis, to establish the scientific basis for an RPA. The subject Order was the result of an Interim Remedies proceeding in the challenge to the previous Delta Smelt BiOp. After an evidentiary hearing, it was determined from the then available data that "the number of Delta smelt entrained at the CVP and SWP export facilities begins to rise significantly when negative flows on the OMR exceed approximately -5,000 cfs. [Tr. 641:14-642:5; 725:16-17; DWR Ex. D ¶ 4; DWR Ex. G ¶ 34; SWC Ex. N]." *NRDC v. Kempthorne*, 1:05-cv-1207, Doc. 561, Int. Rem. Findings, at ¶ 38. The finding was based on two studies of the relationship between OMR flows and smelt salvage: (1) a non-linear model presented by Sheila Greene of DWR; and (2) the linear model created by Peter Smith, which became the basis for Figure B-13. Both of these analyses utilized raw salvage data. AR 009251 (Green's analysis); *see also* 1:05-cv-1207, [**105] Doc. 399, Decl. of Jerry Johns, Ex. B and C; 1:05-cv-1207, Doc. 419, Decl. of Christina Swanson, at 12, Fig. 8. That raw salvage studies were previously relied upon by the Court, when no

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others were available, does not validate their use in the 2008 Smelt BiOp.

d. FWS's Comparison of CALSIM II Data to DAYFLOW Data.

The BiOp's effects analysis used analytical methods and data, "including the CALSIM II model outputs provided in the appendices of Reclamation's 2008 OCAP BA, historical hydrologic data provided in the DAYFLOW database, statistical summaries derived from 936 unique 90-day particle tracking simulations published by [*897] Kimmerer and Nobriga (2008), and statistical summaries and derivative analyses of hydrodynamic and fisheries data published by Feyrer et al. (2007), Kimmerer (2008), and Grimaldo et al. (accepted manuscript)." BiOp at 204.

CalSim II is a computer model developed jointly by DWR and Reclamation. Declaration of Aaron Miller, [21] Doc. 548-1, at ¶ 5. The model simulates SWP and CVP operations and is the standard planning tool for evaluating project operations. *Id.* at ¶ 6. CalSim II has been continuously updated since it was first applied in 2002. *Id.* at ¶ 8. CalSim II simulates [**106] SWP and CVP reservoir operations, project exports and water deliveries, flow through the Delta, and salinity requirements in the Delta, including the location of X2. *Id.* at ¶ 7.

21 Mr. Miller is DWR's Technical Senior Water Resource Engineer and possesses expertise in CALSIM II and Dayflow modeling. Miller Decl., Doc. 548-1, at ¶¶ 1-3.

CalSim II uses historic hydrologic data from October 1922 to September 2003, including precipitation, runoff into reservoirs and inflow into the Delta from unimpaired streams. Miller Decl., Doc. 548-1, at ¶ 10 & n.1. The model further assumes a level of development, which reflects water demand resulting from particular levels of urban population, agricultural production, and wildlife refuge needs, *id.* at ¶ 10, along with the effect of environmental regulations and programs, *id.* at ¶ 27; BiOp at 207. CalSim II is capable of estimating the position of X2. Miller Decl., Doc. 548-1, at ¶ 14.

The BiOp considered a number of CalSim II studies, either directly or indirectly:

> o Study 6.0 was designed to represent the assumptions used in the 2004 OCAP BA within the updated CalSim II model framework in order to highlight changes from the previous model framework. This [**107] Study models a 2005 level of development and includes steps to account for operations under CVPIA (b)(2) and Joint Point of Diversion [22]. *See* OCAP BA at 9-32 (AR 010729).
>
> o Study 6.1 is similar to 6.0, except that the 2005 Trinty River Record of Decision is removed, and the Joint Point of Diversion is not accounted for. *Id.*
>
> o Study 7.0 was developed as the baseline study for the OCAP BA. Study 7.0 represents existing conditions, and assumes a 2005 level of development and a full environmental water account ("EWA") [23]. BiOp at 207.
>
> o Study 7.1 is a near-future conditions study. It assumes a 2005 level of development and a limited EWA. BiOp at 207-08.
>
> o Study 8.0 is a future conditions study. It assumes a 2030 level of development and a limited EWA. BiOp at 208.
>
> [*898] o The 9.0 series of studies represents climate change scenarios. BiOp at 208.

22 State Water Resources Control Board Decision 1641 granted Reclamation and DWR the ability to "use/exchange each Project's diversion capacity capabilities to enhance the beneficial uses of both parties...." with certain conditions. BiOp at 26.

23 The EWA was originally designed to compensate CVP and SWP contractors for loss of water to facilitate reduced diversions [**108] from the Delta at times when at risk fish species may be harmed. BiOp at 34. "Typically the EWA replaced water loss due to curtailment of pumping by purchase of surface or groundwater supplies from willing sellers and by taking advantage of regulatory flexibility and certain operational assets." *Id.* However, at the time the BiOp was issued, the agencies that manage the EWA were undertaking environmental review to determine the future of the EWA. *Id.* As a result, the BiOp treats EWA as a "limited" asset in some circumstances. *Id.*

The OCAP BA suggested using Calsim II Study 7.0 as the current baseline and Study 6.1 as the historical baseline for evaluating the impacts of project operations. BiOp at 204. However, the BiOp rejected this suggestion because, although "changes were expected between

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Study 6.1 and Studies 7.0 and 7.1," the modeled results were "nearly identical." *Id.* FWS concluded from this result that Calsim II could not accurately generate an empirical baseline. *See id.* at 204-06. Instead, FWS chose to "use actual data to develop an empirical baseline," including the use of the Dayflow model to "develop[] historical time series data for hydrologic variables." BiOp at 206. [**109] Dayflow is a model that estimates historic outflow based on historic precipitation, inflow, and exports, and estimates of delta island diversions. Dayflow also provides an estimate for the location of X2. Miller Decl., Doc. 548-1, at ¶¶ 14-15.

In the BiOp, FWS purports to quantify adult entrainment by comparing OMR flows from CalSim II studies to historic OMR flows during 1967-2007. BiOp at 212-13. The BiOp depicts these results in Tables E-5a, E-5b, and E-5c:

Table E-5a. Historic and CALSIM II modeled median winter (Dec-Mar) OMR flows by water year type

Water year type	Historic	7	7.1	8	9	9.1	9.2	9.3	9.4	9.5
Wet	-1033	-5256	-5498	-5699	-5684	-5500	-3999	-3678	-7066	-6100
Above Normal	-5178	-7209	-7923	-8073	-8156	-7595	-6863	-6934	-7861	-7723
Below Normal	-2405	-6461	-7208	-7009	-6599	-6420	-5647	-6736	-6721	-6343
Dry	-5509	-6443	-6931	-6692	-6620	-6353	-6831	-7438	-5785	-5760
Critical	-5037	-4547	-4931	-4980	-5051	-4588	-5320	-5194	-4260	-3845

Table E-5b. Winter OMR Flow percent difference from historic median value to CALSIM II model median value

Water year type	7	7.1	8	9	9.1
Wet	408.92%	432.37%	451.84%	450.36%	432.50%
Above Normal	39.21%	53.01%	55.90%	57.49%	46.67%
Below Normal	168.62%	199.68%	191.41%	174.35%	166.90%
Dry	16.95%	25.81%	21.48%	20.17%	15.32%
Critical	-9.74%	-2.12%	-1.14%	0.27%	-8.92%

Table E-5b. Winter OMR Flow percent difference from historic median value to CALSIM II model median value

Water year type	9.2	9.3	9.4	9.5
Wet	287.16%	256.13%	584.15%	490.63%
Above Normal	32.53%	33.91%	51.80%	49.13%
Below Normal	134.75%	180.05%	179.42%	163.72%
Dry	24.01%	35.02%	5.01%	4.57%
Critical	5.61%	3.11%	-15.44%	-23.68%

Table E-5c. Percent difference from historic median salvage to predicted salvage based on Dec-Mar OMR flows from CALSIM II studies

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Water year type	Study 7	Study 7.1	Study 8	Study 9	Study 9.1
Wet	45.64%	48.26%	50.43%	50.26%	48.27%
Above Normal	15.15%	20.49%	21.60%	22.22%	18.04%
Below Normal	38.17%	45.20%	43.33%	39.46%	37.78%
Dry	6.80%	10.36%	8.62%	8.09%	6.15%
Critical	-3.70%	-0.81%	-0.43%	0.10%	-3.39%

Table E-5c. Percent difference from historic median salvage to predicted salvage based on Dec-Mar OMR flows from CALSIM II studies

Water year type	Study 9.2	Study 9.3	Study 9.4	Study 9.5
Wet	32.05%	28.59%	65.20%	54.76%
Above Normal	12.57%	13.10%	20.02%	18.99%
Below Normal	30.50%	40.76%	40.61%	37.06%
Dry	9.63%	14.05%	2.01%	1.83%
Critical	2.13%	1.18%	-5.87%	-9.00%

[*899] Tables [**110] E-5b and E-5c depict changes in OMR flows and entrainment using the Dayflow-generated historic data as the baseline and comparing that to CalSim II study results. In addition, the BiOp utilized an equation taken from Kimmerer's [*900] 2008 paper to estimate the population loss of delta smelt under the various modeled scenarios. The results of these calculations were depicted in Figures E-5 and E-6:

Figure E-5. Frequency distribution of predicted adult delta smelt entrained at Banks and Jones for predicted estimates from historic data (1967-1994), actual estimates from Kimmeier (2008) for years 1995-2006, and those estimated from CALSIM II model data by study.

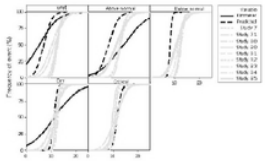
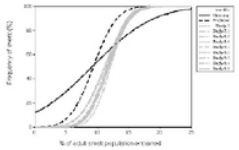


Figure E-6. Same as E-5 but by water year type. Kimmerer (2008) estimates did not include below normal or critical dry water year types.



[*901] BiOp at 251-52. The accompanying text explains the significance of these results to the analysis:

> The median OMR flows from the CALSIM II modeled scenarios were more negative than historic OMR flow for all WY types except critically dry years (Figure E-3; see Table E-5b for all differences). Overall, proposed OMR flows are likely to generate increases in population [**111] losses compared to historic years (Figure E-5 and Figure E-6). For example, the frequency of years when population losses are less than 10 percent from most modeled studies (except studies 7.0 and 8.0) is less than 24 percent compared to

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historic estimates that only exceed 10 percent in approximately half of the years.

The most pronounced differences occur during wet years, where median OMR flows are projected to be approximately 400 to 600 percent (-7100 to -3678 cfs) higher than historical wet years (-1032 cfs). Generally, wet years are marked by low salvage and population losses. However, the proposed operations during wet year are predicted to cause up to a 65 percent increase in smelt salvage and lower probability that population losses will be below 10 percent.

The proposed operation conditions likely to have the greatest impact on delta smelt are those modeled during above normal WYs. The modeled OMR flows for the above normal WYs ranged between -8155 and -6242 cfs, a 33 to 57 percent decrease from the historic median of -5178 cfs. Though the predicted salvage would only be about 15-20 percent higher than historic salvage during these years (Table E-5c), the modeled OMR flows [**112] in these years would increase population losses compared to historic years.

In below normal and dry WYs, proposed OMR flows are also modeled to decrease from historic medians. Predicted salvage levels are likely to increase between 2 and 44 percent. More importantly, the modeled median flows from all studies in these WY types range between -5747 and -7438 cfs. Modeled OMR flows at these levels are predicted to increase salvage and increase the population losses from historic levels as well.

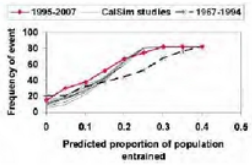
During critically dry years, the median OMR flows for studies 7.0, 7.1, 8.0, 9.1, 9.4, and 9.5 are less than -5,000 cfs. These studies have predicted salvage lower than historic salvage and are not likely to generate larger population losses compared to historic years. The models might overestimate salvage during critical dry years when smelt are unlikely to migrate towards the Central Delta due to lack of turbidity or first flush. Thus, the effects of critical dry operations on delta smelt take are probably small and lower than estimated.

BiOp at 212-13.

Based on these comparisons of CalSim II data and Dayflow-generated historic data, the BiOp concludes, "adult entrainment is likely to be higher than [**113] it has been in the past under most operating scenarios, resulting in lower potential production of early life history stages in the spring in some years." BiOp at 213.

The BiOp performed comparisons of CalSim II data to Dayflow-simulated historic baseline data to quantify the effects of the action on larval and juvenile delta smelt. *See, e.g.*, BiOp at 219 (examining effect of action on larval and juvenile entrainment: "[t]he analysis is based on comparison of historical (1967-2007) OMR and X2 to the proposed action's predictions of these variables provided in ... [CalSim] studies 7.0, 7.1, 8.0, and 9.0-9.5"). Figure [*902] E-18 depicts several sets of calculations of the frequency at which certain percentages of the delta smelt population would be entrained:

Figure E-17. Frequency distribution of estimated proportions of larval-juvenile delta smelt entrained at Banks and Jones for 1967-1994 and 1995-2007. The data were extrapolated to an 82-year period to make them comparable to the CALSIM II out



BiOp at 264. The black dashed line depicts entrainment estimates for Dayflow-generated historic data from 1967 to 1994, the red line with diamonds depicts entrainment estimates [**114] for Dayflow-generated historic data from 1995-2007, and the fine lines depict the various entrainment estimates based on Calsim II data. Based on these calculations, the BiOp concludes that "the proposed action will decrease the frequency of years in which estimated entrainment is 15 percent. Thus, over a given span of years, the project as proposed will increase larval juvenile entrainment relative to 1995-2005 levels. This will have an adverse effect on delta smelt

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based on their current low population levels." BiOp at 222.

A separate BiOp analysis purports to quantify the effects of the project operations on delta smelt habitat by comparing CalSim II model projections of the location of X2 under the proposed operations to the median location of X2 over the historical period 1967-2007, as simulated by Dayflow. BiOp at 235-36. Based on this comparison, the BiOp concludes "[t]he median X2 [locations] across the CalSim II modeled scenarios were 10-15 percent further upstream than actual historic X2 (Figure E-19)." *Id.* at 235. In reliance on these percent differences between CalSim II-created data and historical data, the BiOp concludes: "proposed action operations are likely to negatively [**115] affect the abundance of delta smelt." *Id.* at 236.

According to Plaintiffs, the comparison of Calsim II to Dayflow outputs distorts the BiOp in several key ways:

> (1) The comparison of outputs of these two models in the Project Effects analysis is, *ipso facto*, a violation of the best available science requirement.
>
> [*903] (2) To use Dayflow, which represents historical conditions, to generate the baseline for the Project Effects analysis, improperly attributes past effects to the Projects;
>
> (3) Because the flawed comparison was used to support imposition of Component 3 (Action 4) (a/k/a the "fall X2" action), that Action is invalid. [24]

24 In some of the briefs, this third argument is presented with Plaintiffs' other challenges to the Fall X2 action. It is most logical and efficient to address this issue with Plaintiffs' challenges to the use of the Calsim II versus Dayflow comparisons in the Project Effects Analysis.

Plaintiffs also argue that the BiOp improperly attributes all (or substantially all) of the observed, historical upstream shift of X2 to Project Operations. It is preferable to address these contentions with related arguments in Part VII.A.(6).

(1) Was FWS's Decision to Compare Calsim II [**116] to Dayflow Model Runs a Violation of the Best Available Science Requirement?

Mr. Aaron Miller opines that outputs from a CalSim II study should not be compared to outputs from the Dayflow model because the assumptions used in the two models are significantly different. Miller Decl., Doc. 548-1, at ¶¶ 22-55. He identified the following key differences between the models:

> o Level of Development: The CalSim II model assumes a constant level of development. In contrast, the Dayflow model incorporates a continuous change in the level of development because the Dayflow model is using historical information as input. When comparing models to determine the effect of project operations, the best scientific practice is to keep the assumed level of development constant. *Id.* at ¶¶ 31-38.
>
> o Regulatory Assumptions: CalSim II assumes a constant regulatory environment, whereas Dayflow uses a regulatory environment that has changed over time. Over the past 40 years, numerous regulatory programs have altered the way the projects are operated, including D-1485, D-1641, the Central Valley Project Improvement Act ("CVPIA"), the 1995 Water Quality Control Plan, and the EWA. These differences "further undermine [**117] the reliability of comparing historically based Dayflow values to the Calsim II model results." *Id.* at ¶¶ 39-41.
>
> o Time Step: CalSim II operates on a monthly time step, whereas Dayflow operates on a daily time step. *Id.* at ¶ 42.
>
> o Operational/Computational Guidelines: The Dayflow model incorporates real-world conservative operational tactics designed to avoid violating applicable regulations. In contrast, the CalSim II model operates strictly to that regulation. *Id.* at ¶ 44. Operating conservatively results in higher modeled outflow. *Id.*
>
> o Year Range: The Dayflow model uses a different historic time window than CALSIM II. The BiOp used values from 1967 to 2007 as inputs into the Dayflow model, while 1922 to 2003 were used for Calsim II. *Id.* at ¶ 52. This introduces additional error into any comparison between outputs of these two models because the time period used for the Dayflow model had a higher percentage of

No comments

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wet or above normal years, as compared to the time period covered by Calsim II. *Id.* at ¶ 53.

o Method for Calculating position of X2: The artificial neural network [*904] ("ANN") and the Kimmerer Monismith equation ("KM equation") are two methods of estimating X2. *Id.* at ¶ 46. The CalSim [**118] II studies used ANN to estimate the position of X2, while the Dayflow model uses the KM equation. *Id.* at ¶ 47. Holding all other variables constant, but varying the method (ANN v. KM) used, produces inconsistent results. At locations less than 75 kilometers ("km") from the Golden Gate, the KM equation results in an X2 estimate greater than (or farther upstream than) the ANN estimate. In contrast, at locations greater than 75 km from the Golden Gate, the KM equation provides an estimate less than the ANN estimate. *Id.* at 11, Fig. 2.

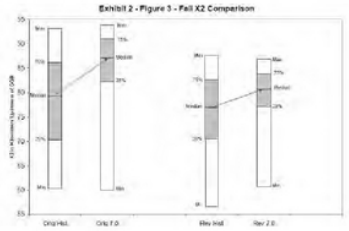
Mr. Miller opined that best scientific practice is to compare models that use consistent assumptions and methodologies. *See id.* at ¶¶ 38, 51, 54; *see also id.* at ¶ 41. The approach taken in the BiOp, quantitatively comparing Calsim II runs to Dayflow model outputs "introduces significant error into the analysis." *Id.* at ¶ 56.

Dr. Punt, a 706 Expert added that "[i]n principle, there is nothing wrong with fitting a model using a set of OMR/X2 valued from one model and making predictions using OMR/X2 values which are based on the output from a different model, as long as the two sets of values are calibrated.... Not calibrating the two sets of model outputs will [**119] lead to some bias in the inferences, with the level of bias dependent on the net effect of all the differences between the 'historical' and Calsim II values for the same years." Doc. 633-1 at 15.

Mr. Derek Hilts, a FWS employee who previously served as "Engineer-in-Charge" of CVP/SWP modeling for Reclamation, disagrees with Mr. Miller's general opinion that comparing Calsim II and Dayflow outputs is *per se* scientifically unreliable, noting that the OCAP BA's Appendix D specifically compared Calsim II and Dayflow runs for the purposes of testing "Calsim II's ability to simulate the CVP/SWP system reasonably well." Decl. of Derek Hilts, Doc. 540, at ¶ 11. But, as Mr. Miller explains, this type of "validation comparison" is designed to "help establish the credibility of the CalSim II model by showing that the model moves water, simulates operation of the export pumps, and so forth, with the same general timing and magnitude as actual historical data show." Second Miller Decl., Doc. 597, at ¶ 12. In fact, Mr. Miller points out that the detailed validation data contained in the OCAP BA demonstrate that, although Calsim II outputs generally track historical data, they "do not precisely match [**120] the actual historical data." *Id.* at ¶ 12. Because validation is "looking only at the general operational performance of the model," a validation comparison "does not need to control for the effects of all the differences in the model and the historical measurements...." *Id.* at ¶ 13.

More specifically, Mr. Hilts disagrees with Mr. Miller's critique that the divergent methods of calculating the position of X2 render the comparison used in the BiOp scientifically inappropriate. Mr. Hilts does not dispute Mr. Miller's conclusion that the KM and ANN equations produce marginally different outcomes. Instead, Mr. Hilts criticizes Mr. Miller for failing to "assert that any such error would have changed the conclusions drawn in the BiOp." Doc. 540 at ¶ 19.

Assumedly to demonstrate that the conclusion would not have changed, Mr. Hilts revisited the calculations in the BiOp, using the KM equation in both models to [*905] produce revised estimates of the position of X2. [25] In performing this analysis, Mr. Hilts also attempted to correct for one of the other purported sources of bias -- the inconsistent year range -- as well as for a few incorrect data points found in the underlying data used in the BiOp. [**121] Doc. 540 at ¶¶ 17-18. This revised analysis, which is presented in Exhibit 2, Figure 2 to Mr. Hilts' declaration, is replicated below:



Doc. 540, Exhibit 2, Figure 2. According to Mr. Hilts, this figure demonstrates the "same general upstream movement" of X2 "discussed in the 2008 BiOp." *Id.* at ¶ 17. [26]

25 Mr. Hilts chose to use KM instead of ANN because "[w]orking with ANN is very complex"; "using ANN to estimate X2 had just been introduced to Calsim II when the 2008 OCAP BA was

No comments

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completed"; and "few outside DWR know how to work with [ANN]." Doc. 540 at ¶ 15.

26 Mr. Miller rejoins that Mr. Hilts' revised analysis contains several errors. *See* Doc. 597 at ¶ 18(b)-(c). Even assuming, *arguendo*, Mr. Hilts' analysis was accurately performed, the comparison of Calsim II to Dayflow generates significant bias that is not addressed in the BiOp.

Recognizing that his revised analysis demonstrates the same general upstream shift as the BiOp, Mr. Hilts criticizes Mr. Miller for failing to "quantify the effect of the alleged biases ostensibly embedded in the X2 comparison presented in the BiOp." *Id.* at ¶ 7. Federal Defendants contend that even if [**122] the Calsim II to Dayflow comparison introduced bias, that bias was not significant. However, the record suggests otherwise.

Recognizing that it is not possible to quantify all aspects of the error caused by the comparison of Calsim II runs to Dayflow output, Mr. Miller's reply declaration endeavored to quantify the bias in his reply declaration. *See* Second Miller Decl., Doc. 597. As with Mr. Hilts' revised calculations, Mr. Miller compared the results reported in the BiOp (Calsim II runs applying the ANN equation and Dayflow runs using the KM equation), to a revised set of results using the KM equation instead [*906] of ANN in the Calsim II runs. *Id.* at ¶ 14. Mr. Miller's analysis shows that project operations will cause an upstream shift in X2 . Mr. Miller explained that the BiOp's comparison reflected a difference between the reported historic median of X2 [79 km] and the study 7.0 median [87 km] of 10% [(87 km - 79 km)/79]. Mr. Miller concluded that the median X2 for the CalSim 7.0 study using the KM equation (instead of using ANN) was 84 km (instead of 87 km). Finally, he identified the percent difference between the reported historic median estimate of X2 using the KM equation [79 km] [**123] and the CalSim study 7.0 median estimate of X2 using the KM equation [84 km] to be 6% [(84 km-79 km)/79 km]. *Id.* at ¶ 14; BiOp at 235-36. From this, Mr. Miller concluded 40% of the difference between X2 as estimated by study 7.0 and the historical X2 baseline reported in the BiOp is error attributed entirely to the use of the KM equation to calculate the historical baseline X2 and the ANN equation to calculate the CalSim II study 7.0 results. *Id.* at ¶ 15. It is unknown which portion of the remaining 60% of difference is attributable to the proposed action, and which portion is due to the other identified biases. *Id.* at ¶ 16. Dr. Punt expressed a corroborating opinion, estimating that the bias created by failing to calibrate the models "seems non-trivial" and opining that it could be "as large as the differences seen in Figure E-19," the figure in the BiOp depicting the purported 10% shift in X2 between the historic/Dayflow runs and the Calsim II runs. Doc. 633-1 at 16.

Following a similar methodology, using the BiOp's Figure E-20 equation, Mr. Miller calculated the reduction in suitable habitat consistent with the change in the position of X2. A comparison of CalSim II study 7.0 with [**124] study 7.1 yielded a reduction in habitat area of 128 hectares (or 2.8%), and a comparison of study 7.0 with study 8.0 yielded a reduction in habitat area of 289 hectares (or 6.2%). Doc. 597 at ¶ 20; BiOp at 266.

Mr. Miller opined that all errors/biases could have been avoided by comparing CalSim II study 7.0 -- designed as a current conditions baseline -- instead of the "historical" baseline in the BiOp, to the near-future 7.1 study. [27] However, Mr. Hilts points out that comparing Calsim II Study 7.0 to 7.1 and 8.0 is simply "not responsive to the need for comparisons with historical X2 locations," because none of the Calsim II simulations represent Delta conditions that existed from 1967 -2007. Doc. 540 at ¶ 9. "With the Fall X2 comparison, []FWS wanted to investigate whether the continuation of the recent, as well as future, CVP/SWP operations would result in less or deteriorated habitat for delta smelt relative to the habitat that prevailed historically." *Id.* at ¶ 8. "The CalSim II simulations that Mr. Miller would have the FWS use do not" accomplish this. *Id.*

27 Mr. Miller performed a Calsim II to Calsim II comparison. The results indicate a 0.7 km upstream movement of X2, with a 0.8% [**125] change in X2 from current to near-current conditions. In a comparison of Calsim II Study 7.0 to Study 8.0 (a 2030 level of development scenario), X2 moved upstream only 1.1 km (1.2 % change). Doc. 597 at ¶20; BiOp at 235, 265. In contrast, the BiOp estimated approximately 8.7 km and 9.1 km changes, respectively, using Dayflow data as the baseline. BiOp at 265 (Figure E-19).

The theoretical problems with using a Calsim II to Calsim II comparison were manifest. As discussed above, when CalSim II was used to model current Project operations, and these results were then compared to the results of a CalSim II modeling run purportedly simulating past operations, the results "were nearly identical" despite significant operational changes in current operations as compared to past. BiOp at 204-205. The BiOp explains that " [*907] [t]he inaccuracies in CalSim [led FWS] to use actual data to develop an empirical baseline." *Id.* at 206. [28] FWS contends it had legitimate reasons to rely on a Calsim II to Dayflow comparison instead of a Calsim II to Calsim II comparison.

28 The Independent. Peer Review of the BiOp's Effects Analysis also noted and was "surprised at" the fact that the historical baseline "differed [**126] greatly" from CalSim II Study 7.0 simu-

No comments

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> lated results. AR 008817. The Peer Review reasoned that this discrepancy "raises the question of how representative Study 7.0 is of current and near-future conditions." *Id.*

In light of the known and material resulting disparity, FWS's decision to use a Calsim II to Dayflow comparison to quantitatively justify its jeopardy and adverse modification conclusions, without attempting to calibrate the two models or otherwise address the bias created, was arbitrary and capricious and ignored the best available science showing that a bias was present. The BiOp specifically relied upon the quantitative nature of the Calsim II to Dayflow comparisons in many places. For example, in reference to the X2 shift and resulting effects on smelt habitat:

> The median X2 across the CALSIM II modeled scenarios were 10-15 percent further upstream than actual historic X2 (Figure E-19). Median historic fall X2 was 79km, while median values for the CALSIM II modeled scenarios ranged from 87 to 91km. The CALSIM II modeled scenarios all had an upper range of X2 at about 90km. The consistent upper cap on X2 shows that water quality requirements for the Delta ultimately constrain [**127] the upper limit of X2 in the simulations. These results were also consistent across WY types (Figure E-19) with the differences becoming much more pronounced as years became drier. Thus, the proposed action operations will affect X2 by shifting it upstream in all years, and the effect is exacerbated in drier years.

BiOp at 235. The BiOp does not explain to what extent the ultimate jeopardy/ adverse modification conclusions were based upon the calculated magnitude (10-15 percent) of the X2 shift, rather than the existence of a shift. It cannot be determined whether the BiOp would have reached the same conclusion had this bias not been present.

Federal Defendants concede but understate that "the two models are not perfectly calibrated, and a slight transformation of the data occurs when the analysis switches from one model to the other, the BiOp acknowledges this slight shift." Doc. 660 at 36. Nevertheless, FWS concluded in its "scientific judgment [] that the CalSim [II]-to-Calsim [II] output was far worse." *Id.* (citing BiOp at 207). Federal Defendants argue this was a choice between "one comparison that yielded a slight calibration issue and another that completely masked altogether [**128] the variable sought to be compared...." and that "it would have been irrational for the Service to proceed with [a Calsim II to Calsim II comparison" after discovering its flaws. *Id.* This may be the case, but it does not follow that what FWS did with the Calsim II to Dayflow comparisons was rational or based upon the best available science.

FWS had actual notice of scientific concerns with comparing historical data to CalSim II simulated data. DWR Deputy Director Jerry Johns, on October 24, 2008, submitted comments to FWS on the draft effects analysis, generally cautioning against the comparison of modeled data with actual data:

> USFWS is using historic data for comparison to CalSim II simulations. Great [*908] caution should be taken when comparing actual data to modeled data. CalSim II modeling should be used in a comparative mode. In other words, it should be used to compare one set of model runs to another. For example, it would be appropriate to compare CalSim II modeling of one demand alternative to another to analyze the incremental effects.

AR 008671; *see also* AR 008668 (further explaining unreliability problems comparing historic and modeled data). Although neither Mr. Miller nor any [**129] interested party suggested that comparing Dayflow to Calsim II data was a scientifically invalid methodology prior to the issuance of the BiOp, the BiOp does not recognize the essential methodological defect, or explain how any of the conclusions it reached account for it. Nor does the BiOp explain how it is able to attribute the changes in X2 it found between the "historic" baseline and the CALSIM studies to the proposed action, and not to any of the other differences between the Dayflow and Calsim II models. Instead, FWS only rationalizes that it opted to use the "historic" baseline rather than CALSIM Study 7.0 as the baseline because, "the CALSIM monthly simulation model does not capture a precise Delta operation.... [Thus], the inaccuracies in CALSIM lead us to use actual data to develop an empirical baseline." BiOp at 204 & 206. This statement may explain the reasons for FWS's decision, but it does not justify its ultimate conclusion.

This is of particular concern because DWR, a joint operator of the projects communicated its scientific and operational concerns based on known available science. DWR and Reclamation have legal obligations to allocate water supply reasonably and responsibly, [**130] not solely to save the species. As discussed in below at Part

No comments

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VII.B, FWS's focus on its responsibilities to the species appears to have caused it to ignore its own regulations' obligations to consider impacts to the overall water supply and additional uses. The potential impacts of inaccurate quantitative analyses in the BiOp cannot be understated.

Defendants argue FWS's decision to compare the two models to quantify the shift of X2 was a reasonable scientific decision, even though other experts may disagree. Doc. 660 at 17-19; Doc. 661-3 at 13-14. Federal Defendants cite *Lands Council, 537 F.3d at 993*, to justify FWS's modeling decisions as entitled to deference, because it is a matter "within its area of special expertise, at the frontiers of science." [29] As a general rule, choices regarding modeling methods are exactly the sort of choices that, under the APA, are left to the expert agency in the exercise of its discretion. *NWF v. EPA, 286 F.3d at 565*. [*922] A court "may reject an agency's choice of a scientific model only when the model bears no rational relationship to the characteristics of the data to which it is applied." *Id. at 565* (internal quotations and citations omitted). *Lands* [**131] *Council* instructs [*909] that a court is "not free to impose on the agency [its] own notion of which procedures are best.... Nor may [it] impose procedural requirements not explicitly enumerated in the pertinent statutes." *537 F.3d at 993* (internal citations and quotations omitted); *id. at 1000* (finding agency did not act arbitrarily "in relying on its own data and discounting the alternative evidence offered" by plaintiffs because "[w]hen specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive") (citations omitted).

29 *Lands Council* also held that an agency is not required "to conduct any particular test or to use any particular method, so long as 'the evidence ... provided to support [its] conclusions, along with other materials in the record,' ensure that the agency 'made no clear error of judgment that would render its action arbitrary and capricious.'" *League of Wilderness Defenders-Blue Mountains Biodiversity Project v. U.S. Forest Serv., 549 F.3d 1211, 1218 (9th Cir.2008)* (quoting *Lands Council, 537 F.3d at 993*). But *Lands Council* [**132] and *Blue Mountains Biodiversity Project* arose under the National Forest Management Act ("NMFA") and/or the National Environmental Policy Act ("NEPA"), neither of which include the additional requirement, found in the ESA, that the agency use the "best available science." Although *Lands Council's* general holding that a court must be deferential to an agency's choice of methodology in an area of its expertise, the agency is not free to ignore the best available science.

In *NWF v. EPA*, the EPA evaluated several regulatory options for economic feasibility, applying a particular model to predict whether businesses were likely to go bankrupt under the weight of additional regulation. NWF criticized the model on several grounds, including that the model had "an error rate of at least 15%." *Id. at 565*. The D.C. Circuit examined and rejected each critique, reasoning that none called into question the model's reliability. *Id.*

Here, however, undisputed expert testimony offered by DWR, a co-operator of the Projects, calls into question the manner by which FWS utilized the two models to evaluate the impact of project operations on the position of X2. The Calsim II model was developed [**133] by DWR and Reclamation as a planning tool to simulate State Water Project and Central Valley Project operations. DWR, one of the agencies with special expertise in the use and application of Calsim II, *see* BiOp at 207; Miller Decl., Doc. 548-1, at ¶ 5-7, raised cautions and objects to the manner in which FWS used the model. Federal Defendants do not rebut the undisputed expert evidence that using such comparisons for quantitative purposes is scientifically improper. All experts in this case agree that data from two different models should not be compared without calibration. Doc. 633-1 at 13-17 (706 expert report); Miller Decl., Doc. 548-1, ¶¶ 22-55; Second Miller Decl., Doc. 597, ¶¶ 4-22. In other words, even though no superior set of models have been identified, the chosen models were indiscriminatly used without addressing an important factor, the potential (and apparently real and significant) bias created when the results of two different computer models were used to perform quantitative comparisons. Unlike *NWF v. EPA*, where the agency applied a model that was deemed reliable, here, FWS has not addressed or explained the material bias created by its methodological choices. It [**134] cannot be determined whether FWS would have reached the same result had the bias been considered or addressed. FWS must do so on remand.

(2) Does the Use of Dayflow to Represent the Baseline in the Project Effects Analysis Improperly Attribute Past Effects to the Projects?

DWR asserts that FWS's use of an "historical baseline" was per se unlawful because the ESA's implementing regulations "require the Service to use current operations, not past operations, as the baseline for its effects analysis." Doc. 548 at 7-8. In support of this contention, DWR cites *50 C.F.R. § 402.02*, which defines the "environmental baseline" to include:

No comments

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> the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section [*910] 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process.

See also Consultation Handbook at 4-22 (baseline includes "effects of past and ongoing human and natural factors leading to the current status of the species") (emphasis added). In addition, DWR cites *NWF v. NMFS II, 524 F.3d at 930*, [**135] which held that an agency action "only 'jeopardize[s] ' a species if it causes some new jeopardy." (Emphasis added.) DWR argues that "[b]ecause [FWS's] baseline looks to decades past, it cannot be used as a basis for assessing any 'new jeopardy" posed by Project operations going forward." Doc. 548 at 8. [30]

> 30 Plaintiffs advance the related argument that FWS's use of a historic baseline caused FWS to mix the effects of the OCAP with the effects of all the other changing factors that occurred during the historical period of 1967 to 2007 represented by the Dayflow data. Doc. 551 at 24. However, the post-record expert testimony provided in support of this argument was stricken. Doc. 750 at 3, at ¶9.

DWR oversimplifies the issue. FWS's BiOp sought to determine whether ongoing and future coordinated operations of the CVP and SWP would cause jeopardy to the delta smelt or adversely affect its critical habitat. Arbitrarily setting the baseline at 2008, when the BiOp's analysis was finalized, would not have captured the impacts of then-ongoing project operations. The agency had discretion to use a historic baseline.

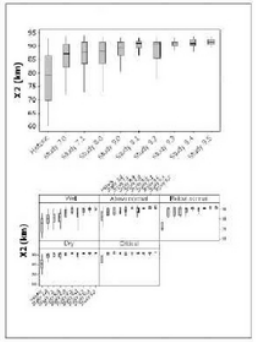
(3) Use of Comparisons Between CALSIM and DAYFLOW Model Outputs to Justify Imposition [**136] of Component 3 (Action 4), the Fall X2 Action.

In addition to utilizing comparisons of Calsim II and Dayflow data in the Project Effects section to demonstrate that Project Operations affect the location of X2, the BiOp relies on these comparisons to justify the imposition of RPA Component 3 (Action 4, or the "Fall X2 action"). The BiOp's "Justification" section discussing Action 4 references the Calsim II to Dayflow comparison:

> The Effects section clearly indicates there will be significant adverse impacts on X2, which is a surrogate indicator of habitat suitability and availability for delta smelt in all years (Figures E-19 and E-25 in Effects section).... The action is focused on wet and above normal years because these are the years in which project operations have most significantly adversely affected fall (Figure E-27 in Effects section) and therefore, actions in these years are more likely to benefit delta smelt.

BiOp at 373. Figures E-19 and E-25 compare historic X2 locations simulated by Dayflow to conditions under planned project operations simulated by Calsim II:

> [*911] Figure E-19. X2.(km) during September to December based on historic dara and CALSIM H model iconics. The ceorer line [**137] in the box is the median and the outer box boundaries are the fuse and third quartiles.



> [*912] Figure E-25. Smoothed trend lines for the time series of historic and CALSIM II-modeled fall X2.

No comments

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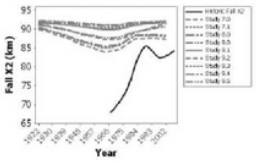

BiOp at 265, 271.

Undisputed expert testimony establishes the likelihood that the comparison of Dayflow to Calsim II data introduced significant error into the analysis that forms the basis for Figures E-19 and E-25. Mr. Miller concluded 40% of the difference between X2 as estimated by study 7.0 and the historical X2 baseline reported in the BiOp is error attributed entirely to the use of the KM equation to calculate the historical baseline X2 and the ANN equation to calculate the CalSim II study 7.0 results. Second Miller Decl., Doc. 597, at I 15. It is unknown which portion of the remaining 60% of difference is attributable to the proposed action, and which portion is due to the other identified biases. *Id.* at ¶ 16. Dr. Punt gave a consistent opinion, estimating that the bias created by failing to calibrate the models "seems non-trivial" and opining that it could be "as large as the differences seen in Figure E-19," the figure in the BiOp depicting the shift [**138] in X2 between the historic/Dayflow runs and the Calsim II runs. Doc. 633-1 at 16.

Federal Defendants do not respond directly to these assertions of bias. Instead, they point out that the historical X2 data was not the only basis for Action 4. Doc. 660 at 49. The BiOp describes multiple sources of information that were considered:

> This analysis of the effects [of the] proposed CVP and SWP operations on the delta smelt and its critical habitat uses a combination of available tools and data, including the CALSIM II model outputs provided in the appendices of Reclamation's 2008 Biological Assessment, historical hydrologic data provided in the DAYFLOW database, statistical summaries derived from 936 unique 90-day particle tracking simulations published by Kimmerer and Nobriga (2008), and statistical summaries and derivative analyses of hydrodynamic and fisheries data provided by Feyrer et al. (2007), Kimmerer (2008), and Grimaldo, et al. (accepted manuscript).

BiOp at 204; *see also* Feyrer Decl., Doc. 541, at I 17. Additionally, "[t]he Service's [*913] examination of habitat suitability during fall is derived from published literature and unpublished information linking X2 to the amount of suitable [**139] abiotic habitat for delta smelt (Feyrer et al. 2007, 2008)." BiOp at 234. The BiOp expressly recognizes that the modeling does not precisely represent historic X2, as do the peer-reviewed studies on which the BiOp relies in part for this component. *See* BiOp at 204; AR 018278-018306 (Feyrer, *et al.* (2008)).

The justification for Action 4 relies heavily on the quantitative analyses presented in Figures E-19 and E-25. *See* BiOp at 373. Whether Action 4, which has substantial adverse impacts on the water supply, is justified in the absence of the quantitative analysis cannot be determined. These questions are too serious to go unanswered and must be remanded to the agency for further explanation and/or correction.

(3) Other Challenges to the Fall X2 Action.

Plaintiffs raise additional challenges to the justification for the Fall X2 action, arguing "neither the BiOp nor the record demonstrate that Component 3 (Action 4) is necessary to avoid jeopardy to the delta smelt or destruction or adverse modification of its critical habitat, or that it will materially benefit the species or its habitat." Doc. 697 at 25.

a. Plaintiffs' Argument that Action 4 is an "Untested Hypothesis."

Plaintiffs maintain [**140] that Action 4 is nothing more than an "untested hypothesis," emphasizing that FWS acknowledges the need to assess the efficacy of Action 4 over time:

> The Service shall conduct a comprehensive review of the outcomes of the Action and the effectiveness of the adaptive management program ten years from the signing of the biological opinion, or sooner if circumstances warrant. This review shall entail an independent peer review of the Action. The purposes of the review shall be to evaluate the overall benefits of the Action and to evaluate the effectiveness of the adaptive management program. At the end of 10 years or sooner, this action, based on the peer review and Service de-

No comments

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> termination as to its efficacy shall either be continued, modified or terminated.

BiOp at 283.

This does not render Action 3 a mere "hypothesis," nor does this "demonstrat[e] the absence of a rational connection between Action 4 and an increase in smelt abundance." Doc. 697 at 25. It is not inconsistent to find an action necessary, while also calling for an evaluation whether that action actually produced the expected outcomes. It is of no moment that in a research paper Mr. Feyrer referred to the X2 requirement as "the [**141] hypothesis that the combined effects of pre-adult abundance and the amount of suitable abiotic habitat (or X2) during autumn affect recruit abundance the following summer." AR 018285 (Feyrer unpub. 2008). He is a scientist gathering further information about the relationship between X2 and smelt population dynamics. The record does not suggest this is scientifically improper. It was not clearly erroneous for FWS to rely upon Feyrer's 2008 research paper.

b. FWS' Reliance on the Feyrer Papers.

FWS based its effects analysis of X2 in part [31] on two articles written by Feyrer et [*914] al., which purported to show a correlation between X2 in the autumn and subsequent delta smelt abundance. *See* BiOp at 235-38 (citing Feyrer et al. (2007); Feyrer et al. (2008)). Plaintiffs argue that these articles did not represent the best available science because "the correlation they claimed to find was driven by the presence of a single unrepresentative data point." Doc. 551 at 34. Even assuming the scientific validity of the 2007 and 2008 Feyrer analysis, Plaintiffs contend the BiOp's X2 conclusions far exceed what the articles scientifically support. *Id.*

> 31 Plaintiffs argue that "FWS based its effects analysis [**142] of X2 entirely on two articles written by Feyrer, et al." Doc. 551 at 34 (emphasis added). Federal Defendants point to pages 152 to 179 of the BiOp to demonstrate that FWS considered a broad range of other materials in analyzing X2. However, these pages are not part of the BiOp's Effects Analysis nor the description and justification for Action 4. Rather, they describe FWS's view of the delta smelt's status and description of the environmental baseline. The portion of the BiOp that actually examines the purported relationship between X2 and smelt habitat states that FWS's "evaluation of habitat suitability considered three specific elements: X2, total areas of suitable abiotic habitat, and the predicted effect on delta smelt abundance the following summer." BiOp at 234-35. The description of the first of these three elements refers to the "CALSIM II modeled results" and "Feyrer 2007, 2008." BiOp at 235. Similarly, the second step of the evaluation, modeling the location of X2 purportedly to determine the "total surface area of suitable abiotic habitat," also relied on "modeled X2" and the Feyrer 2008 paper. BiOp at 235. Finally, in the third step of the evaluation, FWS allegedly used [**143] the modeled X2 data to estimate the effect of Project operations on delta smelt abundance. BiOp at 236. This third step cited extensively to the Feyrer (2007) article and a Feyrer 2008 paper, along with a citation to Bennett (2005). Facially, the X2 analysis relied on the modeled X2 data, Feyrer's work, and Bennett's 2005 paper.
>
> Plaintiffs suggest that the modeled X2 data did not constitute a separate justification for Action 4 because the reason FWS gave in the BiOp for presenting the Calsim II model results in a monthly time step was "to be consistent with previous analyses (Feyrer 2007, 2008)." BiOp at 235. But, this does not mean that the Calsim II data was somehow dependent upon Feyrer's work. Rather, that data was presented in such a way to be consistent with the way Feyrer analyzed data. In the final analysis, Action 4 did rely extensively, but not exclusively, on Feyrer's articles.

Plaintiffs' letter, responding to a draft of the BiOp, identified a purported flaw in the Feyrer et al. (2008) analysis: the supposed correlation between Fall X2 and delta smelt abundance Feyrer et al. was driven by the presence of a single, apparently outlier, data point. Removing that data point [**144] resulted in a finding of no statistically significant relationship between Fall X2 and the abundance of delta smelt. *See* SLDMWA & SWC Letter to NMFS and FWS (Oct. 20, 2008) at 2 (AR 006407). As the letter noted, "a correlation solely reliant upon a single data point cannot reasonably be considered as an actual indicator of cause." *Id.* Plaintiffs' argument continues:

> That there was no statistically significant relationship between X2 and delta smelt abundance during the 1987-2007 period should not have been surprising given that Feyrer et al. found no statistically significant relationship between the two factors for the 1968-1986 period or for the entire 1968-2007 period. Feyrer et al. (2008) at 14 (AR 018291). Nor was it

No comments

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> surprising considering that--as the Feyrer et al. (2008) article conceded--the existing best available science on delta smelt showed no direct correlation between the location of Fall X2 and delta smelt abundance. Feyrer et al. (2008) at 8 ("[P]revious analyses have not shown simple relationships between X2 and delta smelt abundance.") (AR 018285).

Doc. 551 at 35.

Federal Defendants respond:

> [U]less data points are excluded to control for a specific variable, or for some [**145] other explicit reason that is central to measuring the relationship at issue, [*915] there is no scientific reason to remove a data point from an analysis just because it changes the result. In any event, removing the data point challenged by Plaintiffs does not appreciably change the result - the result goes from a 95% probability the relationship is not due to chance to a 92% probability that the relationship is not due to chance. Moreover, this is an argument that can go both ways. Removing other individual data points would increase the statistical significance.

Doc. 660 at 44. Federal Defendants are correct that removing a data point simply because it changes the result would be arbitrary. Plaintiffs do not point to any scientific basis, let alone an undisputed one, for excluding the so-called "outlier" point, other than that it is an outlier. Plaintiffs do not show the point is erroneous or identify competing studies that reach different opinions from Feyrer that FWS failed to consider. This is a scientific dispute among experts over which the agency is owed deference.

c. Do [**146] the Studies Cited in the BiOp Support FWS's Conclusion that Fall X2 Determines the Extent of Suitable Smelt Habitat?

The BiOp concludes that to avoid jeopardy the RPA Actions must " [i]mprove fall habitat for delta smelt by managing [] X2 through increasing Delta outflow during fall when the preceding water year was wetter than normal." BiOp at 369; *see also* BiOp at 374 ("Outflow during fall determines the location of X2, which determines the amount of suitable abiotic habitat available to delta smelt (Feyrer et al. 2007, 2008)."). Plaintiffs argue that none of the articles FWS cited in the BiOp actually support FWS's conclusion that the location of X2 determines the amount of suitable habitat for the delta smelt. *See* Doc. 551 at 39-41.

(1) Feyrer (2007).

Plaintiffs first criticize the BiOp's reliance on a 2007 Canadian Journal of Fisheries and Aquatic Sciences paper by Feyrer, Nobriga, and Sommer, three scientists then working for Plaintiff DWR, entitled, "Multidecadal trends for three declining fish species: habitat patterns and mechanisms in the San Francisco Estuary, California, USA." AR 018266-77. That paper used a generalized additive model to assess the relationship between changes [**147] in environmental quality for delta smelt (particularly salinity and turbidity) and the abundance of delta smelt. *Id.*

The paper demonstrated that a statistically significant relationship existed between salinity and turbidity in the fall months and the abundance of juvenile delta smelt the following summer for the period of 1987-2004. *Id.* This time period was chosen because it corresponded to the invasion of the *Corbula amurensis* clam which has resulted in significant ecological changes to the Delta. AR 018270. The results demonstrated that 63 percent of sampling stations showed statistically significant declines in environmental quality in the fall, with the western and southeastern regions of the Delta suffering the most substantial long term declines in habitat quality, while the area at the confluence of the Sacramento and San Joaquin Rivers least affected by the changes in fall habitat quality. *Id.*

The Feyrer (2007) analysis uses the results of a 2005 study by William Bennett published in the Journal of San Francisco Estuary and Watershed Science, which concluded: "Factors defining the carrying capacity for juvenile delta smelt are unknown, but may include a shrinking volume of physically [**148] suitable habitat combined with a high density of competing [*916] planktivorous fishes during late summer and fall." AR 017004.

The BA acknowledged the results of this 2007 study, including the conclusion that fall habitat conditions have population level effects:

> Based on a 36-year record of concurrent midwater trawl and water quality sampling, there has been a long-term decline in fall habitat environmental quality for delta smelt (Feyrer et al. 2007). The long-term environmental quality declines for delta smelt are defined by a lowered probability of occurrence in samples based on

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> changes in specific conductance arid Secchi depth. Notably, delta smelt environmental quality declined recently coinciding with the POD (Figure 7-8). The greatest changes in environmental quality occurred in Suisun Bay and the San Joaquin River upstream of Three Mile Slough and southern Delta (Figure 7-9). There is evidence that these habitat changes have had population-level consequences for delta smelt. The inclusion of specific conductance and Secchi depth in the delta smelt stock-recruit relationship described above improved the fit of the model, suggesting adult numbers and their habitat conditions exert important [**149] influences on recruitment.

AR 010626; *see also* AR 10628-29 (reproducing maps and graphics showing habitat declines and geographic distribution of declines from Feyrer (2007)).

The conclusions in Feyrer (2007) were also recognized in the January 2008 report on the Pelagic Organism Decline by the Interagency Ecological Program, which reached nearly identical conclusions about the effects of declining fall habitat quality on delta smelt abundance. *See* AR 016938, 016954, 016957.

Plaintiffs level several criticisms at Feyrer (2007) and the BiOp's use of the study. First, Plaintiffs complain that the Feyrer study "repeatedly states that the article supports only the 'hypothesis' that EQ (a metric devised by Feyrer that incorporates two factors - secchi depth and temperature - in addition to salinity) is 'an important predictor of delta smelt abundance during the 1987-2004 *post-Corbula* period.'" Doc. 697 at 29 (citing AR 018271). The use of the term "hypothesis" does not undermine Feyrer's conclusions, as articulating a hypothesis is a step in the scientific method.

Plaintiffs next point out that while Feyrer (2007) found a statistically significant relationship between the location of X2 and [**150] delta smelt abundance from 1987-2004, there was no statistically significant correlation for the twenty years prior to *Corbula's* arrival (1968-1986). AR 018271. The article acknowledged "[b]iotic variables, most notably competition, predation, and food availability, could have also played a major role in controlling the distribution" of delta smelt and "[t]he recent step change in the abundance of pelagic fish suggests that salinity alone may not be sufficient to explain long-term trends in estuarine management." AR 018275. The article confirms that even when considering specific conductance (i.e., X2), secchi depth, and temperature together, those three factors collectively only predict 25.7% of future delta smelt occurrence. AR 018271. Finally, the article concludes that "the degree to which EQ could be used for management purposes remains unclear." AR 018275.

Tucson Herpetological Society, 566 F.3d 870, held that an agency may not rely on "underdeveloped and unclear" studies to support ESA findings. There, an earlier FWS finding concluded that population dynamics information for the flat-tailed horned lizard was "limited and inconclusive." *Id. at 878*. Nevertheless, FWS relied on [**151] these uncertain studies to infer that [*917] the lizard population remained viable throughout most of its range. *Id.* The Ninth Circuit found that FWS's "affirmative[] reli[ance] on ambiguous studies as evidence of persistence..." to be unreasonable because "the studies do not lead to the conclusion that the lizard persists in a substantial portion of its range and therefore cannot support the Secretary's conclusion." *Id. at 879*.

FWS's reliance on Feyrer (2007) is distinguishable. Although Feyrer (2007) acknowledges that multiple factors may be contributing to the delta smelt's decline, the study affirmatively finds a statistically significant, albeit limited, correlation between the fall location of X2 and subsequent delta smelt abundance. This finding is not uncertain. It acknowledges the context of a complex ecosystem in which many factors may impact the species. Feyrer's X2 analysis explains only 25.7 percent of subsequent year abundance. This is not a *de minimis* impact. (It goes, rather, to the agency's overemphasis on X2 to impose a significantly restrictive fall RPA component.) Plaintiffs cite no studies that demonstrate the cause of the remaining 74.3 percent variation in abundance. [**152] FWS's reliance on Feyrer (2007) was not *per se* unreasonable, however, FWS's use of the study to justify operational restrictions is more questionable.

(2) The Feyrer (2008) Paper.

A 2008 paper by the same authors (Feyrer, Nobriga, Sommer), along with Ken Newman of FWS, appeared in the Estuaries and Coasts journal. *See* AR 018278-306. This expanded upon the 2007 research, used statistical analyses, including both Ricker and Beverton-Holt type models, to compare Fall X2, habitat area for and subsequent abundance of delta smelt. *Id.* Like Feyrer (2007), it concluded that fall habitat quality had a statistically significant effect on subsequent delta smelt abundance, determining that the model incorporating prior abundance and X2 accounted for 66 percent of the variability in subsequent abundance. *Id.* The authors identified a number of reasons why the location and extent of fall habitat affected subsequent abundance:

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> First, positioning X2 seaward during autumn provides a larger habitat area which presumably lessens the likelihood of density-dependent effects (e.g., food availability) on the delta smelt population. For example, food availability during autumn for adult haddock (*Melanogranimus* [**153] *aeglefinus*) likely improves juvenile recruitment the following year (Friedland et al. 2008). Second, a more confined distribution may increase the probability of stochastic events that increase mortality rates of adults. For delta smelt, this includes both predation, as well as anthropogenic effects such as contaminants or water diversion loss (Sommer et al. 2007).

AR 018293. The study concluded: "Comparing the first ten years of the time series to the last ten years, the amount of suitable abiotic habitat for delta smelt during autumn has decreased anywhere from 28% to 78%, based upon the least and most restrictive habitat definitions, respectively." AR 018293-94.

Like Feyrer (2007), Feyrer (2008) narrowly considered abiotic factors alone, and limited its focus on X2. Feyrer (2008) concludes that manipulating X2 might affect delta smelt populations, but that "the specific mechanisms by which X2 affects delta smelt remain poorly understood." AR 018294. Because of this uncertainty, Feyrer (2008) recommended that any "'real world' applications of [its] results should incorporate an adaptive management approach, allowing resource manager[s] to adjust actions in response to new [*918] data collected [**154] on delta smelt habitat conditions and use." *Id.*

Other than arguing that Feyrer (2008), like Feyrer (2007), used the "outlier" data point, Plaintiffs submitted no other substantive criticism of Feyrer (2008). FWS made no error in considering Feyrer (2008).

(3) The Bennett (2005) Article.

Plaintiffs criticize the BiOp's citation of Bennett (2005), because, like the Feyrer studies, this article does not conclude that salinity or the location of X2 is a determinative factor in delta smelt abundance. Bennett (2005) specifically addresses: "[w]hat is the impact of human activities, particularly water export operations, on population abundance?" AR 017061. Bennett (2005) surveyed available data and concluded: "[t]his synthesis of the available information cannot answer th[is] vital management question." AR 017062. "The lack of appropriate data ... impedes efforts to resolve th[is] issue ...." AR 017004.

The BiOp does not rely on Bennett (2005) as the "be all end all" to address the management question. The BiOp cites Bennett (2005) for a series of factual assertions, including the premise that: "There is a statistically significant stock-recruit relationship for delta smelt in which pre-adult [**155] abundance measured by the FMWT positively affects the abundance of juveniles the following year in the TNS." BiOp at 178. Plaintiffs do not disagree that Bennett supports this assertion. *See* AR 017035 (reviewing various studies finding a relationship between X2 position and smelt abundance). Plaintiffs have not demonstrated that the BiOp misrepresented Feyrer (2007), Feyrer (2008), or Bennett (2005), or that any of these studies are not part of the best available science.

d. Does the Best Available Science Support the Assumption that X2 Is a Surrogate for Smelt Habitat?

Plaintiffs object that FWS' use of X2 as a "surrogate" indicator for delta smelt habitat suitability is not supported by the best available science, arguing: "FWS stretched the limited findings of Feyrer et al. (2007 & 2008) far beyond defensible application, converting a tentative finding that the location of X2 might influence habitat suitability into a definite conclusion that X2 alone determines the area and extent of delta smelt habitat for delta smelt." Doc. 551 at 38.

Feyrer (2007) discussed its limitations: "[T]he degree to which EQ [Feyrer's three-part index of environmental quality, which included salinity] could [**156] be used for management purposes is unclear.... salinity alone may not be sufficient to explain long-term trends in estuarine management." AR 018275. Feyrer (2008) concluded, "[o]ur results suggest that managing estuarine flow or X2 during autumn can have positive effects on delta smelt habitat and abundance." AR 018292. The FWS BiOp relied on these two studies to conclude: "Outflow during fall determines the location of X2, which determines the amount of suitable abiotic habitat available to delta smelt (Feyrer et al. 2007, 2008)." BiOp at 374. This is one scientific interpretation of X2's role. It may be a "stretch" or unjustified expansion of Feyrer (2007) or Feyrer (2008), however, when all the disputed X2 studies are considered, X2 has a measurable effect on smelt abiotic habitat. [32]

> 32 The BiOp asserts that Component 3 will improve smelt habitat "quality and quantity" in the fall. BiOp at 282. Plaintiffs point out that FWS has explicitly recognized that delta smelt habitat must be defined to encompass, in addition to space and salinity, food, water, air, light, miner-

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als, or other nutritional or physiological requirements; cover or shelter; sites for breeding; habitats that are protected [**157] from disturbance or are representative of the historic geographical and ecological distributions of a species, including physical habitat, water, and river flow. *59 Fed. Reg. 65,256, 65,259 (Dec. 19, 2004)*. Plaintiffs complain that "X2 is a metric that describes only a two-dimensional space consisting of a particular salinity at a specific depth in the Delta's channels; it is not coterminous with the dynamic three-dimensional space that supports the abiotic and biotic components that define delta smelt habitat." Doc. 697 at 35. In support of this assertion, Plaintiffs refer to many statements in the studies cited in the BiOp, indicating that X2 does not explain all variability in delta smelt abundance and/or distribution. *Id.* Those very same studies and the BiOp acknowledge that, while X2 does not explain everything, it explains enough to consider X2 a proxy for critical habitat and to structure management prescriptions around X2. That X2 is an imperfect proxy is relevant to the degree of uncertainty and justification FWS provides for the specific RPA prescriptions imposed.

[*919] a. Are Delta Smelt Habitat Limited?

Plaintiffs assert that FWS ignored available evidence SLDMWA and SWC presented [**158] to FWS indicating that delta smelt are particularly unlikely to be habitat-limited, given their record low abundance. SLDMWA-SWC Letter at 5-6, AR 006410-006411.

It is unquestioned that delta smelt survey results show decreasing abundance throughout the 2000s, with their current abundance at a historic low. BiOp at 154. In addition, the BiOp notes that "most life stages of the delta smelt are now distributed across a smaller area than historically," and recognizes that this is likely due to multiple factors, including channelization, conversion of Delta islands to agriculture, water project operations, salinity, turbidity, high summer water temperatures, and predacious species. BiOp at 152-53, 157. Plaintiffs argue that "simply because the delta smelt may currently occupy lesser spatial area than they did previously, does not mean that forcing a relocation or expansion of X2 will impact the species beneficially or at all." Doc. 697 at 33. Most of Plaintiffs' evidence submitted to support this argument has been stricken. *See* Doc. 750 at I 8 (striking paragraphs 14-17 of the Declaration of Charles H. Hanson, Doc. 395). Plaintiffs insist that the BiOp itself admits that the delta smelt [**159] is not currently habitat-limited, citing pages 237 and 374. Page 237 makes such an admission, but it is qualified:

Combined, these effects of project operations on X2 will have significant adverse direct and indirect effects on delta smelt. Directly, these changes will substantially decrease the amount of suitable abiotic habitat for delta smelt, which in turn has the possibility of affecting delta smelt abundance through the depensatory density-dependant mechanisms outlined above. Because current abundance estimates are at such historic low levels, depensatory density-dependence can be a serious threat to delta smelt despite the fact that the population may not be perceived to be habitat limited. It is clear from published research that delta smelt has become increasingly habitat limited over time and that this has contributed to the population declining to record-low abundance levels (Bennett 2005; Baxter et al. 2008; Feyrer et al. 2007, 2008; Nobriga et al. 2008). Therefore, the continued loss and constriction of habitat proposed under future project operations significantly threatens the ability of a self-sustaining delta smelt population to recover and persist in the Estuary at [**160] abundance levels higher than the current record-lows.

(Emphasis added). Pages 374-75 state:

The persistence of this significant hydrologic change to the estuary threatens [*920] the recovery and persistence of delta smelt. Outflow during fall determines the location of X2, which determines the amount of suitable abiotic habitat available to delta smelt (Feyrer et al. 2007, 2008). The long-term upstream shift in X2 during fall has caused a long-term decrease in habitat area availability for delta smelt (Feyrer et al. 2007, 2008), and the condition will persist and possibly worsen in the future. This alone is a significant adverse effect on delta smelt.

However, the problem is further complicated because there are several lines of published peer reviewed scientific research that link habitat alteration to the decline of delta smelt (Bennett 2005; Feyrer et al. 2007; Nobriga et al. 2008). An important point regarding this action is that because of the current, extremely

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> low abundance of delta smelt, it is unlikely that habitat space is currently a limiting factor. However, it is clear that delta smelt have become increasingly habitat limited over time and that this has contributed to the population [**161] attaining record-low abundance levels (Bennett 2005; Baxter et al. 2008; Feyrer et al. 2007, 2008; Nobriga et al. 2008). Further, as detailed in the Effects section, persistent degraded or worsened habitat conditions are likely to contribute to depensatory density-dependent effects on the delta smelt population while it is at historical low levels, and would at some point in the proposed term of this project, limit delta smelt recovery.

While "admitting" that the delta smelt may not be habitat-limited, the smelt has become "increasingly habitat-limited over time," contributing to the population's decline, and that worsening habitat conditions may limit smelt recovery. Plaintiffs have not presented any record best available scientific evidence not considered by FWS that contradicts this conclusion.

b. FWS' Use of a Linear Model Instead of a Multiplicative Stock-Recruit Model .

Plaintiffs next argue that FWS committed a serious scientific error by employing a linear additive model to determine the effect of Fall X2 on delta smelt abundance. *See* BiOp at 268, Figure E-22. Dr. Deriso opines that FWS' use of the linear additive model ran counter to decades of established scientific consensus [**162] that linear models are not effective for modeling fish populations. Deriso Decl., Doc. 396, at I 80. He claims that standard practice in fisheries management is to use a multiplicative stock-recruit model, such as the Beverton-Holt or Ricker models, both of which are among the standard tools of the relevant science. *Id.* at ¶ 83; *see also* Hilborn, Decl., Doc. 393, at ¶ 31.

The BiOp estimated the effect of X2 on delta smelt abundance by using an updated version of the linear-additive model developed in Feyrer (2008). BiOp at 236. The result was Fig. E-22, which shows a linear relationship between X2 and delta smelt abundance such that juvenile abundance (which is measured using the Spring Tow-Net Survey) is equal to the sum of a constant number, plus the previous year's Fall Midwater Trawl Survey (times a constant number), minus X2 (times a constant number). BiOp at 268. Put simply, FWS' calculation found that A = B + C - D. Deriso Decl., Doc. 396, at ¶ 78.

Dr. Deriso explains the two fundamental problems with using an additive model. First, a linear additive model can produce the biologically implausible result that the total absence of adults in one year (i.e., no mature smelt to mate [**163] and lay eggs) could still result in the model indicating the presence of newborn smelt the next year. *Id.* at ¶ 80. As Dr. Deriso explains, this nonsensical result is the product of basic [*921] mathematical structure: if A (number of juveniles) = B (constant) + C (adults) - D (Fall X2), then A can be positive even if C is zero, as long as B is larger than D. *See id.*

The second fundamental problem with a linear additive model is that it treats X2 as a purely "additive factor," meaning that an increase of X2 by one unit will always reduce the delta smelt population by a certain number, no matter how large or small the total population may be. *Id.* at ¶ 81. Dr. Deriso's critique implies that if changes in X2 are harmful to delta smelt, it is logical to expect that a change in X2 would affect a considerably higher absolute number of delta smelt in a population of 1,000,000 than in a population of 1,000. *See id.*

Use of a multiplicative stock-recruit model solves both of these deficiencies. *Id.* at II 84-85. Multiplicative models are the textbook standard for modeling fish and other populations. *See* Deriso Decl., Doc. 396, at ¶ 43 n.3 (citing a representative sample of studies making use of multiplicative [**164] stock-recruit models); *see also, e.g.*, Bennett (2005) at 28-29 (using a multiplicative stock-recruit model for smelt abundance), AR 017031-017032; *see also* Hilborn Decl., Doc. 393, at II 30-31. Multiplicative stock-recruit models are preferred because they can better reflect the biological realities and idiosyncrasies of the fish species of concern. *See* Deriso Decl., Doc. 396, at I 83. This is because survival processes are inherently multiplicative: the fraction of individuals that survive to a given age will naturally be the product of all of the previous daily survival rates since birth. *Id.* Dr. Hilborn opined that the linear additive "approach is totally inconsistent with accepted practice in population dynamics." Hilborn Decl., Doc. 393, at ¶ 30.

Plaintiffs point to several record documents critical of FWS's modeling approach. For example, several Plaintiffs sent comment letters recommending the use of a logarithmic model. *See* AR 006406. In addition, the Peer Review Panel expressed general concerns with the linear model, stating "the model may be inappropriate for the data being used." AR 008819.

FWS noted in the BiOp that although the regression model works for 56 percent of the [**165] data points, the residuals are "not normally distributed." BiOp at 236. FWS continued, "[t]he pattern of the residuals suggests that some type of transformation of the data would help

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to define a better fitting model (Figure E-22). This analysis did not explore different data transformations." *Id.* Plaintiffs maintain that "exploring" different data transformations would not require FWS to conduct independent studies or to develop any new types of mathematical models, but rather would only require plugging existing data into the standard model used by fisheries biologists throughout the world. *See* Deriso Decl. ¶ 89.

Federal Defendants respond that this critique is much ado about nothing because, even though linear additive models can produce "biologically infeasible results" in some situations, the data set employed in the BiOp could not have created such a problem. *See* Newman Decl., Doc. 484, at I 19 (explaining that "for the given range of FMWT index and X2 values, the model-fitted values remained positive" using the linear model). Dr. Newman opined that "linear models are often used as approximations to more realistic nonlinear models, and often over the range of covariate values [**166] of interest the nonlinear model may in fact be relatively linear." *Id.*

[*922] A court "may reject an agency's choice of a scientific model 'only when the model bears no rational relationship to the characteristics of the data to which it is applied." *NWF v. EPA, 286 F.3d at 565*; *see Nat'l Ass'n of Metal Finishers v. EPA, 719 F.2d 624, 657 (3rd Cir. 1983)* ("the choice of scientific data and statistical methodology to be used is best left to the sound discretion of the [agency]") *rev'd* on other grounds *sub nom., Chem. Mfrs. Ass'n v. NPJDC, 470 U.S. 116, 105 S. Ct. 1102, 84 L. Ed. 2d 90 (1985).*

Here, Plaintiffs critique raises a scientific dispute among experts. Dr. Newman's declaration provides evidence that the linear model used in the BiOp is not totally inappropriate. *See* Newman Decl., Doc. 484, at ¶ 19. It requires refinement, which FWS said it did. Newman's declaration also points out that the re-analysis by Dr. Deriso, using Deriso's model of choice, yields a result that also exceeds the 0.05 threshold of statistical significance. *Id.*

Feyrer's 2007 analysis was published in a peer-reviewed scientific journal. Although the BiOp's Effect's Analysis Peer Review questioned the model, the reviewers did not recommend that the [**167] analysis or action be excluded; instead, that panel broadly supported implementation of the Fall X2 action, based in part on the analysis using the linear model, provided that the BiOp impose requirements for continued refinement of the analysis and implementation of the action by adaptive management. It is a close call. Absent agency bad faith, Plaintiffs have not established that this modeling dispute proves FWS violated the best available science standard.

c. DWR's Challenge to the BiOp's Choice of X2 Location.

RPA Component 3 (Action 4) requires the Projects to be operated to maintain X2 during the fall months at a location no greater than 74 km upstream from the Golden Gate Bridge following wet water years, and no greater than 81 km upstream following above normal water years. BiOp at 282-283. The rationale for this Component rests in large part on the Calsim II Dayflow comparison articulated in the Effects Analysis and discussed above. *See* BiOp 373-375, (explaining that the Effects section "clearly indicates there will be significant adverse impacts on X2"). As already determined, in the absence of calibration of the two models, the Calsim II to Dayflow comparison has the potential [**168] to introduce significant, if not overwhelming, bias to the analysis that the BiOp nowhere discussed or corrected. The X2 action must be remanded to the agency for further consideration.

DWR also argues the X2 action is unlawful for a different reason, arguing that "[a]lthough the BiOp explains why Action 4 is to be implemented only in certain water year types, *see* BiOp 373-75, it fails completely to explain or justify the requirement that X2 be held at the locations specified." Doc. 548 at 9. Federal Defendants have not identified any record evidence that provides such an explanation. This total lack of explanation violates the APA's requirement that FWS "examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." *Motor Vehicle Mfrs. Ass'n v. State Farm Mutual Auto. Ins. Co., 463 U.S. 29, 43, 103 S. Ct. 2856, 77 L. Ed. 2d 443 (1983).* This failure also violates FWS's own Consultation Handbook implementing the ESA, which requires: "When a reasonable and prudent alternative consists of multiple activities, it is imperative that the opinion contain a thorough explanation of how each component of the alternative is essential [**169] to avoid jeopardy and/or adverse modification." [*923] ESA Handbook at 4-43. The BiOp violates this requirement because it fails to explain why it is essential to maintain X2 at 74 km and 81 km, respectively, as opposed to any other specific location.

(4) Challenges to Turbidity Trigger.

In their opening brief, Plaintiffs argue that one of the underlying tenants of Component 1 -- the link between turbidity and smelt presence -- has been "revealed as wholly arbitrary and capricious." Doc. 551 at 29. Action 1 of RPA Component 1 is triggered when "first flush conditions" occur, which are demonstrated by elevated river inflow and turbidity. BiOp at 280-81. The BiOp claims turbidity is an appropriate "on-ramp" indicator for

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Action 1, because delta smelt presence and densities are correlated with turbid water, i.e., more delta smelt are found in turbid water than in clearer water, and so as turbid waters move towards CVP/SWP pumps, delta smelt must as well, which warrants severe pumping restrictions. *See* BiOp at 150-51, 280-81, 329-30.

Plaintiffs argue that after issuing the disputed BiOp and the RPA, FWS "recanted its confidence in the usefulness of turbidity as such an indicator" in a December 2009 [**170] "Interim Federal Action Plan for the California Bay-Delta" ("Federal Action Plan") to which FWS was a signatory. Doc. 551 at 29. That Federal Action Plan, which was attached to the Declaration of Ronald Milligan [33] in Support of Federal Defendants' Opposition to Plaintiffs' Motion for Interim Remedy/Preliminary Injunction ("Milligan Decl."), Doc. 471, ¶ 11 & Exh. 3 at 10, contains the following discussion of a "2-Gates Fish Protection Demonstration Project":

> [The P]roject was proposed as a scientific experiment to test the hypotheses that delta smelt follow turbidity and that smelt entrainment at the pumps could be prevented by keeping turbid water away from the pumps.... Once in place, the gates would be operated to reduce turbidity near the State and Federal pumps, and an evaluation could then be made of whether turbidity is, in fact, an accurate predictor of the presence of smelt.

Id. (emphasis added). Plaintiffs complain that "FWS cannot simultaneously view turbidity as only a hypothetical indicator of delta smelt presence, and also as a scientifically defensible basis to develop an RPA with significant water costs. The two positions are fundamentally contradictory, resulting in [**171] an arbitrary RPA." Doc. 551 at 30.

> 33 Mr. Milligan is the Manager of Reclamation's Central Valley Operations Office, with responsibility for the day to day operations of the CVP. Milligan Decl., Doc. 471, at ¶ 1.

Plaintiffs are mistaken. First, the turbidity indicator is not an automatic trigger for RPA Component 1:

> In order to prevent or minimize such entrainment, Action 1 shall be initiated on or after December 20 if the 3 day average turbidity at Prisoner's Point, Holland Cut, and Victoria Canal exceeds 12 NTU, or if there are three days of delta smelt salvage at either facility or if the cumulative daily salvage count is above the risk threshold based upon the 'daily salvage index' approach described in Attachment B.... However, the SWG can recommend a delayed start or interruption based on conditions such as delta inflow that may affect vulnerability to entrainment.

BiOp at 281 (emphasis added).

FWS's reliance on turbidity as a potential indicator of smelt presence or movement was justified. The BiOp explains these physical conditions provide foraging, reproductive, and other behavioral and biological [*924] benefits to delta smelt. Turbid waters make it more difficult for delta smelt to be [**172] preyed upon, BiOp at 150-51, and also make it easier for delta smelt to forage for their prey, *id.* (citing 2004 study by Baskerville-Bridges). The preference of delta smelt for turbid waters has been verified in laboratory conditions with captive delta smelt, BiOp at 150 (citing a 2008 review by Nobriga and Herbold), and also in the field, where studies have observed "a negative correlation between the frequency of delta smelt occurrence in survey trawls during summer, fall and early winter and water clarity," *id.* (citing 2007 study by Feyrer and 2008 study by Nobriga). Increased turbidity is a documented indicator of improved habitat quality for delta smelt. Plaintiffs have provided any available science on the subject that was not considered. It was reasonable for the FWS to rely upon turbidity in RPA Component 1 as a potential predictor of delta smelt movement and adult delta smelt distribution.

The Federal Action Plan does not undermine this conclusion. As a threshold matter, the Plan is an extra-record document. Even if it were part of the record, it does nothing to call the FWS's reliance on turbidity into question. The quote from the Plan relied upon by Plaintiffs describes the [**173] "2 Gates Fish Protection Demonstration Project," a forthcoming project designed to examine whether turbidity can be physically manipulated through barge-mounted gate structures, in an effort to keep delta smelt away from the influence of the pumps so that export pumping can be increased for the benefit of Plaintiffs and other agricultural concerns. Federal Action Plan at 10. The Action Plan will result in FWS and Reclamation continuing to study turbidity. *See* Federal Action Plan at 10-11 (announcing the publicly funded installation of an additional "14 real-time turbidity sensors in the Delta"). That further study is called for does not undermine the record evidence supporting the use of turbidity as an indicator.

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Plaintiffs do not address the turbidity trigger in their reply brief. Federal Defendants reliance on turbidity as one of several triggers for Action 1 was not arbitrary and capricious.

(5) Challenges to the Incidental Take Limit/Selective Use of Data.

Plaintiffs maintain Federal Defendants' failed to use the best available scientific data by selectively excluding data from certain parts of the BiOp, while including that data in other sections for different purposes. In particular, [**174] Plaintiffs maintain that such selective use of data tainted: (1) the analysis of the effects of OMR flows on delta smelt; and (2) the formulation of the incidental take statement. [34]

34 The opening paragraph of the section of Plaintiffs' motion for summary judgment addressing the selective use of data also asserts that this practice tainted the BiOp's justification for monthly flow requirements under RPA Action 4 and examination of the effects to the species of exports of Article 21 water by the SWP. Doc. 551 at 25. However, these two additional arguments were not discussed or supported in the text of Plaintiffs motion. They will not be addressed.

a. FWS's Exclusion of Certain Data Points When Analyzing Entrainment.

On the impact of negative OMR flows on entrainment, the BiOp relies on a plot of the total number of salvaged adult delta smelt against OMR flows for the period from 1984 to 2007, BiOp at 164 (Figure S-8), and uses this plot to support the conclusion that entrainment of adult delta smelt rises with increasingly negative OMR [*925] flows, *see* BiOp at 164-65, 348-49. It is also undisputed that FWS eliminated certain data from that plot, excluding data from the years 1987, 1989, 1990, [**175] 1991, 1992 and 2007 because "low turbidity conditions" existed in Clifton Court Forebay. BiOp at 164.

This is explained in the graph itself. *Id.* (1987, 1989-92, 1994, and 2007 were excluded because those years exhibited low (<12ntu) average water turbidity during Jan-Feb at Clifton Court Forebay). The BiOp explains that turbidity is a potential indicator of smelt presence or movement. BiOp at 151. The BiOp presents defensible grounds for excluding these data points; Plaintiffs do not provide any evidence suggesting these exclusions were scientifically improper. There is no independent legal reason why FWS should be precluded from excluding certain data points if scientifically justified.

Under its mandate to utilize the best available science, FWS "cannot ignore available, relevant biological information." *Conner v. Burford, 848 F.2d 1441, 1454 (9th Cir. 1988)*; *Kandra v. United States, 145 F. Supp. 2d 1192, 1208 (D. Or. 2001)*. Plaintiffs cite *Sierra Club v. EPA, 346 F.3d 955, 961 (9th Cir. 2003)*, for the proposition: "[t]he inclusion of data for one purpose and the exclusion of the same data for another, intimately related, purpose is impermissible" and "violates the best available science [**176] standard." Doc. 551 at 27. *Sierra Club* does not stand for such a proposition. The *Sierra Club* plaintiffs challenged EPA's conclusion under the Clean Air Act that exceedences of air pollution standards on two particular days in Imperial County, California were caused by transborder emissions from Mexico. *346 F.3d at 959-60*. The Ninth Circuit recognized that "where, as here, a court reviews an agency action xinvolv[ing] primarily issues of fact,' and where 'analysis of the relevant documents requires a high level of technical expertise,' we must 'defer to the informed discretion of the responsible federal agencies.'" *Id. at 961* (quoting *Marsh, 490 U.S. at 377*). Such deference was not owed where the agency decision "is without substantial basis in fact." *Id.* EPA's decision was vacated after plaintiffs presented uncontested evidence, based on wind data, that the pollution at issue was not caused by transborder emissions. *Id. at 961-62*. Nowhere did the Ninth Circuit discuss or find that EPA included data for one purpose while excluding it for some other related purpose, nor did it evaluate or even mention the ESA's best available science standard. Plaintiffs' argument is without legal or [**177] factual support.

b. FWS's Use of Data to Examine the Relationship Between OMR Flows and Salvage and Exclusion of that Data from the Incidental Take Limit Analysis.

Plaintiffs next argue that FWS acted unlawfully by selectively using certain data when examining, the relationship between negative OMR flows and entrainment while excluding that same data from the calculation of the incidental take limit.

Where FWS concludes that "an action (or the implementation of any reasonable and prudent alternatives) and the resultant incidental take of listed species will not violate section 7(a)(2) ... the Service will provide with the biological opinion a statement concerning incidental take." *50 C.F.R. § 402.14(i)(1)*; *see also 16 U.S.C. § 1536(b)(4)*; BiOp at 285-93. The Incidental Take Statement ("ITS") provides an exemption from the take prohibitions of ESA section 9 when the agency can demonstrate compliance with its terms and conditions. Consultation Handbook 4-47. It "specifies the impact, i.e., the amount or extent, of such incidental taking on the [*926] species," with an estimate of the number of individuals

No comments

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reasonably likely to be taken with full implementation of the RPA. [35] *50 C.F.R. § 402.14(i)(1)(i)* [**178] ; Consultation Handbook 4-50.

35 Federal Defendants note that there is no requirement that an ITS identify an anticipated number of listed species to be taken. *See Ariz. Cattle Growers, 273 F.3d at 1249* ("We have never held that a numerical limit is required"); *Pacific Nw. Generating Coop. ("PNGC") v. Brown, 822 F. Supp. 1479, 1510 (D. Or. 1993)*, aff'd, *38 F.3d 1058 (9th Cir. 1994)*. In rejecting such an argument in PNGC, the District of Oregon cited legislative history that "demonstrates that Congress fully anticipated that there would be occasions when impacts would have to be estimated." *Id.* (citing S. Rep. No. 97-418, 97th Cong.2d Sess. 21 (1982), U.S.C.C.A.N. 1982, p. 2807 (take specification not a "quota" requirement)). The court also noted that other legislative history stated, "The Committee ... does not intend that the Secretary will, in every instance, interpret the word 'impact' to be a precise number...For example, it may not be possible to determine the number of eggs of an endangered or threatened fish which will be sucked into a power plant ...." *Id.* (citing H.R. Rep. No. 97-567, 97th Cong., 2d Sess. 27 (1982), U.S.C.C.A.N. 1982, p. 2827)).

The Consultation Handbook enumerates [**179] three criteria for ITS take: (1) the take must not be likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) it must result from an otherwise lawful activity; and (3) it must be incidental to the purpose of the action. Consultation Handbook 4-48. An agency action can meet the first criterion if the RPA eliminates the likelihood of jeopardy to the species or adverse modification of designated critical habitat. *Id.* If FWS determines that full implementation of the RPA is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat, the ITS is its estimate of the number of individuals which will be taken once the RPA is implemented. If this number is exceeded, the agency must immediately reinitiate consultation with FWS. *50 C.F.R. § 402.14(i)(4)*.

FWS provided an ITS in the BiOp that sets forth the anticipated level of take that will occur as a result of CVP/SWP operations under the RPA. The BiOp employs an adaptive approach that utilizes a formula to compute the take limit each year using the prior Fall Midwater Trawl Index. BiOp at 287, 383-86. The ITS provides separate [**180] estimates of the amount of take anticipated for adult and larval/juvenile life stages of delta smelt upon full implementation of the RPA. *Id.*

BiOp Appendix C explains the methods FWS used to determine adult and juvenile take. To estimate the amount of take, FWS approximated salvage that would be expected under similar conditions, based upon recent historic data from the export salvage facilities. [36] Goude Decl., Doc. 470, at ¶ 14. As Ms. Goude explains, the procedure FWS used yields a discrete value for take as salvage so that the adaptive process can operate relative to an estimate of the absolute number of fish extant in the system. *Id.* at ¶ 15. The calculation of incidental take varies by year under this [*927] methodology, depending on the previous year's FMWT index. This allows take to increase as delta smelt abundance increases. *Id.* Conversely, when the FMWT index is low, the permissible level of take is also reduced. *Id.*

36 Ms. Goude explains in her declaration that the actual number of fish "salvaged" -- that is, recovered and counted at the export facility fish screens -- is a small proportion of those actually lost due to CVP/SWP operations. Goude Decl., Doc. 470, at ¶ 16. Pre-screen [**181] losses (e.g., those that occur as they enter the structures of the export salvage facilities) can account for additional sources of mortality that remain uncounted, but have been shown to be significant for delta smelt and salmonids. *See* BiOp at 209. Also, delta smelt smaller than 20mm long are not counted in salvage counts, thus significant, uncounted losses of juveniles can occur. Goude Decl., Doc. 470, at ¶ 16. For these reasons, salvage is not a completely accurate measure of actual project take via entrainment. *Id.*

The BiOp sets an incidental take limit for prespawning adult delta smelt based on "[t]he average [cumulative salvage index] value for [water years] 2006 to 2008...." BiOp at 287. According to FWS, the years 2006, 2007 and 2008 data were selected because "these years within the historic dataset best approximate expected salvage under RPA Component 1." *Id.* In contrast, FWS relied on a graph that excluded data from 2007 when it analyzed the related "OMR-Salvage relationship for adult delta smelt" which underlies RPA Component 1 and the Project Effects Analysis. BiOp at 348. Plaintiffs argue that "the 2007 data should have been included in the above-described analyses or [**182] excluded from both." Doc. 551 at 27. Plaintiffs point out that the inclusion of the 2007 data in calculating the incidental take limit lowered the average cumulative salvage index value and, the take limit ultimately imposed. *See* Deriso Decl., Doc. 396, at I 99 (explaining that exclusion of the 2007 data increased the take coefficient from 7.25 to 10.45). Plaintiffs maintain that FWS unjustifiably included 2005 data in setting the juvenile take limit, but excluded the data in setting the adult take limit.

No comments

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The BiOp explains why these years were used. In estimating conditions under which take would occur, FWS initially restricted itself to those years where active adaptive management was used to reduce entrainment and salvage was similar to that expected by RPA operations. *See* BiOp 385-86. Only two years are comparable to this scenario, 2007 and 2008. In order to increase sample size for what FWS knew was a rough estimate, the BiOp utilized the range 2006 to 2008 for adult smelt entrainment, and 2005-2008 for juvenile smelt entrainment. Goude Decl., Doc. 470, at ¶ 14; *see* BiOp at 382-96.

Plaintiffs rejoin that "[i]t was per se unreasonable for FWS to make use of the 2007 salvage data in [**183] calculating the ITS because it "best approximate[d] expected salvage under RPA Component 1," after earlier rejecting the same data for Fig. B-13 because it was unrepresentative of salvage trends, and thus could not be used to calculate the OMR flow limits for RPA Component 1." Doc. 697 at 43.

However, such data was used for an entirely different purpose in these two scenarios. Figure B-13 was applied to examine the point at which negative OMR flows posed an unacceptable danger to the smelt. It was premised on a data set of more than 20 years. It was reasonable under those circumstances to exclude data that accounted for confounding factors, such as turbidity. FWS determined that the best way to calculate the ITS (which seeks to estimate take levels that will occur if the RPA Actions are implemented) was to look at years in which flow restrictions similar to those imposed by the RPA Actions were in place. This data set was far smaller, arguably justifying the inclusion of 2007.

Plaintiffs' argument that 2007 should have been treated as an "outlier" for purposes of the ITS is not accurate. As Federal Defendants explain:

> [D]ata from 2007 [] is, in actuality, data from conditions similar [**184] to those under the RPA -- where there was salvage under adaptive management to reduce entrainment. Goude Decl. at ¶ 14. The estimates contained in the ITS are intended to reflect operations during a full [*928] range of year-types, not just those years when smelt entrainment is highest.

Doc. 660 at 53-54.

Plaintiffs' assertion that the sample size of years was too small presents a scientific dispute. In preparing the ITS, FWS selected years for inclusion to replicate expected operations under the RPA. BiOp at 287. Due to limited data, FWS exercised scientific discretion to select the "most appropriate" years to estimate the level of incidental take.

As to the inclusion of 2005 in the calculation for the juvenile take limit, but not in the adult take limit, the BiOp states:

> The mean values from 2005-2008 were used as an estimate of take under the RPA. The reason for selecting this span of years is that the apparent abundance of delta smelt since 2005 as indexed by the 20-mm Survey and the TNS is the lowest on record. It was necessary to separate out this abundance variable, but also to account for other poorly understood factors relating salvage to OMR, distribution, and the extant conditions....

BiOp at 289. [**185] Federal Defendants also attempt to provide an explanation based on the record:

> [T]he Service explained the separate treatment of juveniles and adults, noting that "individuals of the larval/juvenile lifestage are less demographically significant than adults." BiOp at 289. Plaintiffs acknowledge - but dismiss - the biological justification that the Service provided for considering 2005 for juveniles: "the apparent abundance of delta smelt since 2005 ... is the lowest on record." BiOp at 289. Based on information from the summer townet survey and the 20mm Survey, it was reasonable for the Service to include the 2005 juvenile data in its computations. BiOp at 392.

Doc. 660 at 53. These justifications do not explain why the approach used to select the years for the adult ITS (years in which conditions mimicked those under the RPA) was abandoned for criteria based upon low smelt abundance. FWS has not provided a rational explanation for this aspect of the ITS.

Plaintiffs argue the 2006 data point should be excluded from the ITS calculation for larval/juvenile smelt, because that year was "one of only three years in the entire multi-decade sample in which OMR flow was positive, resulting in [**186] almost zero salvage. *See* BiOp at 254." Doc. 551 at 32 (noting that the juvenile salvage index was 0.4 in 2006, compared with values of 23.4 for 2005, 65.1 for 2007, and 60.9 for 2008). Plain-

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tiffs argue that the use of the 2006 data point to calculate the larval/juvenile ITS was unreasonable because it was entirely unrepresentative of normal salvage levels. Plaintiffs also point out that removing unrepresentative data points "significantly increases the take level." Deriso Decl., Doc. 396, at I 105. Federal Defendants do not address this potential flaw in the logic underlying the juvenile/larval ITS. Because the juvenile/larval ITS must be remanded on other grounds, FWS should explain why 2006 was included.

c. DWR's Additional Challenges the ITS.

DWR contends the ITS is flawed because it depends on the average cumulative salvage index of the years selected. Because the incidental take estimate is based on an average, there is theoretically a 50% chance each year that the estimate will be exceeded, and a corresponding 50% chance that the agency will have to reinitiate the consultation. Doc. 548 at 11-12. The estimate would have been exceeded in two of the three years used to calculate [**187] it.

[*929] The record does not explain why an "averaging" approach was used. As part of the process of formulating the ITS, FWS generated a "Concern Level" estimate, "meant to indicate salvage levels approaching the take threshold." BiOp at 387. FWS expressed its "belief" that the "Concern Level" should "trigger at 75 percent of the adult incidental take, as an indicator that operations need to be more constrained to avoid exceeding the incidental take." *Id.* This means the ITS is not only a threshold used to trigger reconsultation; it also functions as an action that influences operations under the RPA.

Based on known adverse water supply consequences of operating the Projects in a "constrained" manner, it is inexplicable that FWS did not provide a clear and rational explanation of how the ITS is set. A court, "cannot infer an agency's reasoning from mere silence," and "an agency's action must be upheld, if at all, on the basis articulated by the agency." *See PCFFA, 426 F.3d at 1091*. Because no such explanation or basis is provided, the entire ITS must be remanded for the required justifying explanation.

DWR further maintains that the BiOp incorrectly calculated the number of years in which [**188] the incidental take limit was historically violated. The BiOp states that the take estimate would be exceeded only five out of the fifteen years between 1993 and 2008. BiOp at 386. This conclusion results from an error. BiOp Table C-l, calculating the number of years the take estimate was exceeded, actually shows that this threshold would be exceeded not only in the five identified years, but in six more years, including two of the years (2006 and 2008) that FWS believes best approximate the future with the RPA fully implemented, a total of eleven out of the sixteen years. *Id.* FWS must correct these errors on remand.

(6) Challenges to the BiOp's Analysis of the Hydrodynamic Effects of the Projects.

Plaintiffs next challenge the BiOp's Project Effects Analysis as unlawful, because it: (1) bases the analysis of effects of Project Operations on the improper assumption that such operations "control" or "drive" hydrodynamic conditions in the Delta, and (2) then determines, relying on this assumption, that because CVP and SWP operations drive the hydrodynamic conditions in the Delta, those operations are the indirect cause of harm to delta smelt; when in truth a multitude of other causes ranging [**189] from predation to the adverse effects associated with invasive species contribute to the delta smelt's currently low population levels.

The BiOp explains:

> [There are a] multitude of factors that affect delta smelt population dynamics including predation, contaminants, introduced species, entrainment, habitat suitability, food supply, aquatic macrophytes, and microcystis. The extent to which these factors adversely affect delta smelt is related to hydrodynamic conditions in the Delta, which in turn are controlled to a large extent by CVP and SWP operations. . . . So while many of the other stressors that have been identified as adversely affecting delta smelt were not caused by CVP and SWP operations, the likelihood and extent to which they adversely affect delta smelt is highly influenced by how the CVP/SWP are operated in the context of annual and seasonal hydrologic conditions. While research indicates that there is no single primary driver of delta smelt population dynamics, hydrodynamic conditions driven or influenced by CVP/SWP operations in turn influence the dynamics of [*930] delta smelt interaction with these other stressors (Bennett and Moyle 1996).

BiOp at 202. Plaintiffs take issue [**190] with the logic and science of this opinion, asserting: (1) in reality, Project Operations do not "control" or "drive" hydrodynamic conditions in the Delta; and (2) hydrodynamic conditions in the Delta do not exert a "high degree of

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influence" over the other stressors on delta smelt and its habitat, which operate independently.

a. Project Operations as a Driver of Hydrodynamic Conditions in the Delta.

Plaintiffs complain that the BiOp "simply assumed that Project Operations drive hydrodynamics thereby exacerbating the effects of other causes of harm on the delta smelt," although the contrary is established by the record. Doc. 551 at 53. Plaintiffs maintain that Project Operations do not control precipitation patterns, which are the real drivers of inflow to the Delta watershed. *Id.* [37]

> 37 In a related argument, Plaintiffs challenge the BiOp's conclusion that the long-term upstream shift in the position of X2 was driven by Project Operations. Plaintiffs insist that the premise that Project operations drive hydrodynamic conditions in the Delta is unsupported by the record and best available science. Rather, they insist historic change in X2 was primarily driven by non-Project causes. Doc. [**191] 697 at 38. The majority of evidence provided by Plaintiffs in support of this argument, cited in their Reply brief, is inadmissible on summary judgment. For example, Plaintiff's cite paragraph 5 of the Reply Declaration of Dr. Charles Hanson, Doc. 598, which was stricken from the record, *see* Doc. 750 at ¶ 10. Plaintiffs also cite extensively to the transcript from the evidentiary hearing on the motion for preliminary injunction. Plaintiffs have provided no authority that the testimony of witnesses at a post-record hearing is admissible under any of the exceptions to the general rule prohibiting consideration of extra-record evidence, except to explain scientific matter and to determine if the information was considered by the agency.

CALFED scientists concluded in a 2008 Report:

> Despite California's extensive system of water storage and flow management, there is growing evidence that our capacity to manage water supply and water quality is limited. For example, there is no getting around the fact that natural patterns of precipitation and runoff drive Central Valley hydrology, and that the salinities found in the Bay- Delta are driven as much by natural climate variability as they are [**192] by freshwater management (Knowles 2002).

CALFED Science Program, The State of Bay-Delta Science 2008 42-43 (2008), Doc. 199 ("State of Bay-Delta Science"). [38] Similarly, Dr. Kimmerer has stated:

> Freshwater supply to the San Francisco Estuary depends on highly variable precipitation patterns and the effects of extensive water development projects upstream and within the Delta....
>
> ***
>
> Given the extent and magnitude of the water projects, it may seem paradoxical that most of the interannual variability in flow patterns in the estuary is due to variability in precipitation.

Wim J. Kimmerer, Open Water Processes of the San Francisco Estuary: From Physical Forcing to Biological Responses, 2(1) San Francisco Estuary & Watershed Science 15 (2004), AR 18717-18718. Indeed, precipitation patterns are highly variable. *See* State of Bay-Delta Science at 40-42 ("precipitation patterns are highly [*931] variable from year to year (inter-annually) and within years (seasonally)"). As a result, "[f]reshwater input to the estuary is highly variable on all time scales." Wim J. Kimmerer et al., Variation of Physical Habitat for Estuarine Nekton with Freshwater Flow in the San Francisco Estuary (May 15, 2008), AR 019016; [**193] *see also* Public Policy Institute of California, Envisioning Futures for the Sacramento-San Joaquin Delta 102 (2007) (stating that inflows to the Delta "vary greatly across seasons and years"), AR 019343.

> 38 Plaintiffs motion to supplement the record with this document was granted in part, allowing Plaintiffs to reference the document and the Court to consider the document under the relevant factors exception to the administrative record doctrine. Doc. 406 at 4.

The first paragraph of the Effects analysis states that "hydrodynamic conditions in the Delta... are controlled to a large extent by CVP and SWP [pumping] operations," and that other sources of water diversion "when taken together do not control hydrodynamic conditions throughout the Delta to any degree that approaches the influence of the Banks and Jones export facilities." BiOp at 202. This apparent inconsistency with the science must be considered in light of the BiOp's next page, which explains that "every day the system is in balanced conditions, the CVP and SWP are [] primary driver[s] of delta smelt abiotic and biotic habitat suitability, health, and mortality." BiOp at 203. The BiOp does not assume that

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pumping operations [**194] continuously drive hydrodynamic conditions; rather, Project operations primarily drive hydrodynamic conditions when the system is in balance. [39] With this qualification, the studies cited by Plaintiffs do not conflict with the BiOp.

> 39 The BiOp explains: "Balanced water conditions are defined in the COA as periods when it is mutually agreed that releases from upstream reservoirs plus unregulated flows approximately equal[] the water supply needed to meet Sacramento Valley in-basin uses plus exports. Excess water conditions are periods when it is mutually agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in-basin uses plus exports. Reclamation's Central Valley Operations Office (CVOO) and DWR's SWP Operations Control Office jointly decide when balanced or excess water conditions exist." BiOp at 19.
>
> "The duration of balanced water conditions varies from year to year. Some very wet years have had no periods of balanced conditions, while very dry years may have had long continuous periods of balanced conditions, and still other years may have had several periods of balanced conditions interspersed with excess water conditions. Account balances continue [**195] from one balanced water condition through the excess water condition and into the next balanced water condition. When the project that is owed water enters into flood control operations, at Shasta or Oroville, the accounting is zeroed out for that respective project. The biological assessment provides a detailed description of the changes in the COA." BiOp at 20-21.

The scientific literature does a side-by-side analysis. Kimmerer (2004) finds that "most of the interannual variability in flow patterns in the estuary is due to variability in precipitation ... due to the overwhelming effect of high flow events." AR 18718. He describes the following impacts of the CVP-SWP:

> The water projects have clearly affected the seasonal patterns of flow into the estuary (Kimmerer 2002b). Springtime flow has decreased significantly relative to unimpaired flow because of shifts in water project operations each year from flood management in winter, during which reservoirs are kept at relatively low levels, to water storage in spring, when much of the flow is captured for subsequent irrigation. In addition, flow in summer and early fall is higher than unimpaired flow to support demand for irrigation and [**196] urban use, much of which is met by releases from reservoirs into the rivers and subsequent recapture and export from the Delta (Arthur et al. 1996).

[*932] *Id.* While the CALFED report observes that "natural patterns of precipitation and runoff drive Central Valley hydrology," it also finds that "[r]ecent examination of the impacts of water project development in the state has documented species population losses due to destruction of habitat, alteration of flow timing and changes in water chemistry, water velocities and runoff quantities." Doc. 199-4 at 15.

The BiOp recognizes that "delta smelt abundance trends have been driven by multiple factors, some of which are affected or controlled by CVP/SWP operations and others that are not. Notably, the BiOp acknowledges the decline of delta smelt cannot be explained solely by the effects of CVP/SWP operations." BiOp at 203. The BiOp's conclusions about the cause and effect of other stressors are ambiguous. Plaintiffs' quest for precision in delinking Project operations as the primary driver of smelt decline is understandable in view of the ambiguity of the BiOp.

b. Treatment of Other Stressors.

Plaintiffs complain that the BiOp attributes a wide variety [**197] of causes of harm to delta smelt and its habitat--such as aquatic macrophytes, predators, competition, toxic blue-green algae, and contaminants--to continued Project Operations, without any meaningful explanation. *See* BiOp at 182-188, 202-203.

The BiOp concludes:

> Other baseline stressors will continue to adversely affect the delta smelt, such as contaminants, microcystis, aquatic macrophytes, and invasive species. Available information is inconclusive regarding the extent, magnitude and pathways by which delta smelt may be affected by these stressors independent of CVP/SWP operations. However, the operation of the CVP/SWP, as proposed, is likely to reduce or preclude seasonal flushing flows, substantially reduce the natural frequency of upstream and downstream movement of the LSZ, and lengthen upstream shifts of the LSZ to an extent that may increase the magnitude and frequency of adverse

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effects to the delta smelt from these stressors.

BiOp at 277.

[*933] Plaintiffs argue that the BiOp makes no rational connection between the other causes of harm to the smelt and their habitat and continued Project Operations. [40] Plaintiffs acknowledge that the BiOp contains some discussion of various causes of [**198] harm to delta smelt and their habitat other than from Project Operations, BiOp at 182-188, but complain that the BiOp "does not quantitatively (or even qualitatively) explain the [independent] impact that these causes of harm to the species and its habitat have on the size of the delta smelt population, nor to the ostensible ecological pathways by which these environmental stressors affect the fish." Doc. 551 at 56-57.

40 Specifically, Plaintiffs maintain that, to comply with the law, FWS must "(1) analyze the effect that other causes of harm have on the delta smelt and its habitat; (2) analyze the extent to which hydrodynamics contribute to each of those other causes of harm to the species and its habitat; (3) analyze the extent to which Project Operations--as distinguished from the other operations that result in the diversion of most of the water from the Delta's watershed--influence hydrodynamics in the Delta watershed; and (4) assess the extent of harm attributable to other causes that can be traced to Project Operations in light of such an analysis." Doc. 551 at 56. Plaintiffs point to no statute, regulation, or caselaw that imposes such specific requirements. Nonetheless, the BiOp [**199] must establish a rational connection between the facts and its conclusion that Project Operations exacerbate the impacts of other stressors.

Plaintiffs argue that the BiOp's treatment of other stressors conflicts with a "consensus that has emerged over the last several years in the scientific community that there are a host of causes of harm to the species that collectively have contributed to its decline." *Id.* at 57. Plaintiffs point to a 2007 Public Policy Institute of California Report entitled "Envisioning Futures for the Sacramento-San Joaquin Delta" by Jay Lund, et al., which discusses how "[s]everal basic assumptions on how the [Sacramento-San Joaquin] estuary operates have proven to be incorrect or only partially correct." AR 19303. The PPIC report describes these revised understandings as a set of "paradigm shifts" in Table 4.1, reproduced in substance below:

Table 4.1

New Understanding of the Delta Ecosystem

New Paradigm	Old Paradigm
1. Uniqueness of the San Francisco	
Estuary	
The San Francisco Estuary has complex	The San Francisco Estuary works on the
tidal hydrodynamics and hydrology. Daily	predictable model of East Coast estuaries
tidal mixing has more influence on the	with gradients of temperature and salinity
ecology of the estuary than riverine	controlled by outflow. Freshwater outflow
outflows, especially in the western and	is the most important hydrodynamic force,
central Delta. Conditions that benefit	If the estuary is managed for striped
striped bass (an East Coast species) do	bass, all other organisms, and especially
not necessarily benefit native organisms.	other fish, will benefit.
2. Invasive Species	
Alien species are a major and growing	Alien (normative) species are a minor
problem that significantly inhibits our	problem or provide more benefits than
ability to manage in support of desirable	problems,
species.	
3. Interdependence	
Changes in management of one part of the	The major parts of San Francisco Estuary
system affect other parts. All are part of	can be managed independently of one
the estuary and can change states in	another. The Delta is a freshwater system,
response to outflow and climatic	Suisun Bay and Marsh are a brackish water

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New Paradigm	Old Paradigm
conditions. Floodplains are of major	system, and San Francisco Bay is a marine
ecological importance and affect estuarine	system. Floodplains such as the Yolo
function. Suisun Marsh is an integral part	Bypass have little ecological importance,
of the estuary ecosystem and its future is	Suisun Marsh is independent of the rest of
closely tied to that of the Delta.	the estuary
4. Stability	
The Delta will undergo dramatic changes in	The Delta is a stable geographic entity in
the next 50 years as its levees fail	its present configuration. Levees can
because of natural and human-caused forces	maintain the Delta as it is. Any change in
such as sea level rise, flooding, climate,	the Delta will destroy its ecosystem,
and subsidence. A Delta ecosystem will	Agriculture is the best use for most Delta
still exist, with some changes benefiting	lands,
native species. Agriculture is	
unsustainable in some parts of the Delta.	
5. Effects of Human Activities	
Pumping in the Delta is an important	Pumping in the southern Delta is the
source of fish mortality but only one of	biggest cause of fish declines in the
several causes of fish declines.	estuary. Fish entrainment at power plants
Entrainment of fish at the power plants is	is a minor problem. Changes in ocean
potentially a major source of mortality.	conditions have no effect on the Delta.
Changes in ocean conditions (El Nino	Hatcheries have a positive or no effect on
events, Pacific Decadal Oscillation, ocean	wild populations of salmon and steelhead.
fishing, etc.) have major effects on the	Chronic toxicants (e.g., heavy metals,
Delta. Hatcheries harm wild salmon and	persistent pesticides) are the major
steelhead. Chronic toxicants continue to	problems with toxic compounds in the
be a problem, and episodic toxic events	estuary,
from urban and agricultural applications	
are also a major problem.	

AR [**200] 19305-306. The fifth paradigm shift finds that Delta Pumping is an "important source of fish mortality but only one of several causes of fish declines." AR 019306. This finding is further supported by the Interagency Ecological Program's conceptual model that describes observed pelagic fish declines in the Delta and recognizes numerous sources of harm to the species including contaminants, disease, toxic algal blooms, climate change, predation, entrainment in diversions, and limited food availability, limited food co-occurrence with the species, and poor food quality. *See* Randall Baxter et al., Pelagic Organism Decline Progress Report: 2007 Synthesis [*934] of Results (2008) AR 16935-53. In light of this general, undisputed consensus that many factors contribute to delta smelt mortality, Plaintiffs challenge the BiOp's attribution to the Projects of the effects of: (1) predation; (2) aquatic macrophytes; and (3) microcystis.

(1) Predation Analysis.

Plaintiffs describe the BiOp's predation as a purportedly flawed attribution of another stressor to Project Operations. The BiOp generally acknowledges that striped bass prey on the delta smelt but concludes that "[i]t is unknown whether incidental [**201] predation by striped bass (and other lesser predators) represents a substantial source of mortality for delta smelt." BiOp at 183. The BiOp does not include any estimates of the effect of predation on the delta smelt population. Such information was available. The Conservation Plan for DFG's Striped Bass Management Program ("Conservation Plan"), which was submitted to FWS as part of an application for an incidental take permit, states: "[d]espite the low incidence of delta smelt in striped bass stomachs, the year-round overlap in distribution of delta smelt and striped bass results in an estimated annual consumption of about 5.3% of the delta smelt population by a striped bass population of approximately 765,000 adults." Doc. 181-1 at 32 (emphasis added).) The Conservation Plan explains that FWS and DFG "have agreed that a predation rate of 5.3% of the annual delta smelt population is a reasonable estimate." *Id.* at 33. FWS issued an incidental

No comments

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take permit to DFG on the basis of this striped bass predation estimate. There is question whether this underestimates the effect on delta smelt of bass predation. *See* First Amended Complaint, *Coalition v. McCamman*, 1:08-cv-00397 OWW GSA, Doc. [**202] 46.

FWS need not include every piece of available information regarding other stressors in the BiOp. *Kempthorne, 506 F. Supp. 2d at 367* ("If FWS was required to consider and address every new piece of information it received prior to publication of its decision, it would be effectively impossible for the agency to complete a biological opinion."). However, FWS cannot ignore relevant information pertaining to a major source of mortality to the species, particularly when that information is decidedly contrary to BiOp findings. It is not clear from the record whether 5.6% mortality should be considered significant. In related contexts, mortality of 1% has been used as an incidental take limit, *see* Findings of Fact and Conclusions of Law Re Existence of Irreparable Harm, *PCFFA v. Gutierrez*, 1:06-cv-00245 OWW GSA, Doc. 367 at 48:5-9 (noting that incidental take limit for winter-run Chinook salmon is set at two percent of the estimated number of juveniles produced each year), suggesting that such small percentages may be significant enough to merit discussion. The 5.3% figure may be partially attributable to Project operations. As the BiOp explains, there are high rates of predation in Clifton [**203] Court Forebay, BiOp 160-161, 209, but the contribution of striped bass predation to this mortality is not articulated. The BiOp erroneously failed to consider available information regarding the magnitude of striped bass predation on delta smelt, with the likely result of erroneously attributing to the Projects, impacts independent of Project Operations.

(2) Aquatic Macrophytes.

The BiOp discusses aquatic macrophytes:

> In the last two decades, the interior Delta has been extensively colonized by submerged aquatic vegetation. The dominant submerged aquatic vegetation is Egeria densa, a nonnative from South [*935] America that thrives under warm water conditions. Research suggests that *Egeria densa* has altered fish community dynamics in the Delta, including increasing habitat for centrarchid fishes including largemouth bass (Nobriga et al. 2005; Brown and Michniuk 2007), reducing habitat for native fishes (Brown 2003; Nobriga et al. 2005; Brown and Michniuk 2007), and supporting a food web pathway for centrarchids and other littoral fishes (Grimaldo et al in review). *Egeria densa* has increased its surface area coverage by up to 10 percent per year depending on hydrologic conditions and water temperature [**204] (Erin Hestir personal communication University of California Davis).
>
> *Egeria densa* and other non-native submerged aquatic vegetation (e.g., *Myriophyllum spicatum*) can affect delta smelt in direct and indirect ways. Directly, submerged aquatic vegetation can overwhelm littoral habitats (inter-tidal shoals and beaches) where delta smelt may spawn making them unsuitable for spawning. Indirectly, submerged aquatic vegetation decreases turbidity (by trapping suspended sediment) which has contributed to a decrease in both juvenile and adult smelt habitat. Increased water transparency may delay feeding and may also make delta smelt more susceptible to predation pressure.

BiOp at 182-183. General discussions of *Egeria densa* are included in the Critical Habitat section of the BiOp. BiOp at 196, 198, 201. Discussion of PCE # 2 explains:

> As stated in the Status and Baseline Section, research suggests that the nonnative South American aquatic plant *Egeria densa* has altered fish community dynamics in the Delta. In addition to the above-mentioned effect of overwhelming spawning habitat (PCE #1), *Egeria* and other submerged aquatic vegetation decreases turbidity by trapping suspended sediment, thereby [**205] decreasing juvenile and adult smelt habitat (Feyrer et al. 2007; Nobriga et al. 2008). Increased water transparency may also make delta smelt more susceptible to predation. It appears that aquatic macrophytes may have a role in degrading pelagic habitat to the extent that the Delta's ability to fulfill its intended conservation purpose continues to diminish. *Egeria* has the additional effect of decreasing turbidity, described above as important to successful feeding of newly-hatched larval delta smelt. However, there is still enough turbidity in the Central and South Delta to initiate larval

No comments

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> feeding responses because larvae collected in the South Delta have comparatively high growth rates. So while *Egeria* may reduce or eliminate the extent and quality of spawning habitat for delta smelt, it is not at this considered to have detectable effects on spawning or early feeding success.

BiOp at 198.

The BiOp concludes:

> Available information is inconclusive regarding the extent, magnitude and pathways by which delta smelt may be affected by these stressors independent of CVP/SWP operations. However, the operation of the CVP/SWP, as proposed, is likely to reduce or preclude seasonal flushing flows, [**206] substantially reduce the natural frequency of upstream and downstream movement of the LSZ, and lengthen upstream shifts of the LSZ to an extent that may increase the magnitude and frequency of adverse effects to the delta smelt from these stressors.

BiOp at 277. Although a connection may exist, the record does not reflect any discussion, nor have the parties pointed to any study, connecting "seasonal flushing flows ... [*936] the natural frequency of upstream and downstream movement of the LSZ, and lengthen[ed] upstream shifts of the LSZ" to the presence of any aquatic macrophyte. FWS has failed to make a rational connection between the facts in the record and its conclusions, particularly when the science indicates the contrary is likely true.

(3) Microcystis

FWS makes no connection whatsoever between microcystis, large blooms of toxic blue-green algae, and continued CVP and SWP operations. *See* BiOp at 186. In a discussion regarding the Vernalis Adaptive Management Plan (VAMP) period, [41] FWS stated:

> Without the flow component, the larval and juvenile delta smelt would remain in the Central and South Delta, where they could be exposed to lethal water temperatures, entrainment at Banks and Jones [**207] after the VAMP export curtailment period, or succumb to predation or microcystis blooms.

BiOp at 224. The BiOp does not analyze the effect that this asserted increased exposure to other stressors has on the delta smelt, or how it is caused by Project Operations; rather, FWS simply concludes without support that this effect buttresses a determination that the proposed action will jeopardize the delta smelt.

> 41 "Adopted by the SWRCB in D-1641, the San Joaquin River Agreement (SJRA) includes a 12-year program providing for flows and exports in the lower San Joaquin River during a 31-day pulse flow period during April and May. It also provides for the collection of experimental data during that time to further the understanding of the effects of flows, exports, and the barrier at the head of Old River on salmon survival. This experimental program is commonly referred to as the VAMP (Vernalis Adaptive Management Plan)." BiOp at 78.

It is undisputed that numerous stressors, including ammonia and other toxics, food limitation, predation, the introduction of non-native species and other factors, all have adverse impacts to delta smelt. *See* e.g., BiOp at 182-84 (discussing other stressors). Yet, [**208] the BiOp concludes that Project Operations are "a primary factor influencing delta smelt abiotic and biotic habitat suitability, health, and mortality." BiOp at 189 (emphasis added). FWS rationalizes this conclusion, at least in part, by attributing the impacts of many of the "other stressors" to the Projects. This attribution has not been justified, nor is it logical or explained by any science. Given that the impacts of regulating Project Operations are so consequential, such unsupported attributions (a result in search of a rationale) are unconscionable.

(7) Indirect Effects Analysis.

Plaintiffs assert that the BiOp inappropriately categorizes adverse effects on delta smelt from limited food supply, invasive species, and contaminants as "indirect effects" caused by Project Operations. The Joint Consultation Regulations promulgated by FWS and NMFS define: "[i]ndirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." *50 C.F.R. § 402.02* (emphasis added). The ESA's definition differs from NEPA's definition of indirect effects of an action: "[iIndirect effects, which are caused by the action and are later in time [**209] or farther removed in distance, but are still reasonably foreseeable." *40 C.F.R. § 1508.8(b)*. In the preamble of the Final Rule adopting the ESA regulations,

No comments

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FWS explained that it intended a narrower regulatory definition of indirect effects under the ESA than applied in the NEPA context (i.e., compare "reasonably [*937] certain to occur" with "reasonably foreseeable"). *51 Fed. Reg. 19, 926 (June 3, 1986)*. NMFS and FWS contrasted the ESA with NEPA and expressly explained the intent and rationale for adopting the more narrow "reasonably certain to occur" standard for indirect and cumulative effects under ESA:

> If the jeopardy standard is exceeded, the proposed Federal action cannot proceed without an exemption. This is a substantive prohibition that applies to the Federal action involved in consultation. In contrast, NEPA is procedural in nature, rather than substantive, which would warrant a more expanded review of cumulative effects. Otherwise, in a particular situation, the jeopardy prohibition could operate to block "nonjeopardy" actions because future, speculative effects occurring after the Federal action is over might, on a cumulative basis, jeopardize a listed species. Congress did not [**210] intend that Federal actions be precluded by such speculative actions.

51 Fed. Reg. at 19, 933.

Shortly after adoption of the ESA regulations, the Ninth Circuit confirmed "'[t]he reasonably certain to occur' standard applies to 'indirect effects ... caused by the proposed action." *Sierra Club v. Marsh, 816 F.2d 1376, 1388 (9th Cir. 1987)* ; *see also Ariz. Cattle Growers Ass'n v. FWS, 273 F.3d 1229, 1243 (9th Cir. 2001)* (invalidating several incidental take statements regarding grazing and effects on fish because "it would be unreasonable for [FWS] ... to impose conditions on otherwise lawful land use if a take were not reasonably certain to occur as a result of that activity"); *Ctr. for Biological Diversity v. U.S. Dept. of Hous. & Urban Dev., 541 F. Supp. 2d 1091, 1100-01 (D. Ariz. 2008)* (dismissing a suit alleging federal agencies had violated the ESA by failing to analyze the indirect effects of providing federal funding to local development projects, concluding that the link between such financial assistance and groundwater depletion that could harm listed species was "too attenuated" to meet the standards of *50 C.F.R. § 402.02*). "[T]he mere potential for harm ... is insufficient" [**211] to meet the "reasonably certain to occur" standard. *Ariz. Cattle Growers Ass'n, 273 F.3d at 1246*. Other causes must be addressed applying this standard.

a. Effect of Project Operations on Delta Smelt Food Supplies.

The BiOp claims that one of "three major seasonally occurring categories of effects" on delta smelt is "entrainment of *Pseudodiaptomus forbesi*[42] , the primary prey of delta smelt during summer-fall." BiOp at 203. The BiOp categorizes this as an "indirect effect." *id.*, and justifies RPA Component 4 (Action 6) [43] in part by the statement that "[t]he Effects Section indicates that [*P. forbesi*] distribution may be vulnerable to effects of exports facilities operations and, therefore, the projects have a likely effect on the food supply available to delta smelt." BiOp at 380-81.

> 42 *Pseudodlaptomus forbesi* is a small aquatic copepod introduced into the Delta in 1988, and has since become an important source of prey for delta smelt. BiOp at 184.
> 43 Action 6 requires the creation or restoration of 8,000 acres (12.5 square miles) of habitat. BiOp at 379.

The relevant section of the effects analysis provides:

> Entrainment of *Pseudodlaptomus forbesi* (June-September) Historically, the diet of [**212] juvenile delta smelt during summer was dominated by the copepod *Eurytemora affinis* and the mysid shrimp *Neomysis mercedis* (Moyle et al. 1992; Feyrer et al. 2003). These prey bloomed from within the [*938] estuary's LSZ and were decimated by the overbite clam *Corbula amurensis* (Kimmerer and Orsi 1996), so delta smelt switched their diet to other prey. *Pseudodiaptomus forbesi* has been the dominant summertime prey for delta smelt since it was introduced into the estuary in 1988 (Lott 1998; Nobriga 2002; Hobbs et al. 2006). Unlike *Eurytemora* and *Neomysis*, *Pseudodiaptomus* blooms originate in the freshwater Delta (John Durand San Francisco State University, oral presentation at 2006 CALFED Science Conference). This freshwater reproductive strategy provides a refuge from overbite clam grazing, but *Pseudodiaptomus* has to be transported to the LSZ during summer to co-occur with most of the delta smelt population. This might make *Pseudodiaptomus* more vulnerable to pumping effects from the export facilities than *Eurytemora* and *Neomysis* were. By extension, the projects

No comments

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might have more effect on the food supply available to delta smelt than they did before the overbite clam changed the LSZ food web. As [**213] evidence for this hypothesis, the IEP Environmental Monitoring Program zooplankton data show the summertime density of *Pseudodiaptomus* is generally higher in the South Delta than in Suisun Bay. The ratio of South Delta *Pseudodiaptomus* density to Suisun Bay *Pseudodiaptomus* density was greater than one in 73 percent of the collections from June- September 1988-2006. The average value of this ratio is 22, meaning that on average summer *Pseudodlaptomus* density has been 22 times higher in the South Delta than Suisun Bay. Densities in the two regions are not correlated (P > 0.30). This demonstrates that the presence of high copepod densities in the South Delta which delta smelt do not occupy during summer months, do not necessarily occur simultaneously in the LSZ where delta smelt rear.

There is statistical evidence suggesting that the cooccurrence of delta smelt and *Pseudodlaptomus forbesl* has a strong statistical influence on the survival of young delta smelt from summer to fall (Miller 2007). In addition, recent histopathological evaluations of delta smelt have shown possible evidence of food limitation in delta smelt during the summer (Bennett 2005; Bennett et al. 2008). However, the [**214] glycogen depletion of the delta smelt livers reported in these studies can also arise from thermal stress due to high summer water temperatures (Bennett et al. 2008).

BiOp at 228. These observations show that *P. forbesi* from the southern Delta are an important source of summer food supply to delta smelt in the lower salinity zone ("LSZ"), and that Project Operations (i.e., export pumping) prevent *P. forbesi* in the South Delta from flowing to the LSZ during that time, causing a reduction in the density of *P. forbesi* that subsequently causes deleterious effects to delta smelt.

Federal Defendants are correct that nothing in the ESA requires FWS to rule out all other potential factors that may or may not play a role in the ecosystem under analysis. *See* Doc. 660 at 58. However, the ESA does require the agency to evaluate the impacts of the proposed action, and make a determination whether the proposed action is likely to have direct and indirect effects on the species. *50 C.F.R. § 402.02* (defining "jeopardize the continued existence of" to means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and [**215] recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."). Plaintiffs argument is simply that "there was no [*939] data or analysis in the BiOp (or elsewhere in the record) to support the BiOp's finding that export pumping causes reduced availability of [*P. forbesi*] for consumption by delta smelt in the Low Salinity Zone and that this reduced availability is reasonably certain to occur." Doc. 695 at 55.

Plaintiffs' central complaint is that in evaluating the indirect effect of Project operations on *P. forbesi*, FWS used data from a few Suisun Bay sampling stations to represent the entire lower salinity zone, even though the low salinity zone occurs outside Suisun Bay as well. " The peer review found a "relationship between outflow and abundance of *P. forbesi* in the [lower salinity zone] ... can be detected only by comparing the distribution of copepods in salinity space rather than relying on sampling station locations." AR 008821. FWS did nothing to correct this problem in the final Effects Analysis.

44 Plaintiffs also summarily argue that this conclusion is unjustified because:

o FWS did not consider or rule out the fact that grazing [**216] by exotic clam species causes the observed reduced *P. forbesi* density in Suisun Bay.

o FWS did not consider or rule out the fact that higher densities of *P. forbesi* in the South Delta are caused by differences in spatial distribution between juvenile and adult *P. forbesi* because juveniles are more dense in the South Delta.

o FWS did not consider or account for the fact that Plaintiffs provided FWS with results of regression analyses of the best scientific data available that showed "[*P. forbesi*] densities in Suisun Bay are not correlated with exports ...," but that there is "a highly significant correlation between [*P. forbesi*] densities in Suisun Bay and those in Suisun Marsh, suggesting (unsurprisingly) that if Suisun Bay densities are being subsidized, the most likely source is Suisun Marsh." AR 006369; 006377-006378.

Doc. 551 at 48-49. The support for these arguments were incorporated by reference from the extensive argument concerning the BiOp's food

No comments

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> analysis contained in Plaintiffs' motion for Preliminary Injunction. Given the prolixity of briefing and the highly contentious process by which page limits for the motions for summary judgment were set in this case, it would be highly [**217] prejudicial to Defendants to permit such extensive incorporation by reference into the summary judgment proceedings. These arguments will not be addressed.

Plaintiffs also complain that the BiOp contains no quantitative analysis of the impact of exports on *P. forbesi*. Federal Defendants' only response to this criticism is to point out that the draft BiOp did contain a quantitative analysis. This draft was presented to the Peer Review panel, which responded that it "agree[d] with the conceptual model and with the justification of its elements" as "well-supported," but had concerns about parts of that analysis, and recommended that it be revised. Goude Decl., Doc. 470, ¶ 5. The Panel concluded that if a "revised analysis does not show a substantial (not necessarily statistically significant) pattern, the analysis should be mentioned but the results dropped as a quantitative metric from the [Effects Analysis]." *Id.* After considering the Panel's recommendation, FWS decided not to use the analysis as a quantitative metric, instead concluding that a qualitative analysis and discussion was sufficient and appropriate for the final 2008 Biological Opinion. *Id.* The BiOp does contain a qualitative [**218] discussion of the impacts of the Delta Food Web, acknowledging the effects that the overbite clam has had on the pelagic food web, including upon the delta smelt, BiOp at 184-85, but noting "it is uncertain whether this is a direct consequence of the overbite clam." BiOp at 184.

Although nothing in the ESA mandates the use of quantitative analyses *per se*, the Peer Review's critique of the *P. forbesl* analysis cannot be separated from FWS's abandonment of its quantitative analysis. [*940] The Peer Review specifically criticized the use of fixed-location monitoring sites as part of the quantitative analysis. Rather than correct this problem, FWS's response was to abandon the quantitative analysis, choosing to advance the same, potentially flawed conclusion in a more subjective, qualitative analysis. This conduct suggests another unlawful, results-driven choice, ignoring best available science.

b. Pollution and Contaminants

The BiOp claims "[r]earing habitat in the South Delta may also be impacted indirectly through increases in contaminant concentrations." BiOp at 242. In assessing Project effects to critical habitat, the BiOp states "[t]he contaminant effects may be generated or diluted by flow [**219] depending on the amount of flow, the type of contaminant, the time of year, and relative concentrations." BiOp at 240.

Plaintiffs argue "[g]eneral statements like this do not comport with ESA's requirements for attributing indirect effects to an action." Doc. 661 at 50. Plaintiffs contend: "[t]o meet ESA's regulatory standard for indirect effects," requiring such indirect effects be "reasonably certain to occur" FWS must "support these general hypotheses with discussion and use of scientific data showing":

> (1) how a specific individual contaminant concentration (e.g., ammonia, mercury, pyrethroids, etc.) would be increased by a particular flow modification caused by Project Operations;
>
> (2) at what time of year or month such flow modifications and contaminant concentration increases would occur; and
>
> (3) how and to what extent this alleged contaminant increase would affect the abundance of delta smelt.

Id. Plaintiffs do not cite any specific statute, regulation, or case that requires such specific findings before an impact is a sufficient indirect effect. The record must reflect that contaminant-related impacts indirectly caused by Project Operations are "reasonably certain" to occur. It [**220] is undisputed that contaminants are not introduced by the Projects, rather by others conducting municipal, industrial, and agricultural (runoff) activities.

FWS provided a qualitative discussion of the impacts of pollutants and changed Delta hydrodynamics resulting from Project operations upon the smelt:

> Contaminants Contaminants can change ecosystem functions and productivity through numerous pathways. However, contaminant loading and its ecosystem effects within the Delta are not well understood. Although a number of contaminant issues were first investigated during the POD years, concern over contaminants in the Delta is not new. There are long-standing concerns related to mercury and selenium levels in the watershed, Delta, and San Francisco Bay (Linville et al. 2002; Davis et al. 2003). Phytoplankton growth rate may, at times, be inhibited by high concentrations of herbicides (Edmunds et al. 1999). New evidence indicates that phytoplankton growth rate is

No comments

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chronically inhibited by ammonium concentrations in and upstream of Suisun Bay (Wilkerson et al. 2006, Dugdale et al. 2007). Contaminant-related toxicity to invertebrates has been noted in water and sediments from the Delta and associated [**221] watersheds (e.g., Kuivila and Foe 1995, Giddings 2000, Werner et al. 2000, Weston et al. 2004). Undiluted drainwater from agricultural drains in the San Joaquin River watershed can be acutely toxic (quickly lethal) to fish and have chronic effects on growth (Saiki et al. 1992). Evidence for mortality [*941] of young striped bass due to discharge of agricultural drainage water containing rice herbicides into the Sacramento River (Bailey et al. 1994) led to new regulations for water discharges. Bioassays using caged Sacramento sucker (Catostomus occidentalis) have revealed deoxyribonucleic acid strand breakage associated with runoff events in the watershed and Delta (Whitehead et al. 2004). Kuivila and Moon (2004) found that peak densities of larval and juvenile delta smelt sometimes coincided in time and space with elevated concentrations of dissolved pesticides in the spring. These periods of cooccurrence lasted for up to 2-3 weeks, but concentrations of individual pesticides were low and much less than would be expected to cause acute mortality. However, the effects of exposure to the complex mixtures of pesticides actually present are unknown.

The POD investigators initiated several studies [**222] beginning in 2005 to address the possible role of contaminants and disease in the declines of Delta fish and other aquatic species. Their primary study consists of twice-monthly monitoring of ambient water toxicity at fifteen sites in the Delta and Suisun Bay. In 2005 and 2006, standard bioassays using the amphipod Hyalella azteca had low (<5 percent) frequency of occurrence of toxicity (Werner et al. 2008). However, preliminary results from 2007, a dry year, suggest the incidence of toxic events was higher than in the previous (wetter) years. Parallel testing with the addition of piperonyl butoxide, an enzyme inhibitor, indicated that both organophosphate and pyrethroid pesticides may have contributed to the pulses of toxicity. Most of the tests that were positive for H. azteca toxicity have come from water samples from the lower Sacramento River. Pyrethroids are of particular interest because use of these insecticides has increased within the Delta watershed (Ameg et al. 2005, Oros and Werner 2005) as use of some organophosphate insecticides has declined. Toxicity of sediment-bound pyrethroids to macroinvertebrates has also been observed in small, agriculture-dominated watersheds [**223] tributary to the Delta (Weston et al. 2004, 2005). The association of delta smelt spawning with turbid winter runoff and the association of pesticides including pyrethroids with sediment is of potential concern.

In conjunction with the POD investigation, larval delta smelt bioassays were conducted simultaneously with a subset of the invertebrate bioassays. The water samples for these tests were collected from six sites within the Delta during May-August of 2006 and 2007. Results from 2006 indicate that delta smelt are highly sensitive to high levels of ammonia, low turbidity, and low salinity. There is some preliminary indication that reduced survival may be due to disease organisms (Werner et al. 2008). No significant mortality of larval delta smelt was found in the 2006 bioassays, but there were two samples [] collected from sites along the Sacramento River and had relatively low turbidity and salinity levels and moderate levels of ammonia. It is also important to note that no significant H. azteca mortality was detected in these water samples. While the H. azteca tests are very useful for detecting biologically relevant levels of water column toxicity for zooplankton, interpretation [**224] of the H. azteca test results with respect to fish should proceed with great caution. The relevance of the bioassay results to field conditions remains to be determined.

[*942] The POD investigations into potential contaminant effects also include the use of biomarkers that have been used previously to evaluate toxic effects on POD fishes (Bennett et al. 1995, Bennett 2005). The results to date have been mixed. Histopathological and viral

No comments

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evaluation of young longfin smelt collected in 2006 indicated no histological abnormalities associated with exposure to toxics or disease (Foott et al. 2006). There was also no evidence of viral infections or high parasite loads. Similarly, young threadfin shad showed no histological evidence of contaminant effects or of viral infections (Foott et al. 2006). Parasites were noted in threadfin shad gills at a high frequency but the infections were not considered severe. Both longfin smelt and threadfin shad were considered healthy in 2006. Adult delta smelt collected from the Delta during the winter of 2005 also were considered healthy, showing little histopathological evidence for starvation or disease (Teh et al., unpublished data). However, there was some [**225] evidence of low frequency endocrine disruption. In 2005, 9 of 144 (6 percent) of adult delta smelt males sampled were intersex, having immature oocytes in their testes (Teh et al., unpublished data).

In contrast, preliminary histopathological analyses have found evidence of significant disease in other species and for POD species collected from other areas of the estuary. Massive intestinal infections with an unidentified myxosporean were found in yellowfin goby *Acanthogobius flavimanus* collected from Suisun Marsh. Severe viral infection was also found in inland silverside and juvenile delta smelt collected from Suisun Bay during summer 2005. Lastly, preliminary evidence suggests that contaminants and disease may impair survival of age-0 striped bass. Baxter et al. 2008 found high occurrence and severity of parasitic infections, inflammatory conditions, and muscle degeneration in young striped bass collected in 2005; levels were lower in 2006. Several biomarkers of contaminant exposure including P450 activity (i.e., detoxification enzymes in liver), acetylcholinesterase activity (i.e., enzyme activity in brain), and vitellogenin induction (i.e., presence of egg yolk protein in blood [**226] of males) were also reported from striped bass collected in 2006 (Ostrach 2008).

BiOp at 186-188.

It is not clear how the BiOp or any other document in the record links the impacts of contaminants to Project Operations. The BiOp does link the position of X2 to the extent of available delta smelt habitat, suggesting that a more confined habitat "may increase" the effects of contaminants:

> During the fall, when delta smelt are nearing adulthood, the amount of suitable abiotic habitat for delta smelt is positively associated with X2. This results from the effects of Delta outflow on salinity distribution throughout the Estuary. Fall X2 also has a measurable effect on recruitment of juveniles the following summer in that it has been a significant covariate in delta smelt's stock-recruit relationship since the invasion of the overbite clam. Potential mechanisms for the observed effect are two-fold. First, positioning X2 seaward during fall provides a larger habitat area which presumably lessens the likelihood of density-dependent effects (e.g., food availability) on the delta smelt population. Second, a more confined distribution may increase the impact of stochastic events that increase mortality [**227] rates of delta smelt. For delta smelt, this includes predation and anthropogenic effects [*943] such as contaminants and entrainment (Sommer et al. 2007).

BiOp at 234. The Effects on Critical Habitat section states:

> [T]hrough upstream depletions and alteration of river flows, the CVP/SWP has played a role in altering the environment of the Delta. This has resulted in adverse effects to delta smelt spawning habitat availability and may mobilize contaminants. The contaminant effects may be generated or diluted by flow depending on the amount of flow, the type of contaminant, the time of the year, and relative concentrations.

BiOp at 240.

No comments

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FWS may only count indirect effects as effects of the action if they are "reasonably certain to occur." FWS's contaminants analysis does not demonstrate it has complied with this requirement. It must be done.

(8) Critical Habitat as Independent Basis for RPA.

Federal Defendants argue that, even if Plaintiffs demonstrate that the BiOp's "jeopardy" findings were arbitrary and capricious, the Court should nevertheless deny Plaintiffs' motion because the RPA is necessary to avoid adverse modification of the delta smelt's critical habitat. Doc. 660 at 55-58. The ESA requires, [**228] once FWS finds the proposed agency action will result in "jeopardy or adverse modification [of critical habitat] ... the Secretary shall suggest those reasonable and prudent alternatives which [it] believes would not violate [Section 7(a)(2)] and can be taken by the Federal agency or applicant in implementing the agency action." *16 U.S.C. § 1536(b)(3)(A).* Avoiding adverse modification of critical habitat is an independent statutory basis for promulgation of an RPA. Federal Defendants maintain that, in light of the statutory mandate to avoid both jeopardy and adverse modification, Plaintiffs must make a separate showing, independent of or in addition to their jeopardy arguments, that the BiOp's findings on critical habitat are also arbitrary and capricious. This is true in part. To support a finding that the adverse modification conclusion is arbitrary and capricious, Plaintiffs must demonstrate either that the underlying critical habitat analysis was independently flawed or that the critical habitat analysis was entirely dependent on flawed aspects of the jeopardy analysis. Whether or not the RPA and its constituent Actions are erroneous is a separate question.

The BiOp makes findings [**229] concerning the impact of export pumping on delta smelt critical habitat, *see* BiOp at 190-202; 239-244, and concludes:

> After reviewing the current status of delta smelt critical habitat, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the coordinated operations of the CVP and SWP, as proposed, are likely to adversely modify delta smelt critical habitat. The Service reached this conclusion based on the following findings, the basis for which is presented in the preceding Status of Critical Habitat/Environmental Baseline, Effects of the Action, and Cumulative Effects sections of this document.
>
> 1. The conservation role of delta smelt critical habitat is to provide migration, spawning and rearing habitat conditions necessary for successful delta smelt recruitment at levels that will provide for the conservation of the species. Appropriate physical habitat (PCE 1), water (PCE 2), river flows (PCE 3), and salinity (PCE 4) are essential for successful delta smelt spawning and survival.
>
> 2. The past and present operations of the CVP/SWP have degraded these habitat [*944] elements (particularly PCEs 2-4) to the extent that their co-occurrence at [**230] the appropriate places and times is insufficient to support successful delta smelt recruitment at levels that will provide for the species' conservation.
>
> 3. Implementation of the proposed action is expected to perpetuate the very limited cooccurrence of PCEs at appropriate places and times by: (a) altering hydrologic conditions in a manner that adversely affects the distribution of abiotic factors such as turbidity and contaminants; (b) altering river flows to an extent that increases delta smelt entrainment at Banks and Jones, as well as reduces habitat suitability in the Central and South Delta; and (c) altering the natural pattern of seasonal upstream movement of the LSZ to an extent that is likely to reduce available habitat for the delta smelt within areas designated as critical habitat.
>
> The proposed action does include a provision for VAMP to address augmentation of river flow but future implementation of this provision is not well defined, making its beneficial effects on the PCEs of delta smelt critical habitat uncertain.
>
> 4. On the basis of findings (1)-(3) above, the Service concludes that implementation of the proposed action is likely to prevent delta smelt critical habitat [**231] from serving its intended conservation role.

BiOp 278-79.

Plaintiffs respond to Federal Defendants' argument that the critical habitat analysis is actually flawed in a number of ways:

> (1) FWS failed to identify the threshold for adverse modification, or to assess and

No comments

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explain whether the magnitude and extent of any claimed effects to critical habitat rise to that threshold level;

(2) in making finding 3(a), the BiOp did not provide analysis or explanation showing how alleged indirect effects to critical habitat will be caused by Project operations and will be reasonably certain to occur; and

(3) in making findings 3(b) and 3(c), FWS expressly relied on the flawed analyses of entrainment and X2.

Doc. 697 at 64-71: [45]

45 Federal Defendants' motion to strike these arguments on the ground that they were raised for the first time in Plaintiffs' reply brief was denied. Federal Defendants were afforded the opportunity to respond, *see* Doc. 745 at 2, which they did, *see* Doc. 746 at 2-7.

a. Identification of a Threshold For Adverse Modification/ Explanation of How Any Alleged Alteration To Critical Habitat Would Exceed that Threshold.

The BiOp's critical habitat findings 1 and 2 state that "appropriate" [**232] habitat elements are "essential" and have been "degraded . . . to the extent that their co-occurrence at the appropriate places and times is insufficient to support successful delta smelt recruitment at levels that will provide for the species' conservation." BiOp at 278. However, Plaintiffs complain that the BiOp does not explain the extent of co-occurrence of habitat elements that is necessary for conservation of delta smelt; the magnitude of the claimed degradation of this co-occurrence that is attributable to Project operations; or why that effect renders the habitat elements "insufficient" to support the species' recovery. Plaintiffs argue, without such analysis there is no basis for FWS to conclude that habitat changes caused by Project operations will result in adverse modification of critical habitat.

[*945] Destruction or adverse modification means "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species." *50 C.F.R. § 402.02*. Previous rulings in related cases have held "that NMFS and FWS have interpreted the term 'appreciably diminish' to mean 'considerably reduce.'" Findings of Fact and Conclusions [**233] of Law Re the Existence of Irreparable Harm, *PCFFA v. Gutierrez*, 1:06-cv-245 OWW GSA, Doc. 367 at 24:6-9 (citing Consultation Handbook at 4-34).

Plaintiffs cite *Gifford Pinchot, 378 F.3d at 1074*, and *NWF v. NMFS II, 524 F.3d at 932 & n.10*, for the principle that FWS must identify a threshold for adverse modification and assess and explain whether the magnitude and extent of any claimed effects to critical habitat reach that threshold. These cases do not support Plaintiff's argument. *Gifford Pinchot* rejected FWS's interpretation of "adverse modification" in a manner that only triggered an adverse modification finding where there is "an appreciable diminishment of the value of critical habitat for both survival and recovery." *Id. at 1069*. After rejecting FWS's rationale for applying the regulation, the Ninth Circuit reasoned that the various biological opinions at issue could nevertheless be found valid if they actually evaluated the impact to recovery. The *Gifford Pinchot* plaintiffs raised concerns about FWS's complete failure to address the issue of recovery in that biological opinion's critical habitat analysis. The Appeals Court specifically found that FWS detailed the percentage [**234] loss of critical habitat but did not discuss the specific impact of that loss on recovery, rendering the BiOp insufficient. *378 F.3d at 1074*.

Following *Gifford Pinchot, NWF v. NMFS II* held that NMFS acted arbitrarily and capriciously by failing to analyze the impacts of dam operations on the recovery value of critical habitat. *524 F.3d at 932*. NMFS' argument "that it 'implicitly' analyzed recovery in its survival analysis" was rejected as a "post hoc justification," because a court cannot consider "an analysis that is not shown in the record." *Id. at 932 n.10* (internal citations and quotations omitted). Plaintiffs do not directly challenge the BiOp's recovery analysis; rather, they argue that the BiOp should have set a "threshold" for adverse modification. Nothing in *Gifford Pinchot* or *NWF v. NMFS II* requires FWS to set a "threshold" for adverse modification.

Butte Environmental Council v. U.S. Army Corps of Engineers, 607 F.3d 570, 582-83 (9th Cir. 2010), suggests exactly the opposite. *Butte* upheld FWS's determination that destruction of a very small percentage (less than 1%) of designated critical habitat would not adversely modify the species' critical habitat. Relevant here is the [**235] Ninth Circuit's rejection of a demand that FWS address the rate of loss of critical habitat, finding that nothing in the statute or regulations requires FWS to perform such a calculation. *Id.*

Plaintiffs extensively discuss the BiOp's critical habitat analysis to attempt to demonstrate the BiOp does not identify a threshold for adverse modification or what standard for adverse modification FWS applied. *See* Doc. 697 at 66-69. Plaintiffs criticize the individual critical habitat findings for failing to clearly describe the effects of project operations on the quantity or quality of the individual habitat elements.

No comments

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This disassembly, focusing on the critical habitat conclusion, does not consider the BiOp as a whole. The BiOp's adverse modification determination relies on four components: "(1) the Status of Critical Habitat... ; (2) the Environmental Baseline... ; (3) the Effects of the Action... ; and (4) Cumulative Effects...." BiOp at [*946] 139. The Status of the Species/Environmental Baseline sections analyze how project operations have degraded the PCEs up to the present time, while the Effects Analysis analyzes how these ongoing operations will continue to adversely modify critical habitat [**236] in the future. *See id.* at 202-203. Most of the impacts analysis is found in the Status of the Species / Environmental Baseline section. The Effects Analysis explains that these well-documented prior effects will continue due to ongoing Project operations. *Id.*

In the discussion of PCE # 2 (water quality, including abiotic elements), the BiOp explains how this PCE's condition is substantially degraded by Project operations. FWS found that project operations cause "[p]ersistent confinement of the effective spawning population" and otherwise "adversely affect" turbidity, "reproductive success," the availability of prey, and the exposure of delta smelt to contaminants and to localized catastrophic events. *Id.* at 197. Plaintiffs' omnibus complaint that the critical habitat section entirely lacks analytical structure is overbroad.

b. Reliance On Assumptions Of Indirect Effects Without Providing Evidence That These Indirect Effects Are Reasonably Certain To Occur.

Plaintiffs argue BiOp critical habitat finding 3(a), BiOp at 278, is flawed as unsupported by any analysis verifying that Project-induced changes to Delta hydrodynamics interact with other abiotic factors to exacerbate the effects of [**237] those factors on the delta smelt's critical habitat. Plaintiffs assert the BiOp's conclusory assertions do not explain how described indirect effects to critical habitat are reasonably certain to occur. *See 50 C.F.R. § 402.02* (requiring that indirect effects be reasonably certain to occur).

The BiOp concludes the impact of Project Operations on PCE 2 (Water), "[a]s described in the Effects Section, the CVP/SWP alter the hydrologic conditions within spawning habitat throughout the spawning period for delta smelt by impacting various abiotic factors including the distributions of turbidity, food, and contaminants." BiOp at 239; *see also* BiOp at 241 ("In addition, pumping at Banks and Jones can alter flows within the Delta. This results in a corresponding alteration of larval and juvenile transport."); BiOp at 242 ("As described in the Effects Section, the CVP/SWP alter the hydrologic conditions within rearing habitat throughout the spawning period for delta smelt by impacting various abiotic factors including distributions of turbidity, food, and contaminants."); *id.* ("Pumping at Banks and Jones alters flows within the Delta. As described in the Effects Section, negative flows can result [**238] in an increased risk of entrainment when rearing habitat includes the South Delta."); BiOp at 243 ("As stated previously, the CVP/SWP alters the extent and location of the LSZ by modifying both the Sacramento and San Joaquin river flows which reduces habitat quality and quantity).).

The BiOp links export pumping and contaminant effects:

> The CVP and SWP, as analyzed in the Effects Section, directly influence the location and the amount of suitable spawning habitat, especially in drier WYs. Further, through upstream depletions and alteration of river flows, the CVP/SWP has played a role in altering the environment of the Delta. This has resulted in adverse effects to delta smelt spawning habitat availability and may mobilize contaminants. The contaminant effects may be generated or diluted by flow depending on the amount of flow, the type of contaminant, the time of the year, and relative concentrations.

BiOp at 239. Although, the BiOp supports the conclusion that the Projects drive hydrodynamics [*947] during times of balanced conditions, nowhere in the BiOp or in any record citation provided by any party is there any support for the conclusion that Project operations are reasonably certain to [**239] exacerbate contaminant impacts. It is logical that changes in hydrodynamics could impact exposure to contaminants in the water, but the extent of this influence is unknown and unsupported by any analysis or record citation.

c. Reliance on Analysis Of Entrainment and X2 in Support of the Adverse Modification Determination.

Plaintiffs opening brief argued: "the BiOp's determination that proposed Project Operations will adversely modify critical habitat rests upon the same defective Project Effects Analysis that led FWS to its determination that Project Operations would jeopardize the delta smelt." Doc. 551 at 63. The critical habitat conclusion section does explicitly rely on conclusions reached in the effects analysis' regarding entrainment and the movement of X2. For example, Critical Habitat conclusion #3 provides:

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> 3. Implementation of the proposed action is expected to perpetuate the very limited co-occurrence of PCEs at appropriate places and times by: (a) altering hydrologic conditions in a manner that adversely affects the distribution of abiotic factors such as turbidity and contaminants; (b) altering river flows to an extent that increases delta smelt entrainment at Banks and Jones, [**240] as well as reduces habitat suitability in the Central and South Delta; and (c) altering the natural pattern of seasonal upstream movement of the [Low Salinity Zone ("LSZ")] to an extent that is likely to reduce available habitat for the delta smelt within areas designated as critical habitat.

BiOp at 278.

The BiOp's general conclusion that Project Operations increase delta smelt entrainment with resulting population-level impacts within year classes is valid. It is, rather, the BiOp's quantitative conclusions regarding the exact negative OMR flow ranges that are unfounded. FWS did not err by incorporating this general conclusion in its Critical Habitat conclusion.

As for the inclusion of the finding that Project Operations alter the natural pattern of seasonal movement of the Low Salinity Zone ("LSZ"), this underlying conclusion from the Effects section is not supported by the record, because it is based at least in part on the invalid quantitative analysis using the Calsim II to Dayflow comparison. This aspect of the critical habitat analysis is without record support. These areas must be addressed on remand.

(9) Discretionary v. Nondiscretionary Actions.

Plaintiffs complain that the BiOp's [**241] Project Effects analysis was "tainted" because it does not distinguish between discretionary and non-discretionary actions. Doc. 551 at 61-63. *National Association of Home Builders v. Defenders of Wildlife, 551 U.S. 644, 127 S. Ct. 2518, 168 L. Ed. 2d 467 (2008)*, held that ESA § 7's consultation requirements do not apply to non-discretionary actions. Where an agency is required by law to perform an action, it lacks the power to insure that the action will not jeopardize the species. *Id. at 667*. Plaintiffs' cite the Coordinated Operations Agreement, the Central Valley Project Improvement Act's ("CVPIA") requirements to deliver water for Central Valley wildlife refuge areas, and D-1641 as examples of mandatory aspects [*948] of Project operations that, they claim, should have been segregated from other Project Operations in the Project Effects Analysis.

However, *Home Builders* does not address whether, once section 7 consultation is triggered, the jeopardy analysis must separately identify and segregate discretionary from non-discretionary actions, relegating the non-discretionary actions to the environmental baseline. *Home Builders* addressed whether the section 7 consultation obligation attaches to a particular agency action at [**242] all. *See Home Builders, 551 U.S. at 669-70* (holding that consultation "duty does not attach to actions... that an agency is required by statute to undertake....") (emphasis added). Plaintiffs do not suggest that section 7 does not apply to the coordinated operations of the Projects. Rather, Plaintiffs contend that the section 7 consultation process requires distinguishing between discretionary and non-discretionary Project operations to identify the actions not subject to Section 7. Neither *Home Builders* nor the regulation interpreted in *Home Builders*, *50 C.F.R. § 402.03*, includes any such requirement. Plaintiffs' motion for summary judgment that the BiOp unlawfully failed to distinguish between discretionary and non-discretionary actions is DENIED. This does not mean non-discretionary actions required by law must not be considered in the consultation process. Federal Defendants and Defendant-Intervenors' cross-motion on identification of non-discretionary actions is GRANTED.

B. Application of the RPA Regulations.

Plaintiffs next argue that, in adopting the RPA, Federal Defendants did not undertake the analysis required by Section 7 and its Joint Consultation Regulations. Doc. 551 at [**243] 65-79. Under the ESA, if a biological opinion concludes that a proposed agency action will cause jeopardy to a listed species or result in the destruction or adverse modification of its critical habitat, "the Secretary shall suggest those reasonable and prudent alternatives which he believes would not violate subsection (a)(2) and can be taken by the Federal agency or applicant in implementing the agency action." *16 U.S.C. § 1536(b)(3)(A)*; *50 C.F.R. § 402.14(h)(3)*. The Joint Consultation Regulations define such reasonable and prudent alternatives as follows:

> Reasonable and prudent alternatives refer to alternative actions identified during formal consultation that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that is [sic] economically and technologically feasible, and that the Di-

No comments

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rector believes would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

50 C.F.R. § 402.02; *see also 51 Fed. Reg. at 19,958*; *50 C.F.R. § 402.14(g)(5)*; *Home Builders, 551 U.S. at 652* [**244] (*Section 402.02* defines what qualifies as an RPA). Under this definition, an RPA must: (1) be consistent with the purpose of the underlying action; (2) be consistent with the action agency's authority; (3) be economically and technologically feasible; and (4) avoid the likelihood of jeopardy to the species or adverse modification of its critical habitat. *50 C.F.R. § 402.02*; *see also 16 U.S.C. § 1536(b)(3)(A)*; *Greenpeace v. Nat'l Marine Fisheries Serv., 55 F. Supp. 2d 1248, 1264 (W.D. Wash. 1999)*.

(1) FWS Did Not Explicitly Analyze Any of the Four Factors in the BiOp.

It has already been determined that "the BiOp does not explicitly discuss the [*949] first three factors -- consistency with the purpose of the action; consistency with the legal authority and jurisdiction of the action agency; and economic and technological feasibility -- at all." Memorandum Decision Re Cross Motions for Summary Judgment Re Reasonable and Prudent Alternative Claims, Doc. 354 at 16 ("None of the terms 'consistent with the intended purpose of the action,' 'jurisdiction,' 'legal authority,' or 'economically and technologically feasible,' are used in the RPA section of the BiOp."). "[I]t is undisputed that the BiOp's [**245] language contains no such discussion." *Id. at 21*.

An October 15, 2009 Decision rejected Plaintiffs' earlier argument that this analysis must be included "on the face" of the BiOp. *See* Doc. 354 at 38. However, the question of whether FWS properly promulgated the RPA was left to be "decided on the basis of the entire record." *Id. at 51*. Of the four requirements, "[j]eopardy has been found to be the 'guiding standard' for determination of RPAs." *Id. at 27* (citing *Greenpeace 55 F. Supp. 2d at 1268*). Whether and how the record must demonstrate compliance with *§ 402.02* is a separate question.

(2) Compliance with § 402.02.

Plaintiffs allege that FWS violated the APA because the administrative record contains no meaningful analysis related to the first three requirements of *§ 402.02*, and that, while FWS undertook some analysis regarding whether its RPA would avoid jeopardizing delta smelt (the fourth factor described in *§ 402.02*), that analysis is flawed because it was not based upon the best available science.

a. Jeopardy Factor (Fourth Factor).

Plaintiffs maintain that FWS violated the ESA by adopting its RPA without providing a reasoned analysis regarding how the various RPA actions will avoid [**246] the likelihood of jeopardizing the delta smelt or adversely modifying its critical habitat. The Consultation Handbook directs that "[w]hen a reasonable and prudent alternative consists of multiple activities, it is imperative that the opinion contain a thorough explanation of how each component of the alternative is essential to avoid jeopardy." Consultation Handbook at 4-43. Plaintiffs do not dispute that the BiOp contains extensive discussion of the need for the RPA components. Rather, Plaintiffs contend that the RPA violates § 402.2 because that discussion is not based on the best available science.

The § 402.02 requirements and the best available science requirement are separate. It is undisputed that both the BiOp and its RPA must be based on the best available science, but a violation of that requirement does not necessarily violate *§ 402.02*. Whether each part of the jeopardy analysis relies on the best available science is discussed above. *Section 402.02* does not provide an independent statutory basis for imposing liability upon FWS for failing to comply with the best available science requirement. Plaintiffs' motion for summary judgment on this ground is DENIED; Federal Defendants' [**247] and Defendant-Intervenors' is GRANTED.

b. Non-Jeopardy Factors (Factors One Through Three).

It is undisputed that the BiOp contains no explicit discussion of the first three factors: (1) consistency with the purpose of the underlying action; (2) consistency with the action agency's authority; and (3) economic and technological feasibility. Plaintiffs insist that the ESA and its implementing regulations require that the record contain explicit "analyses" of each of the four factors. As authority, Plaintiffs invoke general principles of Administrative [*950] Law, including the rule that a court "cannot infer an agency's reasoning from mere silence." *See PCFFA, 426 F.3d at 1091*.

It is undisputed that there is no explicit analysis anywhere in the record of the three non-jeopardy factors. Federal Defendants and Defendant-Intervenors dismiss this fact, arguing (1) that no such explicit analysis is required by law and (2) that satisfaction of all three factors is so obvious that explicit analysis is unnecessary. *See* Doc. 660 at 70-72; Doc. 661-3 at 35-38.

Many of the cases upon which the parties now rely were discussed in the October 15, 2009 Decision:

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Plaintiffs and DWR rely on caselaw to support their [**248] contention that, despite the lack of an explicit requirement, the BiOp must include findings treating the first three RPA requirements. It is undisputed that an agency acts arbitrarily and/or capriciously when it fails to consider an important aspect of a problem before it. *Pac. Coast Fed'n of Fishermen's Ass'ns v. NMFS, 265 F.3d 1028, 1034 (9th Cir. 2001)* ("*PCFFA I*"). But, whether an agency must expressly consider any particular issue on the face of its decisional document, as opposed to elsewhere in the administrative record, is a different question. On the one hand, an agency action may be upheld even if it is of "less than ideal clarity" as long as "the agency's path may reasonably be discerned." *Bowman Transp., Inc. v. Arkansas-Best Freight System, Inc., 419 U.S. 281, 285-86, 95 S. Ct. 438, 42 L. Ed. 2d 447 (1974)*. However, a court "cannot infer an agency's reasoning from mere silence..." but must "rely only on what the agency actually said...." *Compare Gifford Pinchot Task Force v. U.S. Fish and Wildlife Serv., 378 F.3d 1059, 1072 n.9 (9th Cir. 2004)* (holding that the court "may only rely on what the agency said in the record to determine what the agency decided and why"); *Pac. Coast Fed'n of Fishermen's Ass'ns v. NMFS, 426 F.3d 1082, 1092 (9th Cir. 2005)* [**249] ("*PCFFA II*") (citing *Gifford Pinchot* for the proposition that a court must "rely only on what the agency actually said in the biological opinion"). Does the caselaw require that the RPA requirements be discussed on the face of the BiOp?

Plaintiffs place great weight on the Ninth Circuit's decision in *Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation, 143 F.3d 515, 518 (9th Cir. 1998)*, upholding a FWS biological opinion concluding that Reclamation's operations on Lake Mead and the Lower Colorado River would jeopardize an endangered bird species, the Southwestern Willow Flycatcher. Before the BiOp was finalized, FWS sent Reclamation a draft RPA comprised of a number of short and long-term components. *Id.* Some of the short-term measures would have required Reclamation to lower the level of Lake Mead. Reclamation advised FWS that it lacked discretion to do so. *Id.* FWS's final BiOp confirmed that project operations would jeopardize the species, but proposed a new RPA which no longer required Reclamation to take the originally-proposed short term actions, replacing them with other short term measures. *Id.*

Environmental plaintiffs argued that FWS improperly rejected the [**250] draft RPA in favor of the final RPA, which does less to preserve habitat near Lake Mead, "based on Reclamation's alleged lack of discretion to lower the level of Lake Mead." *Id. at 523*. Specifically, Plaintiffs complained "that the secretary never independently reviewed Reclamation's [*951] representation that it lacked such discretion." *Id.*

The Ninth Circuit rejected this argument on several grounds. First, "under the ESA, the Secretary was not required to pick the first reasonable alternative the FWS came up with in formulating the RPA. The Secretary was not even required to pick the best alternative or the one that would most effectively protect the Flycatcher from jeopardy.... The Secretary need only have adopted a final RPA which complied with the jeopardy standard and which could be implemented by the agency." *Id. at 523* (emphasis added).

Second, "under the ESA, the Secretary was not required to explain why he chose one RPA over another, or to justify his decision based solely on apolitical factors.[FN5]" *Id.* Footnote 5 further explains:

> The Secretary must rely on "the best scientific and commercial data available" in formulating an RPA, *16 U.S.C. § 1536(a)(2)*. However, the ESA does not [**251] explicitly limit the Secretary's analysis to apolitical considerations. If two proposed RPAs would avoid jeopardy to the Flycatcher, the Secretary must be permitted to choose the one that best suits all of its

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> interests, including political or business interests.

Id.

The Ninth Circuit then articulated the governing standard: "The only relevant question before [the court] for review was whether the Secretary acted arbitrarily and capriciously or abused his discretion in adopting the final RPA." *Id.* "In answering this question, the court had only to determine if the final RPA met the standards and requirements of the ESA. The court was not in a position to determine if the draft RPA should have been adopted or if it would have afforded the Flycatcher better protection." *Id.*

The Ninth Circuit reviewed the evidence and found no APA violation:

> Upon careful review of the evidence, we cannot say the district court erred in finding that the final RPA met the standards and requirements of the ESA. The district court determined that the FWS considered the relevant factors and reasonably found that the Flycatcher could survive the loss of habitat at Lake Mead for eighteen months until 500 acres could [**252] be protected, then survive an additional two years until an additional 500 acres could be protected, and finally survive through the MSCP process until compensation could be made for the historical habitat lost on the Lower Colorado River and until an extensive ecological restoration could be undertaken. Southwest failed to present any convincing evidence to contradict the FWS' findings. Southwest merely relied upon the discarded draft RPA which had indicated that preservation of the Lake Mead habitat was necessary to the survival of the Flycatcher. However, upon further consideration of the matter, the FWS was entitled to, and did, in fact, change its mind. The FWS concluded in the final BO that the proposed short-term and long-term provisions of the final RPA would avoid jeopardy to the Flycatcher, notwithstanding the failure to modify Reclamation's operation of Hoover Dam at Lake Mead. Because there was a rational connection between the facts found in the BO and the choice made to adopt the final RPA, and because we must defer to the special expertise of the FWS in drafting RPAs that will sufficiently [*952] protect endangered species, we cannot conclude that the Secretary violated the [**253] APA.

Id. (emphasis added).

Plaintiffs argue the emphasized text, approving FWS's RPA because there was a rational connection between the facts "found in the BiOp" and that decision, establishes that the FWS must make findings on all four RPA requirements on the face of the BiOp. This overstates the Ninth Circuit's holding. First, *Southwest Center* says nothing about requiring findings on the face of the BiOp. The requisite findings were, unsurprisingly, in the BiOp in that case, because those findings concerning how each component of the final RPA would avoid jeopardy, were explicitly required by the Consultation Handbook. Consultation Handbook 4-41 ("When a reasonable and prudent alternative consists of multiple activities, it is imperative that the opinion contain a thorough explanation of how each component of the alternative is essential to

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avoid jeopardy and/or adverse modification.")(emphasis added). Neither the Handbook, the ESA, nor any of its implementing regulations explicitly require that the BiOp contain an analysis of any of the other three RPA requirements.

Plaintiffs suggest the second sentence from the *Southwest Center* language delineates that findings are required for [**254] all four RPA requirements. Plaintiffs quote that sentence as authority to claim the "FWS considered the relevant factors and reasonably found[] the Joint Consultation Regulations requirements were satisfied with respect to an RPA issued in a biological opinion for the Southwest Willow Flycatcher...." Doc. 237 at 10. This is misleading, because the entire sentence makes clear that the only "findings" discussed in *Southwest Center* were findings concerning the capacity of the Flycatcher to survive in the short term while the RPA was being implemented. *143 F.3d at 523*. *Southwest Center* only stands for the proposition that FWS must justify its conclusion that the RPA would prevent jeopardy and/or adverse modification in the BiOp. *See Greenpeace, 55 F. Supp. 2d at 1268* (finding the jeopardy determination to be the "guiding standard" for determination of RPAs). Southwest *Center* does not create the discussion requirement Plaintiffs suggest.

PCFFA II, on which Plaintiffs also rely, is not contrary. *426 F.3d 1082*. There, the Ninth Circuit overturned an RPA adopted for coho salmon because NMFS failed to articulate the bases for its assumptions underlying the RPA. *Id. at 1090-95*. The district [**255] court concluded that the agency had "implicitly considered" whether all three phases of the RPA would ensure against jeopardy. *Id. at 1091*. The Ninth Circuit emphasized that "it is a basic principle of administrative law that the agency must articulate the reason or reasons for its decision." *Id.*

The Ninth Circuit found "little substance to the discussions of Phases I and II" in the BiOp. *Id. at 1093*. Although some language suggested that "the agency believed that the RPA would avoid jeopardy to the coho, this assertion alone is insufficient to sustain the BiOp and the RPA." *Id.* The Ninth Circuit refused to "take [the agency's] word that the species will be protected if its plans are followed." *Id.* As in Southwest *Center, PCFFA II* only discussed whether the RPA would avoid jeopardy, the analysis of which is explicitly required in the BiOp. Here, Plaintiffs seek to extend this logic to mandate that FWS include specific findings concerning [*953] the three other RPA requirements in the BiOp. *PCFFA II* does not require this.

Plaintiffs also cite *NRDC v. Kempthorne, 506 F. Supp. 2d 322 (E.D. Cal. 2007)*, which held that, although certain, potentially critical data was part of the administrative record, [**256] its significance, or lack thereof, was not discussed in the BiOp. *Id. at 362-363*. The government's post hoc reasoning was rejected, that, even if the data had been addressed in the BiOp, the ultimate opinion reached by the Service would not have been different. "Although a decision of less than ideal clarity may be upheld if the agency's path may reasonably be discerned, [a court] cannot infer an agency's reasoning from mere silence. Rather, an agency's action must be upheld, if at all, on the basis articulated by the agency itself." *Id. at 366* (citing *PCFFA, 426 F.3d at 1091*). The district court further reasoned "[h]ad FWS examined the FMWT 2004 data in the BiOp, the weight it gave to that data would have been entitled to deference. The agency's silence cannot be afforded deference." *Kempthorne, 506 F. Supp. 2d at 366*.

Plaintiffs argue that this language reflects a requirement that analysis of the data must be included in the BiOp, suggesting that if such analysis was instead found elsewhere in the administrative record it would be insufficient. This reads too much into *Kempthorne*, where the necessary reasoning was found in neither the BiOp nor the administrative record. *Id. at 380* [**257] (district court searched for, but did not find, certain analyses in the BiOp or "elsewhere in the administrative record). *Kempthorne* found the content of the BiOp lacking in light of the entire AR, both of which entirely failed to competently perform the required ESA

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jeopardy and habitat modification analyses. The practical fact is that a BiOp is much more accessible than the administrative record, which can be tens of thousands of pages long. *Kempthorne* did not address or decide the issue presented here.

In APA review cases, it is well established that, in determining whether agency action was "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.... the court shall review the whole record or those parts of it cited by a party, and due account shall be taken of the rule of prejudicial error." *5 U.S.C. § 706*. The "whole record," includes "everything that was before the agency pertaining to the merits of its decision." *Portland Audiibon Soc'y v. Endangered Species Committee, 984 F.2d 1534, 1548 (9th Cir. 1993). See also Seattle Audubon Soc'y v. Lyons, 871 F. Supp. 1291, 1308 (W.D. Wash. 1994)* (finding declarations properly considered to "explain the [**258] agency's actions or to determine whether its course of inquiry was inadequate.").

DWR's cases do not undermine this reasoning. *Motor Vehicle Manufacturers Association of the United States, Inc., v. State Farm Mutual Auto Insurance Company, 463 U.S. 29, 103 S. Ct. 2856, 77 L. Ed. 2d 443 (1983)*, concerned the National Highway Traffic Safety Administration's ("NHTSA") decision to rescind passive restraint crash safety requirements for new motor vehicles. When NHTSA learned that automakers opted to install automatic seatbelts which users could easily detach, the agency rescinded the order in light of the expense required to implement a program that would have only minimal safety benefits because it could be disengaged by users. *Id. at 38-39*. The Court concluded that this [*954] decision was arbitrary and capricious because NHTSA failed to consider modifying the standard to require the installation of airbags. *Id. at 46*. In reaching this conclusion, the Court indicated it must "consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment." *Id.* (emphasis added).

Focusing on *State Farm's* use of the word "decision," DWR asserts that all relevant factors must [**259] be considered in the text of the agency's decision document, rather than elsewhere in the administrative record. But, *State Farm* also emphasized that the relevant statue required a "record of the rulemaking proceedings to be compiled," *id. at 43-44*, and indicated that "Congress established a presumption against.... changes in current policy that are not justified by the rulemaking record," *id. at 43*. *State Farm* does not support DWR's position that the "whole record" rule should be ignored in favor of a requirement that any and all analytical reasoning must be included in the decision document (the BiOp).

DWR also relies on *Burlington Truck Lines, Inc. v. United States, 371 U.S. 156, 168-69, 83 S. Ct. 239, 9 L. Ed. 2d 207 (1962)*, which criticized the Interstate Commerce Commission's ("ICC") failure to make any findings or include any analysis to justify a particular decision. The Court noted that "expert discretion is the lifeblood of the administrative process, but unless we make the requirements for administrative action strict and demanding, expertise, the strength of modern government, can become a monster which rules with no practical limits on its discretion." *Id. at 167* (internal citations and quotations omitted). [**260] *See also Ry. Labor Executives' Ass'n v. ICC, 784 F.2d 959, 974* (refusing to "rummage around in the record below to find a plausible rationale to fill the void in the agency order under review"). *Burlington* and *Railway Labor Executives'* insistence upon formal findings is unsurprising given that, under the procedures applicable in that case, where the ICC was required to "make findings that support its decision, and those findings must be supported by substantial evidence." *Id.* No such general findings requirement exists here. Rather, the only findings explicitly required by the Consultation Handbook are those concerning the capacity of any RPA to prevent jeopardy and/or adverse modification.

A statute or regulation may specifically require certain reasoning or findings

No comments

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> to be included in the ultimate decision document. The above-mentioned requirement that the BiOp explain why each part of a multi-part RPA ensures against jeopardy or adverse modification is one such example. However, there is no parallel requirement that FWS certify or make findings with respect to the other three RPA requirements on the fac[e] of the record. It is not appropriate for a court to "create[] a requirement [**261] not found in any relevant statute or regulation." *The Lands Council v. McNair, 537 F.3d 981, 991 (9th Cir. 2008)*. Rather, the issue of whether FWS properly promulgated the RPA must be decided on the basis of the entire record.

Doc. 354 at 38-51 (footnotes omitted, emphasis in original). Plaintiffs' argument that the three non-jeopardy factors must be explicitly analyzed on the face of the BiOp was rejected, but the question of how the three non-jeopardy factors must be treated elsewhere [*955] in the record was left open. Must an explicit analysis of the three factors be included in the record? Or may evidence in the record itself, even absent explicit analysis, be relied upon to evaluate whether the RPA satisfies the three factors? The October 15, 2009 Decision recognizes a dichotomy in the caselaw:

> On the one hand, an agency action may be upheld even if it is of "less than ideal clarity" as long as "the agency's path may reasonably be discerned." *Bowman Transp., Inc. v. Arkansas-Best Freight System, Inc., 419 U.S. 281, 285-86, 95 S. Ct. 438, 42 L. Ed. 2d 447 (1974)*. However, a court "cannot infer an agency's reasoning from mere silence..." but must "rely only on what the agency actually said...." *Compare Gifford Pinchot Task Force v. U.S. Fish and Wildlife Serv., 378 F.3d 1059, 1072 n.9 (9th Cir. 2004)* [**262] (holding that the court "may only rely on what the agency said in the record to determine what the agency decided and why"); *Pac. Coast Fed'n of Fishermen's Ass'ns v. NMFS, 426 F.3d 1082, 1092 (9th Cir. 2005)* ("*PCFFA II*") (citing *Gifford Pinchot* for the proposition that a court must "rely only on what the agency actually said in the biological opinion").

Id. at 39.

Defendants acknowledge that the agency must explicitly analyze the jeopardy factor, but claim that it is permissible for the agency not to address the non-jeopardy factors anywhere in the administrative record. To accept Defendants' view would be to abdicate the judicial review function. Even though the jeopardy factor is the "guiding standard" for the adoption of an RPA, *see Greenpeace, 55 F. Supp. 2d at 1268*, this does not eviscerate the other three § 402.02 factors. *Greenpeace* rejected the contention that the "economically and technologically feasible" language required the agency to "balance the benefit to the species against the economic and technical burden on the industry before approving an RPA," because such a conclusion would be inconsistent with the purposes of the ESA under *TVA v Hill. Id. Greenpeace* confirms that [**263] *50 C.F.R. § 402.02* "contains four distinct requirements for any valid RPA," *id. at 1264*, and that FWS "must come up with [RPAs] that are consistent with the purposes of the underlying action and the action agency's authority, that are economically and technologically feasible, and which avoid the likelihood of jeopardy and adverse modification." *Id.*

According to *PCFFA*, a court should "sustain an agency action if the agency has articulated a rational connection between the facts found and the conclusions made." *426 F.3d at 1090* (citing *Motor Vehicle Mfrs. Ass'n, 463 U.S. at 43*).

> "Even when an agency explains its decision with 'less than ideal clarity,' a reviewing court will not upset the decision on that account 'if the agency's path may reasonably be discerned.'" *Alaska Dep't of Envt'l Conserv. v. EPA, 540 U.S. 461, 497, 124 S. Ct. 983, 157 L. Ed. 2d 967 (2004)* (quoting Bowman *Transp., Inc. v. Arkansas-Best Freight Sys., Inc., 419 U.S. 281, 286, 95 S. Ct. 438, 42 L. Ed. 2d 447 (1974))*
>
> While our review is deferential, our inquiry must "be searching and careful." *Marsh, 490 U.S. at 378*. We must determine whether the agency's decision was "based on a consideration of the relevant factors and whether there has been a clear error of judgment." *Id.*

Id. Here, [**264] the agency has articulated absolutely no connection between the facts in the record and the required conclusion [*956] that the RPA is (1) consistent with the purpose of the underlying action; (2) consistent with the action agency's authority; and (3)

No comments

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economically and technologically feasible. The record here is not just an explanation of "less than ideal clarity." There is no explanation at all

Defendants offer a number of post hoc rationalizations for the RPA. Defendant-Intervenors argue that the record demonstrates the RPA can be implemented in a manner consisted "with the intended purpose of the action" and "within the scope of the Federal agency's legal authority and jurisdiction," because, by letter dated December 15, 2008, the Bureau "provisionally accept[ed]" most portions of the RPA and stated that Components 3 and 4 "both need additional review and refinement before Reclamation will be able to determine whether implementation of these actions by the Projects is reasonable and prudent." *NRDC v. Kempthorne*, 1:05-cv-01207 OWW GSA, Doc. 767-1. Defendant-Intervenors conclude that the Bureau has made no determination that the RPA is inconsistent with the purpose of the action or with its [**265] legal authority and jurisdiction. Doc. 661-3 at 38. They suggest as to economic and technological feasibility, that these requirements must have been considered because, based on concerns expressed by the Bureau, the RPA was modified to be more flexible. [46] *Id.* at 37.

46 For example, OMR flows under Components 1 and 2 are to be calculated based on a 14-day running average, compared to the 7-day average under the interim remedial order. *See* BiOp at 168, 280-82. The turbidity trigger for Action 1 of Component 1 is now based on a 3-day average at three stations in the Delta, compared to one station under the Court's interim remedial order, to "better reflect a Delta-wide change in turbidity than one station which may be prone to localized conditions." BiOp at 281, 347.

But, the record provides none of these explanations. [47] FWS is ultimately responsible to ensure that the record supports the RPA. FWS explained in the preamble to its final rule adopting the Joint Consultation Regulations:

> [I]n those instances where the Service disagrees with a Federal agency's assessment of the reasonableness of its alternatives, the Service must reserve the right to include those alternatives in the biological [**266] opinion if it determines that they are "reasonable and prudent" according to the standards set out in the definition in § *402.02*; the Service cannot abdicate its ultimate duty to formulate these alternatives by giving Federal agencies control over the content of a biological opinion.

51 Fed. Reg. 19,926, 19,952 (June 3, 1986). Even if, *arguendo*, the RPA is consistent with the multiple purposes of the action [*957] and the agency's statutory authority, and is economically and technologically feasible to implement, the APA requires, and the public is entitled under the law to receive, some exposition in the record of why the agency concluded (if it did so at all) that all four regulatory requirements for a valid RPA were satisfied. The RPA Actions manifestly interdict the water supply for domestic human consumption and agricultural use for over twenty million people who depend on the Projects for their water supply. "Trust us" is not acceptable. FWS has shown no inclination to fully and honestly address water supply needs beyond the species, despite the fact that its own regulation requires such consideration.

47 The specific requirements of the X2 action are another example of how the record [**267] fails to address the "consistency with the intended purpose of the action," and is "within the scope of the ... agency's authority and jurisdiction." *50 C.F.R. § 402.02*. Because of competing demands for water from the Projects, combined with a limited supply, one purpose of the Projects is to ensure that that water use and allocation be carefully managed, and to also ensure that water is put to a beneficial use and not wasted. This purpose is, in fact, required by California law, *Cal. Const. art. X, §2*; *Cal. Water Code § 275*, and imposed upon federal project operations by virtue of Section 8 of the Reclamation act of 1902. *43 U.S.C. § 383*. The Projects will have to expend hundreds of thousands of acre feet of water to maintain X2 as far seaward as Component 3 requires. Miller Decl., Doc. 400, at ¶ 67-73. Less water would be required if X2 did not need to be pushed so far downstream--water would then be available for other uses. Yet nothing in the BiOp or the record explains why it is essential that X2 be moved seaward to the degree required by Component 3 in order to protect the smelt and its habitat.

How the appropriation of water for the RPA Actions, to the exclusion of implementing [**268] less harmful alternatives, is required for species survival is not explained. The appropriate remedy for such a failure to explain is remand to the agency. *See Sears Sav. Bank v. Federal Sav. and Loan Ins. Corp. 775 F.2d 1028, 1030 (9th Cir. 1985)* ("If the administrative record is inadequate to explain the action taken, the preferred practice is to remand to the agency for amplification."). Plaintiffs' motion for summary judgment that FWS violated §

No comments

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402.02 is GRANTED; Defendants' cross-motion is DENIED.

c. There is no Procedural Requirement that FWS Accept, Consider, and/or Address Comments Regarding the BiOp or its RPA.

Neither the ESA nor its implementing regulations require an opportunity for public comment or that FWS respond to any comments received. *See Kandra v. United States, 145 F. Supp. 2d 1192, 1209 n.8 (D. Or. 2001)* ("as the government correctly pointed out during oral argument, the ESA does not require public review or input during the consultation process"); *Ctr. for Biological Diversity v. Kempthorne, 2008 U.S. Dist. LEXIS 17517, 2008 WL 659822, *7 (D. Ariz. Mar. 6, 2008)* ("Biological opinions, unlike DPS findings, are not subject to notice and comment rulemaking procedures pursuant to the ESA."). [**269] Plaintiffs' suggestion that FWS violated the ESA by "ignoring" comments on the draft BiOp is legally unsustainable. Plaintiffs' motion on this ground is DENIED; Defendants' cross-motion is GRANTED.

C. Stewart & Jasper Orchards' Argument Re: Reasonable and Prudent Measures.

Stewart & Jasper Orchards, et al., ("Stewart & Jasper") allege that FWS's failure to consider the economic impacts of implementing the reasonable and prudent measures ("RPMs") is arbitrary and capricious. Doc. 551 at 68 n. 24. Whenever FWS offers reasonable and prudent alternatives to avoid jeopardy to a species, it must also specify "those reasonable and prudent measures that [FWS] considers necessary or appropriate to minimize" incidental taking of the species. *16 U.S.C. § 1536(b)(4)(C)(ii)*. Stewart & Jasper argues that by formulating RPMs that it believes "are necessary and appropriate to minimize the effect of the proposed action on the delta smelt," without "provid[ing] a statement that allows for Reclamation to take into consideration the economic impacts of implementing the RPMs," *see* BiOp at 294, FWS has allegedly "arbitrarily left open the question of whether the RPMs are in fact reasonable, necessary, and [**270] appropriate in light of the harm that their implementation will cause." Doc. 551 at 68 n. 24.

This argument is unsupported in law. Unlike 50 C.F.R. § 402.02's definition of a RPA, which provides that RPAs must be "economically and technologically" feasible, [*958] the regulatory definition of RPM lacks such language:

> Reasonable and prudent measures refer to those actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take.

50 C.F.R. § 402.02. Even if the definition of RPM included an economic feasibility requirement, this language does not require that FWS "balance the benefit to the species against the economic and technical burden on the industry before approving an RPA," because such a conclusion is inconsistent with the purposes of the ESA under *TVA v Hill. Greenpeace, 55 F. Supp. 2d at 1267*. Stewart & Jasper's motion for summary judgment regarding the lawfulness of the RPMs for failure to consider economic effects is DENIED; Federal Defendants and Defendant-Intervenors' cross-motions are GRANTED.

D. Stewart & Jasper, et al.'s, Argument that FWS Illegally Arrogated Authority to Itself Over Bureau of Reclamation and California [**271] Department of Water Resources Operations.

The Stewart & Jasper Plaintiffs raise a novel argument that FWS "illegally arrogated" authority to itself over Reclamation and DWR, by "claim[ing] the ability to oversee [Project operations] indefinitely," rather than "advis[ing] Reclamation and DWR on how to avoid jeopardizing the delta smelt and destroying or adversely modifying its critical habitat." Doc. 551 at 80:

> In RPA Component 1, for example, FWS not only set forth actions "designed to reduce the delta smelt entrainment losses," but also stated that "[t]hroughout the implementation of RPA Component 1, FWS will make the final determination as to OMR flows required to protect delta smelt." BiOp at 280-81. Likewise, in RPA Component 2 that FWS "shall make the final determination regarding specific OMR flows," BiOp at 282, as well as the FWS' reasonable and prudent measures. See BiOp at 294 (noting that FWS "shall have the final decision on the operations of the Permanent Gates" and that the members of the Gate Operations Review Team "can provide suggestions to operate the gates, but the ultimate decision on how to operate the gates to protect delta smelt will be made by the Service").

Id.

Stewart [**272] & Jasper argue that this is unlawful because the ESA "does not give the FWS the power to

No comments

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order other agencies to comply with their requests or to veto their decisions." *Id.* (citing *Sierra Club v. Marsh, 816 F.2d 1376, 1386 (9th Cir. 1987))*. The law is clear that FWS has no such authority, nor can FWS, as consulting agency, act *ultra vires* to usurp the operational authority of the Bureau and DWR over the Projects. The November 13, 2009 Decision found: "the action agency retains the ultimate responsibility for deciding whether, and how, to proceed with the proposed action after Section 7 consultation." Doc. 399, Mem. Decision re Cross-Motions for Summary Judgment on NEPA Issues, at 23-24 n.7. Even if FWS issues an RPA with specific requirements following a jeopardy or adverse modification finding, the action agency remains free to disregard such requirements, and FWS has no enforcement authority absent an ESA violation. Reclamation and DWR have provisionally adopted the RPA and have implemented many of its Actions, but the record does not show FWS employees have "claimed the ability to oversee these agencies indefinitely." Doc. 551 at 80.

[*959] Stewart & Jasper's contention that FWS's reserved [**273] to itself "an ongoing power of oversight, as well as a power to dictate new and different pumping restrictions," assumes that neither Reclamation, as action agency, nor DWR, as co-operator, have the ability to not comply with the RPA. Doc. 697 at 87. Reclamation is not legally compelled to blindly follow FWS's pronouncements. Reclamation retains the authority to reject the RPA at any time, subject to its obligation to reinitiate consultation. Although FWS has not yet demonstrated a willingness or capability to protect interests other than the species, it cannot be assumed that Reclamation will not lawfully discharge its statutory water supply responsibilities.

Stewart & Jasper's motion for summary judgment regarding FWS's alleged unlawful arrogation of authority is DENIED; Federal Defendants and Defendant-Intervenors' cross-motions are GRANTED.

E. Information Quality Act Claim.

Family Farm Alliance ("FFA") Plaintiffs claim that Federal Defendants did not apply the IQA and its implementing guidelines in preparing and disseminating the BiOp.

(1) Legal Framework of the IQA.

The IQA provides in its entirety:

> (a) IN GENERAL.--The Director of the Office of Management and Budget shall, by not later [**274] than September 30, 2001, and with public and Federal agency involvement, issue guidelines under *sections 3504(d)(1)* and *3516 of title 44, United States Code*, that provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies in fulfillment of the purposes and provisions of chapter 35 of title 44, United States Code, commonly referred to as the Paperwork Reduction Act.
>
> (b) CONTENT OF GUIDELINES.--The guidelines under subsection (a) shall--
>
> > (1) apply to the sharing by Federal agencies of, and access to, information disseminated by Federal agencies; and
> >
> > (2) require that each Federal agency to which the guidelines apply--
> >
> > > (A) issue guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency, by not later than 1 year after the date of issuance of the guidelines under subsection (a);
> > >
> > > (B) establish administrative mechanisms allowing af-

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fected persons to seek and obtain correction of information maintained and disseminated by the agency that does [**275] not comply with the guidelines issued under subsection (a); and

(C) report periodically to the Director--

(i) the number and nature of complaints received by the agency regarding the accuracy of information disseminated by the agency; and

(ii) how such complaints were handled by the agency.

Pub. L. 106-554, 114 Stat 2763, 2763A-153-2763A-154 (2000) (codified at *44 U.S.C. § 3516*).

Subsection (a) mandates that the Office of Management and Budget ("OMB") issue, by no later than September 30, 2001, government-wide guidelines to ensure the "quality, objectivity, utility, and integrity of information" disseminated by federal [*960] agencies. *See* Pub. L. No. 106-554, § 515(a) (2000). The statute itself contains no substantive provisions regarding information quality, leaving the structure and design of any such requirements to OMB. There is no relevant legislative history disclosing substantive Congressional intent regarding information quality.

Within one year of OMB's issuance of Guidelines, each federal agency was required to issue its own guidelines consistent with OMB's. *Id.* at § 515(b)(2)(A). OMB, the Department of the Interior, and FWS timely issued the required guidelines. *See, e.g.*, *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies, 67 Fed. Reg. 8,452 (Feb. 22, 2002)* [**276] ("OMB IQA Guidelines"); *Information Quality Guidelines of the U.S. Department of the Interior, 67 Fed. Reg. 50,687 (Aug. 5, 2002))* ("DOI IQA Guidelines"); FWS Information Quality Guidelines ("FWS IQA Guidelines") [48]. The IQA specifically required agencies to "establish administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency...." and to "report periodically" on "the number and nature of complaints received by the agency regarding the accuracy of information disseminated by the agency" and "how such complaints were handled by the agency." *Id.* at § 515(b)(2)(B)&(C)(emphasis added).

48 Available at http://www.fws.gov/informationquality/topics/IQAguidelines-final82307.pdf (last visited August 11, 2010).

FWS's own IQA Guidelines are specific to its activities and disseminations, including biological opinions, and state that in order to ensure objectivity of information disseminated, the information will be presented in an "accurate[]," "clear[]," "complete[]," and "unbiased" manner. FWS IQA Guidelines III-8. In addition, FWS' IQA Guidelines require that a "preparer of a highly influential assessment or of influential [**277] information ... document the strengths and weaknesses of the data underlying the assessment/information so that the reader will understand the context for the FWS decision." *Id.* at § VI-10. Plaintiffs maintain that FWS failed to comply with these guidelines because the "effects of the BiOp were assumed, not supported by data and objective and scientific analyses." Doc. 551 at 82.

(2) Right to Judicial Review Under the APA.

Federal Defendants and Defendant Intervenors raise a threshold objection, arguing that there is no right of judicial review under the IQA.

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It is undisputed that the IQA provides no private right of action. A party challenging an administrative agency's compliance with a substantive statute that lacks an internal private right of action must seek judicial review under the APA. *See Lujan v. Nat'l Wildlife Fed'n, 497 U.S. 871, 882, 110 S. Ct. 3177, 111 L. Ed. 2d 695 (1990)*; *Village of False Pass v. Clark, 733 F.2d 605, 609 (9th Cir. 1984)* (because ESA contains no internal standard of review, *APA § 706* governs review of actions brought under the ESA).

The APA authorizes suit by a plaintiff "suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning [**278] of a relevant statute." *5 U.S.C. § 702*. There is a presumption of reviewability under the APA. *Shalala v. Illinois Council on Long Term Care, Inc., 529 U.S. 1, 44 n.11, 120 S. Ct. 1084, 146 L. Ed. 2d 1 (2000)*. However, [*961] the APA expressly precludes judicial review where: (1) any statute "precludes judicial review"; or (2) "agency action is committed to agency discretion by law." *5 U.S.C. § 701(a)*. If either of these exceptions applies, the lawsuit cannot proceed under the APA.

If neither exception applies, the APA permits judicial review of "[a]gency action made reviewable by statute and final agency action for which there is no other adequate remedy in a court...." *5 U.S.C. § 704*. Where a statute lacks an internal judicial review provision, the "agency action made reviewable by statute" language is inapplicable, requiring the existence of a "final agency action." "Agency action" is defined to include "the whole or a part of an agency rule, order, license, sanction, relief, or the equivalent or denial thereof, or failure to act." *5 U.S.C. § 551(13)*. The APA requires that the agency action be upheld unless it is found to be "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," or "without [**279] observance of procedure required by law." *5 U.S.C. § 706(2)*.

a. APA § 702(a) (2)'s Exception for Agency Action "Committed to Agency Discretion by Law" Bars Judicial Review in this Case.

FFA does not allege that any statute expressly precludes judicial review of FFA's IQA claim. The issue is whether the IQA and/or its implementing guidelines, by law, commit to agency discretion the disputed agency actions challenged by Plaintiff's claim.

The general test for when an action is "committed to agency discretion by law" under the APA is whether there is "no law to apply." *Heckler v. Chaney, 470 U.S. 821, 830, 105 S. Ct. 1649, 84 L. Ed. 2d 714 (1985)* (internal quotation marks omitted). "Agency action is committed to the discretion of the agency by law when 'the statute is drawn so that a court would have no meaningful standard against which to judge the agency's exercise of discretion.'" *Steenholdt v. FAA, 314 F.3d 633, 638, 354 U.S. App. D.C. 192 (D.C. Cir. 2003)* (quoting *Heckler, 470 U.S. at 830*). "If no 'judicially manageable standard' exists by which to judge the agency's action, meaningful judicial review is impossible and the courts are without jurisdiction to review that action." *Id.* Here, the IQA itself contains absolutely no substantive standards, [**280] let alone any standards relevant to the claims brought in this case concerning the timing of responses to Requests and Appeals and the makeup of peer review panels. The statute itself commits the challenged agency actions to the agency's discretion.

However, even "[w]here an action is committed to absolute agency discretion by law, ... courts have assumed the power to review allegations that an agency exceeded its legal authority, acted unconstitutionally, or failed to follow its own regulations." *United States v. Carpenter, 526 F.3d 1237, 1242 (9th Cir. 2008)*; *see also Padula v. Webster, 822 F.2d 97, 100, 261 U.S. App. D.C. 365 (9th Cir. 1987)*("Judicially manageable standards may be found in formal and informal policy statements and regulations as well as in statutes, but if a court examines all these possible sources and concludes that there is, in fact, 'no law to apply,' judicial review will be precluded.")(quoting *Citizens to Preserve Overton Park, Inc. v. Volpe, 401 U.S. 402, 410, 91 S. Ct. 814, 28 L. Ed. 2d 136 (1971)*). The critical issue is: Do the agency's own regulations create meaningful standards or do they preserve the discretion afforded by the statute?

Salt Institute v. Thompson, 345 F. Supp. 2d 589 (E.D. Va. 2004), aff'd sub [**281] nom. on alternate grounds, *Salt Inst. v. Leavitt, 440 F.3d 156 (4th Cir. 2006)*, applied *701(a)(2)* and *Steenholdt* to the [*962] IQA, finding that "[n]either the IQA nor the OMB Guidelines provide judicially manageable standards that would allow meaningful judicial review to determine whether an agency properly exercised its discretion in deciding a request to correct a prior communication." With respect to the request for correction at issue in *Salt Institute*:

> [T]he guidelines provide that "[a]gencies, in making their determination of whether or not to correct information, may reject claims made in bad faith or without justification, and are required to undertake only the degree of correction that they conclude is appropriate for the nature and timeliness of the information involved." *67 Fed. Reg. at 8458*. Courts have determined that regulations containing similar language granted sufficient discretion to agencies to preclude judicial

No comments

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review under the APA. *See Steenholdt, 314 F.3d at 638* (holding that agency's decision under a regulation allowing an agency to take an action "for any reason the Administration considers appropriate" is committed to agency discretion and not reviewable under APA). [**282] Judicial review of [the agency's] discretionary decisions is not available under the APA because the IQA and OMB guidelines at issue insulate the agency's determinations of when correction of information contained in informal agency statements is warranted.

Id. at 602-603. Do the IQA Guidelines create meaningful standards regarding the content of a biological opinion, or do the Guidelines preserve agency discretion over these procedural matters? [49]

49 Plaintiffs attempt to distinguish the many cases that have found no right to judicial review under the IQA on the ground none of them involved "final agency action" cognizable under the APA, which provides for judicial review of a "final agency action for which there is no other adequate remedy in a court ...." *5 U.S.C. § 704*. Plaintiffs are correct that the relevant cases do not concern "final agency actions," for purposes of the APA. For example, *Salt Institute* involved the issuance of information about a trial study, an action the district court found was not "a final agency action necessary for judicial review under the APA." *345 F. Supp. 2d at 602*. Here, the issuance of the BiOp is indisputably final agency action. However, "final agency [**283] action" is a necessary but not sufficient prerequisite to judicial review under the APA. Judicial review may also be precluded where there is no "judicially manageable standard" by which to judge the agency's action. *Heckler v. Chaney, 470 U.S. at 830*.

Plaintiffs' attempt to distinguish *Salt Institute* on the ground that, in preparing and disseminating "highly influential" scientific documents, the agency is mandated to follow a scientific approach to develop the best available scientific data used in that document. Specifically, Plaintiffs reference FWS IQA Guidelines VI-10, which provide:

VI -- 10 How will FWS describe the strengths and weaknesses of the data used in influential scientific information and highly influential scientific assessments

The preparer of a highly influential assessment or of influential information will document the strengths and weaknesses of the data underlying the assessment/information so that the reader will understand the context for the FWS decision. The narrative will be contained in the administrative record of the issue under consideration. The documentation may be done in a narrative that includes a complete literature cited section, and an assessment [**284] of the strengths and weaknesses of the information used for advising the decision at hand. The narrative's form and length is left to the preparer. The following [*963] bullet points provide questions to consider in the narrative.

o What types of research studies does the assessment/information rely upon (e.g. experimental studies with controls, statistically designed observational studies that test hypotheses, monitoring studies, information synthesis, professional judgment etc.)?

o How recent is the research?

o What are the sources for the underlying data that support the assessment/information (e.g. peer reviewed article reporting primary data or data synthesis, unpublished peer reviewed reports, on-line publication, textbook, personal communication etc.)?

o Which of the sources were most crucial to the conclusions reached in the assessment/information?

o What type of review did each source receive (anonymous independent peer review, external peer review, agency review,

No comments

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public review and comment etc.)?

o Were the reviewers independent of the FWS? Were the reviewers independent of individuals or groups advocating a certain course of action by FWS?

o Were the reviews in compliance with OMB M-05- [**285] 03, "Final Information Quality Bulletin for Peer Review"?

Two examples of how one might provide such a characterization are provided below:

Example 1: (A number of references are listed.) These references were the primary sources of data that provided the basis for the decision. They are peer reviewed studies with an experimental design that includes controls and testable hypotheses. They were completed within the last 5 years and were independently reviewed by non-FWS personnel and published in scientific journals.

Example 2: (A number of references are listed.) These references were articles and sources of data that provided specific data points that were included in the decision document, but by themselves did not primarily contribute to the decision. These citations are a combination of fact sheets, summaries of information, professional judgments, and personal communications that have not been peer reviewed. Most of the data is current (within the last 7 years).

Although this biological opinion is undoubtedly the type of "influential document" [50] to which this provision applies, Plaintiffs' overreach by suggesting that these guidelines require the agency to follow any particular scientific [**286] approach to the development of the best available scientific data used in a BiOp. All that this guideline affirmatively requires is that the agency prepare some kind of "narrative" that documents the strengths and weaknesses of the data upon which the document relies. There are no other "judicially manageable standards" included in this guideline.

50 The FWS IQA Guidelines further state that the term "influential, when used in the phrase 'influential scientific, financial, or statistical information,' means that [FWS] can reasonably determine that dissemination of the information will have or does have a clear and substantial impact on important public policy or private sector decisions, and thus, a decision or action to be taken by the Director.... As a general rule, FWS considers an impact clear and substantial when a specific piece of information or body of information is a principal basis for a FWS position." FWS IQA Guidelines, § III-10.

[*964] Under this guideline provision, Plaintiffs have not claimed that no such narrative was prepared. [51] But, that is not the thrust of any of the IQA claims in this case, which seek to impose substantive standards on the presentation, use, and analysis [**287] of data by FWS. None of the guidelines cited by Plaintiffs set forth any "judicially manageable standards" against which the presentation, use, or analysis of data can be measured. The FWS guidelines disclaim any intent to do so or any right to judicial review. There is no right to judicial review of Plaintiffs' IQA claims. FFA's motion for summary judgment is DENIED. Federal Defendants' cross motion is GRANTED.

51 Whether such a claim would be subject to judicial review is not clear. The guidelines specify that they are "intended only to improve the internal management of FWS relating to the [IQA]. Nothing in these guidelines is intended to create any right or benefit, substantive or procedural, enforceable by law or equity against the United States, its agencies, its offices, or another person. These guidelines do not provide, in any by themselves, any right to judicial review." FWS IQA Guidelines Part IV.

No comments

- n/a -

(3) To the Extent FFA Bases Any of its Claims against Reclamation on the ESA, Such Claims are Subject to the ESA's Pre-Filing Requirements.

To the extent FFA's IQA and ESA claims overlap, its ESA claims are subject to the ESA's pre-filing notice requirement. No suit may be commenced [**288] under the ESA "prior to sixty days after written notice of the violation has been given to the Secretary." *16 U.S.C. § 1540(g)(2)(A)(i)*. This requirement is jurisdictional and "[a] failure to strictly comply with the notice requirement acts as an absolute bar to bringing suit under the ESA." *Southwest Ctr. for Biological Diversity, 143 F.3d at 520*. Failure to comply with a statutory notice requirement is a jurisdictional objection that may be addressed "at any time." *See Fed. R. Civ. P. 12(h)(3)*.

Here, FFA failed to notify Reclamation of its intent to sue. Plaintiffs argue that "[a]doption of a BiOp is a final agency action, and such actions are subject to judicial review under the APA," citing *Bennett v. Spear, 520 U.S. at 178*. However, allowing a plaintiff to circumvent the ESA's 60-day notice requirement by claiming that its cause of action arises under the APA would circumvent the ESA's notice requirement entirely. *Hawaii County Green Party v. Clinton, 124 F. Supp. 2d 1173, 1193 (D. Haw. 2000)*.

To the extent that FFA's claims against Reclamation arise under the ESA, their motion for summary judgment is DENIED on the ground that they failed to comply with the statutory notice requirement. [**289] Federal Defendants' and Defendant Intervenors' cross-motions are GRANTED.

F. Renewed Claim That FWS Violated NEPA.

Plaintiffs attempt to revisit the issue of whether FWS violated NEPA in issuing the BiOp and its RPA. Plaintiffs first renew an argument that was rejected in the Salmonid Consolidated cases, namely that *Ramsey v. Kantor, 96 F.3d 434 (9th Cir. 1996)*, the only case in which the issuance of a biological opinion was found to violate NEPA, controls here. In *Ramsey*, the NEPA obligation was imposed on the consulting agency's issuance of a biological opinion in part because there was no federal action agency to comply with NEPA.

The November 12, 2009 NEPA decision in this case found *Ramsey* inapplicable because the action agency is Reclamation. *See* Doc. 399 at 16-17. [*965] Plaintiffs argue that the Courts' initial finding was incorrect because, here, as in *Ramsey*, the BiOp was not only imposed upon Reclamation's operations, but also upon the operations of DWR, a state agency. This argument was rejected in the Consolidated Salmonid Cases shortly after the cross-motions in the Consolidated Smelt Cases were filed. The March 5, 2010 Consolidated Salmonid Cases decision concluded:

> Plaintiffs [**290] ignore the interconnected nature of the SWP and CVP projects. Reclamation and DWR have, for many years, operated the projects in a coordinated manner. *See* OCAP Biological Assessment ("OCAP BA") at 1-2. The Biological Assessment ("BA"), prepared by Reclamation, describes the project for which consultation was being sought as "the ongoing operations of the CVP and SWP and potential future actions that are foreseeable to occur within the period covered by the project description." *Id.* at 1-1. The two water projects, which are jointly operated by Reclamation and DWR, share water resources, storage, pumping, and conveyance facilities to manage and deliver one third of the water supply for the State of California. Reclamation's BA provided NMFS with extensive analyses of the effects of coordinated operation of the CVP and SWP on the Listed Species.

Consolidated Salmonid Cases, 1:09-cv-1053 OWW DLB, Doc. 266 at 14 (emphasis in original). Plaintiffs offer no new law or persuasive authority compelling a finding of clear error to justify reconsideration.

Alternatively, Plaintiffs argue that "FWS's future choices with respect to OMR flows restrictions are 'major federal actions' within the scope [**291] of [NEPA's implementing regulations]." Doc. 551 at 87. This argument continues:

> [R]ather than DWR or Reclamation operating the CVP and SWP, respectively, the BiOp and its RPA have resulted in transferring operational control to FWS for up to six months year (i.e., December through June). FWS' future choices with regard to implementation of RPA Components 1 and 2 will cause distinct and separate impacts to the human environment within both the CVP and SWP service areas. Even if Reclamation shares a NEPA obligation with regard to its acceptance of the BiOp, Reclamation is not the proper federal agency to account for and analyze the environmental effects of FWS' actions that will occur within the SWP

No comments

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> service area. These SWP impacts are solely attributable to the FWS' formulation of the RPA and its ongoing role in implementing that RPA, and they were not caused by Reclamation and are beyond Reclamation's discretion or jurisdiction. FWS will continue to make weekly water use and resource allocation decisions that amount to major federal actions significantly affecting the human environment in both CVP and SWP service areas without the benefit of the information required by a proper NEPA [**292] review and without satisfying the public disclosure and accountability purposes of NEPA.

Id.

This is an attempt to re-argue and re-frame arguments previously decided. The prior NEPA rulings determined that Reclamation bears the NEPA responsibility in this case as action agency. "Reclamation proposed the action (in the form of the Operations and Criteria Plan ('OCAP')) to FWS, which triggered the preparation of the BiOp." Doc. 399 at 28. "Reclamation was not xbound' by the BiOp until it chose to proceed with the OCAP and implement the RPA. Once Reclamation did so, operation of the Projects [*966] became the relevant agency 'action,' and Reclamation, as action agency, is the more appropriate lead agency under NEPA." *Id.* at 30. Reclamation accepted the adaptive management protocol prescribed in the RPA "as a constraint upon its operations when it provisionally accepted the RPA." Doc. 399 at 30. FWS's day-to-day decisions to implement the adaptive management protocol are a natural incident of Reclamation's decision to adopt the RPA. Moreover, FWS's setting of specific OMR flows under RPA Components 1 and 2 is based on a weekly review of salvage data, distribution, flow and turbidity levels, population [**293] status, and other information, making NEPA review of such actions impractical. *See Flint Ridge Dev. Co. v. Scenic Rivers Ass'n, 426 U.S. 776, 788-89, 96 S. Ct. 2430, 49 L. Ed. 2d 205 (1976)* (provision in applicable law requiring statement of record to become effective 30 days after filing made preparation of EIS "inconceivable"); *Kandra, 145 F. Supp. 2d at 1205* (finding that "[a]n EIS takes at least several months to complete"). FWS has no legal or functional authority to operate the projects and adequate remedies exist to compel the Bureau to stop FWS, if FWS endeavors to do so.

Plaintiffs' motion for summary judgment as to FWS's liability under NEPA is DENIED; Federal Defendants' and Defendant-Intervenors' cross motion is GRANTED.

G. Reclamation's Liability under the ESA.

Following the issuance of a biological opinion, the ESA regulations require the action agency, here, Reclamation, to "determine whether and in what manner to proceed with the action in light of its section 7 obligations and the Service's biological opinion." *50 C.F.R. § 402.15(a).* In making that determination, a federal action agency "may not rely solely on a FWS biological opinion to establish conclusively its compliance with its substantive obligations [**294] under section 7(a)(2)." *Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of Navy, 898 F.2d 1410, 1415 (9th Cir. 1990).* In *City of Tacoma v. Fed. Energy Regulatory Comm'n, 460 F.3d 53, 76, 373 U.S. App. D.C. 117 (D.C. Cir. 2006),* the D.C. Circuit summarized the caselaw culminating in *Pyramid Lake*:

> [The] interagency consultation process reflects Congress's awareness that expert agencies (such as the [NMFS] and [FWS]) are far more knowledgeable than other federal agencies about the precise conditions that pose a threat to listed species, and that those expert agencies are in the best position to make discretionary factual determinations about whether a proposed agency action will create a problem for a listed species and what measures might be appropriate to protect the species. Congress's recognition of this expertise suggests that Congress intended the action agency to defer, at least to some extent, to the determinations of the consultant agency, a point the Supreme Court recognized in *Bennett v. Spear, 520 U.S. 154, 169-170, 117 S. Ct. 1154, 137 L. Ed. 2d 281 (1997).* In *Bennett*, the Court stated that an action agency disregards a jeopardy finding in a BiOp "at its own peril" and bears the burden of articulating the reasons for reaching its [**295] contrary conclusion. *Id.*
>
> Accordingly, when we are reviewing the decision of an action agency to rely on a BiOp, the focus of our review is quite different than when we are reviewing a BiOp directly. In the former case, the critical question is whether the action agency's reliance was arbitrary and capricious, not whether the BiOp itself is somehow flawed. *Aluminum Co. of Am. v. Adm'r, Bonneville Power Admin.* [*967] ,

No comments

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175 F.3d 1156, 1160 (9th Cir.1999); *Pyramid Lake Palute Tribe v. U.S. Dep't of Navy, 898 F.2d 1410, 1415 (9th Cir.1990)*; *Stop H-3 Ass'n v. Dole, 740 F.2d 1442, 1460 (9th Cir.1984)*; cf. *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv., 422 F.3d 782, 790 (9th Cir. 2005)* (direct review of a BiOp). Of course, the two inquiries overlap to some extent, because reliance on a facially flawed BiOp would likely be arbitrary and capricious, but the action agency "need not undertake a separate, independent analysis" of the issues addressed in the BiOp. *Aluminum Co., 175 F.3d at 1161*. In fact, if the law required the action agency to undertake an independent analysis, then the expertise of the consultant agency would be seriously undermined. Yet the action agency must not blindly adopt [**296] the conclusions of the consultant agency, citing that agency's expertise. *Id.* Rather, the ultimate responsibility for compliance with the ESA falls on the action agency. *16 U.S.C. § 1536(a)(1)-(2)*. In Pyramid Lake, the Ninth Circuit balanced these two somewhat inconsistent principles and articulated the following rule:

> [E]ven when the [consultant agency's] opinion is based on "admittedly weak" information, another agency's reliance on that opinion will satisfy its obligations under the Act if a challenging party can point to no "new" information-i.e., information the [consultant agency] did not take into account-which challenges the opinion's conclusions.

898 F.2d at 1415; *see also Defenders of Wildlife v. U.S. EPA, 420 F.3d 946, 959, 976 (9th Cir. 2005)*; *Stop H-3 Ass'n, 740 F.2d at 1459-60*.

City of Tacoma, 460 F.3d at 75-76. The D.C. Circuit rejected the City of Tacoma's claim that the consultant agency in that case, FERC, was liable under the ESA because the City had not "presented FERC with new information that was unavailable to [NMFS] or [FWS] and that would give FERC a basis for doubting the expert conclusions in the BiOps those agencies prepared." *Id. at 76*.

Here, Plaintiffs attempt [**297] to side-step this standard, arguing that Reclamation should have independently recognized and addressed specified errors in the BiOp. For example, they argue Reclamation should have recognized the error caused by comparing CALSIM data to non-CALSIM Data because Reclamation had extensively analyzed the use of CALSIM in the BA. *See* AR 010698-010807. The BA stated:

> The simulation results of the OCAP BA are designed for a comparative evaluation because the CALSIM-II model uses generalized rules to operate the CVP and SWP systems and the results are a gross estimate that may not reflect how actual operations would occur.... Results should only be used as a comparative evaluation to reflect how changes in facilities and operations may affect the CVP-SWP system.

AR 010701. FWS took this information into account in the BiOp. *See* BiOp at 204-206, reviewing Calsim II modeling performed in the BA. Plaintiffs have not demonstrated that Reclamation was in possession of any "new information" not considered by FWS that provided Reclamation a basis for questioning the BiOp's expert conclusions. Absent such a showing, even though the BiOp is flawed in many ways, Reclamation could rely upon it without [**298] incurring ESA liability.

VIII. CONCLUSION

It cannot be disputed that the law entitles the delta smelt to ESA protection. It is significant that the co-operator of the Projects, DWR, in its endeavors to protect [*968] a substantial part of the State's water supply, opposes as unjustified and based on bad science some of the RPA Actions. It is equally significant that despite the harm visited on California water users, FWS has failed to provide lawful explanations for the apparent over-appropriation of project water supplies for species protection. In view of the legislative failure to provide the means to assure an adequate water supply for both the humans and the species dependent on the Delta, the public cannot afford sloppy science and uni-directional prescriptions that ignore California's water needs. A court is bound by the law. Resource allocation and establishing legislative priorities protecting the environment are the

No comments

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prerogatives of other branches of government. The law alone cannot afford protection to all the competing interests at stake in these cases.

For all the reasons set forth above:

(A) Plaintiffs' and DWR's motions for summary judgment that the BiOp violates the ESA and the [**299] APA are GRANTED IN PART AND DENIED IN PART; and Federal Defendants' and Defendant Intervenors' cross-motions are GRANTED IN PART AND DENIED IN PART based on the following findings:

(1) It was not arbitrary, capricious, or clear error for FWS to base its jeopardy conclusion in part on Kimmerer (2008)'s predictions of relative increases in delta smelt entrainment.

(2) FWS's failure to apply a quantitative life-cycle model to evaluate the impacts of Project operations on the smelt did not violate the ESA.

(3) The BiOp's reliance on analyses using raw salvage figures to set the upper and lower OMR flow limits of Actions 1, 2, and 3 was arbitrary and capricious and represents a failure to use the best available science. Actions 1, 2, and 3 depend so heavily on these flawed analyses that this failure is not harmless. Remand is necessary.

(4) Comparison of Calsim II to Dayflow model runs created potentially material bias in the BiOp's evaluation of the impacts of Project operations on the position of X2 and related conclusions regarding population dynamics and habitat. FWS's failure to address or explain this material bias represents a failure to consider and evaluate a relevant factor and violates [**300] the ESA and APA. Remand is required.

(5) The use of Dayflow to represent the baseline did not improperly attribute past effects to the Projects.

(6) The flawed Calsim II to Dayflow comparison fatally taints the justification provided for Action 4. Remand is required.

(7) Plaintiffs' argument that Action 4 is unlawful because it is an "untested hypothesis" is an unfounded interpretation of the scientific method.

(8) FWS's reliance on Feyrer (2007), Feyrer (2008), and Bennett (2005) was not arbitrary, capricious, or clear error.

(9) The best science available at the time the BiOp issued supports the conclusion that X2 is a valid surrogate for delta smelt habitat.

(10) Plaintiffs' argument that FWS violated the best available science standard because the smelt are not habitat limited is unfounded. The BiOp admits the delta smelt may not be habitat limited, but reasonably concludes that the species has become increasingly habitat limited over time, contributing to the population's decline, and that worsening habitat conditions may limit smelt recovery.

[*969] (11) FWS's use of a linear stock-recruit model, although scientifically criticized, was not ar-

No comments

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bitrary, capricious, or clear error.

(12) The BiOp [**301] has failed to sufficiently explain why maintaining X2 at 74 km (following wet years) and 81 km (following above normal years), respectively, as opposed to any other specific location, is essential to avoid jeopardy and/or adverse modification. Remand is required.

(13) Federal Defendants' reliance on turbidity as one of several triggers for Action 1 was not arbitrary, capricious, or clear error.

(14) Plaintiffs' argument that FWS violated the ESA and/or the APA by excluding data from 2007 in its analysis of entrainment effects, but including it in its calculation of the ITL is without merit. FWS offered a reasonable explanation for these choices.

(15) The BiOp provides a reasonable explanation for why the 2006-2008 year range was used to calculate the adult delta smelt ITL, but unlawfully fails to explain why 2005 was added to the juvenile ITL calculation. Remand is required.

(16) The BiOp also fails to explain why FWS chose to set the ITL based on the average cumulative salvage index for the years selected. FWS shall explain this choice on remand.

(17) In general, the BiOp's conclusions about the causal connections between Project Operations and "other stressors" are ambiguous. However, [**302] the BiOp's assertion that Project Operations contribute to and/or exacerbate the impacts on delta smelt of predation, aquatic macrophytes, and microcystis are unsupported by record evidence and/or explanation. Remand is required.

(18) The record does not support the BiOp's conclusion that food web and pollutants/contaminant impacts are indirect effects of Project operations. Remand is required.

(19) Plaintiffs' omnibus challenge to the substance of the critical habitat analysis fails. However, the critical habitat analysis does not specifically explain its conclusion that Project operations are reasonably certain to exacerbate the impact of contaminants to delta smelt habitat. In addition, because critical habitat conclusion 3(c) explicitly relies upon the flawed analysis regarding the movement of X2, this conclusion is without support in the record and is arbitrary and capricious. Remand is required.

(20) Although there is record support for the BiOp's conclusion that Project operations are likely to jeopardize the continued existence and/or adversely modify the critical habitat of the delta smelt, the analyses supporting the specific flow prescriptions set forth in the RPA are fatally [**303] flawed and predominantly unsupported.

No comments

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The BiOp does not justify or explain its attribution to Project operations adverse impacts caused by others stressors. When combined, the totality of these failures demand remand to the agency for further consideration and explanation.

(B) Plaintiffs' motion for summary judgment that the BiOp does not segregate discretionary from nondiscretionary actions is DENIED; Federal Defendants' and Defendant- Intervenors' cross motions are GRANTED.

(C) Plaintiffs' motion for summary judgment that the BiOp does not undertake the analysis required by *50 C.F.R. § 402.02* is GRANTED; Federal Defendants' and Defendant-Intervenors' cross [*970] motions are DENIED. The BiOp completely fails to analyze economic feasibility, consistency with the purpose of the action, and consistency with the action agency's authority demanded by *§ 402.02*. Further analysis in compliance with *§ 402.02* is required on remand.

(D) Plaintiffs' motion for summary judgment that FWS did not address comments on the draft BiOp is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

(E) Stewart & Jasper's motion for summary judgment that the BiOp failed to consider the economic [**304] impacts of promulgating the RPMs is DENIED; Federal Defendants' and Defendant- Intervenors' cross motions are GRANTED.

(F) Stewart & Jasper's motion for summary judgment that FWS illegally arrogated authority to itself over Reclamation and DWR is DENIED; Federal Defendants' and Defendant- Intervenors' cross motions are GRANTED.

(G) Family Farm Alliance's motion for summary judgment on its IQA claim is DENIED; Federal Defendants' and Defendant- Intervenors' cross motions are GRANTED.

(H) Plaintiffs' renewed motion for summary judgment that FWS violated NEPA is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

(I) Plaintiffs' motion for summary judgment that Reclamation violated the ESA is DENIED; Federal Defendants' and Defendant-Intervenors' cross motions are GRANTED.

The 2008 BiOp and its RPA are arbitrary, capricious, and unlawful, and are remanded to FWS for further consideration in accordance with this decision and the requirements of law. Plaintiffs shall submit a form of order consistent with this memorandum decision within five (5) days of electronic service.

A status conference is set for January 4, 2011, at 12:00 noon, in Courtroom 3 (OWW), to address [**305] any need for further proceedings.

SO ORDERED

Dated: December 14, 2010

/s/ Oliver W. Wanger

Oliver W. Wanger

United States District Judge

No comments

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No comments

- n/a -

APPENDIX DOC. 9

DEPARTMENT OF
WATER RESOURCES

NEWS FOR IMMEDIATE RELEASE

August 15, 2012

Contact:

Ted Thomas, Information Officer (916) 653-9712

Researchers Shake Delta Soil to Better Understand Earthquake Risk

SACRAMENTO -- Researchers will simulate the shaking of an earthquake on a remote part of Sherman Island today to better understand how the unique peat soil of the Sacramento-San Joaquin Delta may respond to a seismic event.

The engineering researchers from the University of California, Los Angeles conducted a similar shaking test last year on dry peat soil. This year, their test will monitor the response of saturated peat soil.

"We hope to learn how the peaty organic Delta soil will contribute to seismic levee performance," said Scott Brandenberg, Vice Chair of the UCLA Civil and Environmental Engineering Department and leader of the research team. "We already know that liquefaction of inorganic sandy soils is an important problem in the Delta, but we don't know as much about the peat."

The research promises to inform an important debate over how much risk earthquakes pose to the Delta's levees -- and thus the state and federal water supply systems that are centered in the Delta.

Using heavy equipment in a cow pasture owned by the California Department of Water Resources, the UCLA engineers built a six-foot-high, 40-foot-wide, 12-foot-long model of a levee. The model levee was reinforced to transmit the shaking into the ground where the motions will be sampled. The researchers attached a mobile field shaker to the model levee crest. Their model levee is unsaturated and built of

No comments

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non-liquefiable materials, unlike the saturated, liquefiable fills in many Delta levees. Their focus is not whether the newly-created embankment fails during shaking. Instead, they seek to understand how the underlying peat soil of Sherman Island responds to the earthquake simulation. Such highly-organic soil serves as the foundation for many of the roughly 1,100 miles of levees across the Delta.

Once a region of tule marsh and tidal wetlands, the Delta of today is a patchwork of islands ringed by levees and separated by waterways. The highly-organic Delta soil, built by thousands of years of decomposing tules, may be as deep as 80 feet, but it oxidizes and disappears easily when dried and tilled. As a result, some Delta islands are bowl-like, dipping as much as 25 feet below sea level.

Though they appear as ordinary farm fields, the Delta islands are critical to protecting infrastructure important to the entire California economy. They serve as barriers that help protect the fresh river water that supplies much of the state from the saltwater that could encroach from San Francisco Bay if the islands were not there. If several Delta levees failed in an earthquake, river water would be sucked into the sunken islands. The flow of freshwater out toward the Bay would diminish, allowing saltwater to be drawn deeper into the Delta and make its way toward the large pumps in the south Delta that supply two major water projects. Federal and state water project operators would be forced to shut down the pumps to prevent saltwater contamination of aqueducts, pumps, and treatment plants. Such a shutdown could interrupt deliveries of water to Southern California, the Central Valley, and the Santa Clara Valley. If the interruption lasted long enough, it could cause billions of dollars of damage to the state's economy.

In the roughly 160 years since people began scraping together levees in the Delta, levee failures have caused island flooding at least 140 times. Though none of the failures have been linked to an earthquake, the record is too brief, geologically, to accurately gauge the seismic hazard to the Delta's levee system.

Several large faults, including the Hayward, Calaveras, and San Andreas faults, lie to the west of the Delta. But smaller local faults that run through the Delta present the most significant seismic hazard to levees, including the western Tracy and southern Midland faults.

According to the 2009 Delta Risk Management Strategy prepared by the Department of Water Resources, a ground motion equivalent to less than 20 percent of the acceleration of gravity would be capable of collapsing, or liquefying, the loose, sandy soils in many Delta levees. An earthquake capable of generating such motion has a 45 percent chance of being exceeded in the western Delta in the next 30 years, according to experts. The hazard decreases farther from the Bay; experts put the probability at 26 percent in the eastern Delta. However, the hazard increases each year that passes without an earthquake.

"The Department of Water Resources welcomes this research that will help us to better understand the vulnerability of the Delta levees and the water supply to earthquakes," said David Mraz, chief of DWR's Delta levees and environmental

No comments

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engineering branch. "In the meantime, the state will continue to work with our local partners to make improvements to the levees in the regions that protect communities, farms, wildlife habitat, and critical infrastructure."

The state has invested approximately $300 million in Delta levee improvements since 2005, when Hurricane Katrina overwhelmed Louisiana's flood defenses.

There are few places in the world with such extensive levees on peat soils as the Delta. Scientists hope to learn from measurements recorded during Wednesday's experiment whether saturated peat soil will settle in response to earthquake shaking. Laboratory tests performed on peat samples indicate that the peat will expel water following shaking, which could result in levee settlement after an earthquake. However, this mechanism has never been observed in the field, and the Sherman Island test will provide that opportunity and help scientists interpret their laboratory results for application to Delta levees.

The Delta is also unusual in that the underlying soil -- peat -- is typically softer than the mixture of sand, silt, clay, peat and other types of materials scraped together to construct levees. By testing the response of peat soils to ground acceleration, researchers will get a better sense of how energy transfers between the peat soils and levee materials. The experiment may help better determine the magnitude of earthquake that could trigger collapse, or liquefaction, of Delta levees.

The research team, including geotechnical engineers Jonathan Stewart of UCLA and Robb Moss of California Polytechnic State University, performed a similar test on Sherman Island in August 2011. At that time, the peat soil beneath the artificial embankment was dry to a depth of six feet and the embankment settled very little upon shaking. Researchers speculate that the fibrous peat soil may be stiffer, stronger, and more resistant to seismic energy when dry than when wet.

For Wednesday's experiment, the researchers built a berm around the experiment site in order to soak the underlying peat to the soil surface. The saturation will mimic the condition of the peat beneath the Delta levees. (Many Delta levees essentially act as dams and are kept wet year-round by the waterways they channel.)

Various instruments arrayed within 300 feet of the test site will measure ground motion and water pressure. Previous tests have shown that the ground motion generated by UCLA's mobile field shaker dissipates before it reaches the levees that protect Sherman Island.

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The Department of Water Resources operates and maintains the State Water Project, provides dam safety and flood control and inspection services, assists local water districts in water management and water conservation planning, and plans for future statewide water needs.

No comments

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No comments

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APPENDIX DOC. 10

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No comments

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JUNE 2008

SAN FRANCISCO ESTUARY&WATERSHED SCIENCE

Losses of Sacramento River Chinook Salmon and Delta Smelt to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta

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ABSTRACT

Pumping at the water export facilities in the southern Sacramento-San Joaquin Delta kills fish at and near the associated fish-salvage facilities. Correlative analyses of salvage counts with population indices have failed to provide quantitative estimates of the magnitude of this mortality. I estimated the proportional losses of Sacramento River Chinook salmon *(Oncorhynchus tshawytscha)* and delta smelt *(Hypomesus transpacificus)* to place these losses in a population context. The estimate for salmon was based on recoveries of tagged smolts released in the upper Sacramento River basin, and recovered at the fish-salvage facilities in the south Delta and in a trawling program in the western Delta. The proportion of fish salvaged increased with export flow, with a mean value around 10% at the highest export flows recorded. Mortality was around 10% if pre-salvage losses were about 80%, but this value is nearly unconstrained. Losses of adult delta smelt in winter and young delta smelt in spring were estimated from salvage data (adults) corrected for estimated pre-salvage survival, or from trawl data in the southern Delta (young). These losses were divided by population size and accumulated over the respective seasons. Losses of adult delta smelt were 1–50% (median 15%), although the highest value may have been biased upward. Daily losses of larvae and juveniles were 0–8%, and seasonal losses accumulated were 0–25% (median 13%). The effect of these losses on population abundance was obscured by subsequent 50-fold variability in survival from summer to fall.

KEYWORDS

Chinook salmon *Oncorhynchus tshawytscha*, delta smelt *Hypomesus transpacificus*, diversions, population ecology

SUGGESTED CITATION

Kimmerer, Wim J. 2008. Losses of Sacramento River Chinook Salmon and Delta Smelt *(Hypomesus transpacificus)* to Entrainment in Water Diversions in the Sacramento-San Joaquin Delta. San Francisco Estuary and Watershed Science. Vol. 6, Issue 2 (June), Article 2.

INTRODUCTION

One of the greatest challenges facing resource managers is assessing the effectiveness of their actions in influencing ecosystems or biological populations. This difficulty arises from three sources: 1) weak or

inaccurate understanding of the causal links between actions and responses; 2) inability to control for other sources of variability; and 3) inherent inaccuracy in monitoring causal and response variables. Yet, managers are held accountable for successes and failures, as we have witnessed recently with the decline of pelagic organisms in the upper San Francisco Estuary (Sommer et al. 2008). Thus, the challenge for the scientific community is how to detect and quantify effects of management actions in the absence of strong correlative relationships between these actions and the response variables. This requires an analysis of mechanisms rather than one based on correlative relationships alone.

The San Francisco Estuary is a highly altered and managed system (Nichols et al. 1986) in which conflicts over resources are particularly strong. Perhaps the greatest conflict is due to the diversion and export of substantial quantities of freshwater from the tidal freshwater reach in the Sacramento-San Joaquin Delta. Losses of fish to mortality associated with export pumping have been blamed in part for declines of numerous species including striped bass (Stevens et al. 1985), Chinook salmon (Kjelson and Brandes 1989), and delta smelt (Bennett 2005). Nevertheless, no quantitative estimates have been made of the population-level consequences of losses to the export facilities of any fish species. Kimmerer et al. (2001) concluded that large proportional losses to the export facilities were a minor contributor to variability in the striped bass population of the Estuary. Jassby et al. (2002) conducted a mass balance of chlorophyll concentration in the Delta and concluded that losses of phytoplankton to export pumping must be large, but were masked in correlative analyses by other sources of variation. Similar calculations have not been made for other taxonomic groups, and there have been no published reports of correlations between any measure of export losses and subsequent population size.

Despite the lack of evidence for population-level effects, a strong influence of the south Delta export facilities on populations of estuarine and anadromous fish has been assumed for several reasons. First, large numbers of fish are entrained in the fish facilities (Brown et al. 1996). Second, it is reasonable to expect a large effect on some fish because of the large quantities of water exported, at times more than half of the inflow to the Delta (Kimmerer 2004). Third, manipulations of flow patterns in the Delta provide the only apparent tool for managing some fish populations such as delta smelt.

In this paper I estimate the effects of export pumping in terms of proportional losses of two fish species. Chinook salmon *(Oncorhynchus tshawytscha)* and the threatened delta smelt *(Hypomesus transpacificus)* are target taxa for restoration and management in the Delta. Data for several races of Chinook salmon are available to estimate the losses of these fish to direct effects of entrainment. I focus on winter Chinook because it has been the target of considerable restoration effort, although data for other races are used to provide greater resolution. Two life stages of delta smelt are examined: adults in late winter, and larvae and juveniles in spring. Effects of export pumping are estimated mechanistically, rather than through correlative analyses with the respective population abundances.

The conceptual framework for these calculations differs for the two species. Young Chinook salmon are exposed to export effects during movement through the Delta. Data on length distributions at the export facilities and in field studies suggest that juvenile Chinook generally are exposed to entrainment only during movement, and are rarely entrained while rearing. Young Chinook rear in or migrate through the Delta at various times of year but are most abundant in the Delta from March through June (Williams 2006). Although most of the migrating fish are small fall-run Chinook, winter Chinook and other runs form a substantial pulse of fish larger than the fall run in February–March (Williams 2006). Chinook smolts may take any of several pathways that lead them through the Delta either to the export facilities or through the western margin of the Delta at Chipps Island, and then to sea (Figure 1). When control gates in the Delta Cross-Channel (Figure 1) are open, the smolts may enter the central Delta further upstream, and this could increase their probability of entrainment in the export facilities.

Delta smelt are considered to be resident fish but are actually weakly anadromous, spending most of their

No comments

- n/a -

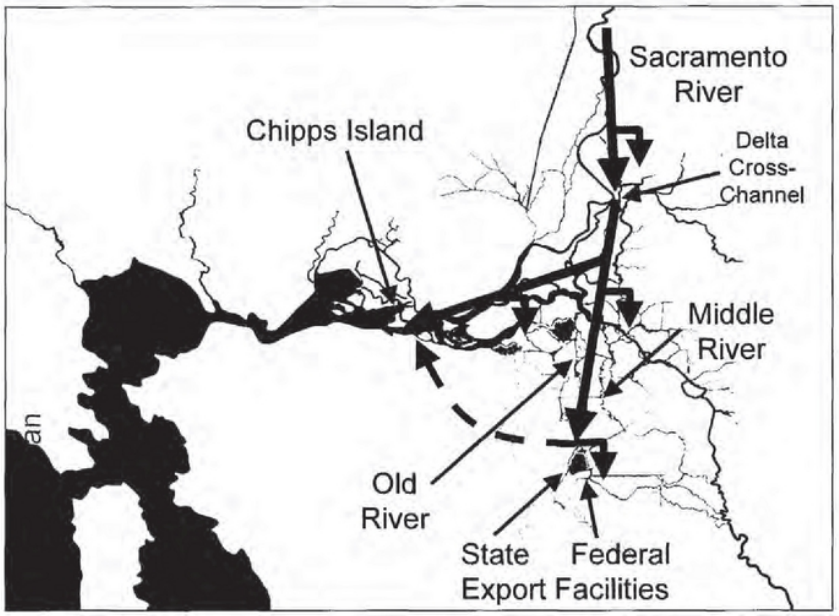

Figure 1. Map of the San Francisco Estuary showing locations mentioned in the text. Green arrows indicate general movement pathways for winter Chinook salmon; the dashed arrow represents movement of salvaged fish by truck. Red arrows indicate mortality losses; only those occurring at the export facilities are accounted for here.

No comments

- n/a -

lives in brackish water where they are not exposed to export entrainment (Bennett 2005). The adults spawn in freshwater in late winter, and those in the southern Delta are then vulnerable to entrainment at the export facilities. Eggs are demersal and therefore invulnerable to entrainment, but the pelagic larvae and juveniles in the southern Delta are vulnerable from the time they hatch until they move seaward into brackish water. Thus, export pumping causes a continuous mortality that acts on the population over time during two life stages.

Fish Facility Operations

Fish facilities associated with the state and federal water export facilities (Figure 1) are designed to salvage fish from the water and return them to the Estuary (Brown et al. 1996; Haefner and Bowen 2002). These facilities use two sets of louvers to concentrate the fish behaviorally, but this process is not very efficient. For example, many salmon and other fish are lost to predation in the waterways leading to the fish facilities (Gingras 1997). The efficiency with which the louvers concentrate the fish can be << 100% (Bowen et al. 2004). In addition, few delta smelt probably survive the salvage process (Bennett 2005).

The salvage facilities accumulate fish in holding tanks during sampling periods that are most often 2 hours but have ranged from 10 minutes to 9 hours during 1995–2006. During each sampling period, a sub-sample may be taken over a shorter time-period, nominally 20 minutes (state facility) or 10 minutes (federal facility) although it may be longer or shorter. Karp et al. (1997) compared the sub-sampling procedure for the federal facility with complete analysis of the salvaged fish, validating this procedure. All fish > 20 mm in a sub-sample are counted and identified, and salmon marked with clipped adipose fins are inspected for coded-wire tags and, if present, the tags are read.

It is helpful to define terms (see Table 1 for symbols). Daily *salvage* is the number of fish of given characteristics (species, stage, length) estimated to have entered a fish facility in a day. Daily *entrainment* is the estimated net number of fish that arrived at the entrance to the fish facility per day, i.e., those that arrived and did not leave the area except via the fish facilities. Entrainment exceeds salvage because of mortality in the waterways, leading to the export facilities and losses through the louvers. Daily *loss* is the estimated number entrained that were not subsequently salvaged and returned alive to the Estuary, which includes losses both before and after the salvage process; these are also termed "direct" losses because they are directly attributable to pumping operations.

Losses of fish due to altered hydrodynamic conditions or migration cues in the Delta are called "indirect" losses. Although export pumping has substantial impacts on flow patterns in the Delta, the extent to which such alterations affect survival of fish is much less clear. Indirect losses may be important (NMFS 2004), but they remain hypothetical and unquantified, and are not calculated in this paper.

METHODS

Daily salvage (see Table 1 for all symbols used in this paper) is calculated from the counts taken during each sampling period as:

$$\hat{N}_{di} = \sum_{p=1}^{P_d} \frac{N_{dpi} M_{dpi}}{m_{dpi}} \qquad (1)$$

where hats indicate estimated quantities. For tagged Chinook salmon (see below), salvage counts were available only for the entire day, so Equation 1 was simplified by summing over all time-periods within each day:

$$\hat{N}_{di} = \frac{\sum_{p=1}^{P_d} N_{dpi} \sum_{p=1}^{P_d} M_{dpi}}{\sum_{p=1}^{P_d} m_{dpi}} \qquad (2)$$

Equations 1 and 2 were compared using salvage data for total Chinook salmon from 1995–2006. The mean ratio of estimates from Equation 2 to those from Equation 1 for all samples with total daily counts > 100 was 0.98 ± 0.017 (95% CL, N = 219), so these equations were considered equivalent for tagged

No comments

- n/a -

Table 1. Definition of terms used in the models for Chinook salmon (C) and delta smelt (D). Terms are unitless unless stated. Subscripts may be added to indicate export facilities (i, state = 1, federal = 2, combined = x), cohorts (j), surveys (s), sampling time-periods for calculating salvage (p), or calendar time-periods (d, mo).

Term	Species	Definition
A	D	Total abundance of fish = Ds V
$A_{L,t}$	D	Abundance of fish of length L at time t
D	CD	Duration of the sampling period (days)
D_s	D	Mean density over all samples (m^{-3})
E_i	CD	Louver efficiency of facility i
E_k	D	Efficiency of Kodiak trawl
E_L	D	Relative efficiency of the 20-mm net as a logistic function of length of fish
g	D	Growth rate (mm d^{-1})
H	D	Number of fish hatching per day
L	D	Length of fish (mm)
m	D	Daily mortality rate (d^{-1})
m_n	D	Daily natural mortality rate (i.e., not due to direct export effects) (d^{-1})
M_{dpi}	CD	Duration of fish salvage period p (min) on day d
m_{dpi}	CD	Duration of subsampling during salvage period p (min) on day d
N_{dpc}	C	Number of fish counted during Chipps Island trawl p on day d
N_{dpi}	CD	Number of fish counted at facility i during period p on day d
N_{di}	CD	Daily salvage for facility i (d^{-1})
N_i	CD	Total salvage for facility i
N_{Ri}	C	Daily number of fish successfully released from fish facility i (d^{-1})
N_{SD}	D	Total fish caught in trawl samples in the south Delta during a survey
$N_{w\delta}$	C	Five-day running mean of total fish caught centered on day δ (weighting factor)
P_d	C	Total number of samples on day d (fish facilities or Chipps Island)
P_S	C	Proportional salvage of fish leaving Delta
P_L	CD	Proportional loss of fish to export effects
Q_{SD}	D	Daily flow to the south Delta (= Old and Middle River flow) (m^3d^{-1})
S	D	Survival (fraction); subscripts indicate time-period or cohort j
S_{HT}	C	Fraction of fish surviving handling and trucking
S_{Pi}	CD	Fraction of fish entrained that reach louvers
S_{Si}	C	Fraction of fish entrained that enter salvage facility
t	D	Any day between T_0 and the final date of the simulation (d)
T_0	D	Initial hatch date (d)
T_j	D	Initial hatch date (d) for cohort j
T_i	D	Final hatch date (d)
T_f	D	Final day of survey
u	C	Migration speed, m d^{-1}
V	D	Volume of habitat over which trawl catches are averaged (m^3)
V_{dpc}	C	Volume sampled by sample p on day d in the Chipps Island Trawl (m^3)
V_{SD}	D	Total volume filtered in survey s at South Delta stations (m^3)
W	C	Width of channel at Chipps Island (~ 1,000 m)
Z	C	Depth over which salmon are assumed to migrate (4 m)
θ	D	Efficiency ratio, a free parameter in adult loss equation (18)
$\hat{\lambda}$	C	Ratio of loss to salvage, calculated from pre-salvage survival
Λ_{di}, Λ_i	D	Daily or cumulative loss to export facilities
Φ_{di}, Φ_i	CD	Daily or cumulative entrainment to export facilities
Φ_{dc}, Φ_c	CD	Daily or cumulative flux of fish past Chipps Island

No comments

- n/a -

Chinook salmon. For either method, the total salvage for a sampling period D is:

$$\hat{N}_i = \sum_{d=1}^{D} \hat{N}_{di} . \quad (3)$$

Entrainment is calculated as:

$$\hat{\Phi}_{di} = \frac{\hat{N}_{di}}{S_{Pi} E_i} , \quad (4)$$

and daily total loss is:

$$\hat{\Lambda}_{di} = \hat{\Phi}_{di} - \hat{N}_{Ri} = \hat{N}_{di} \left(\frac{1}{S_{Pi} E_i} - S_{HT} \right) . \quad (5)$$

$\Lambda = \Phi$ for delta smelt since they are assumed not to survive salvage. Proportional loss is calculated differently for salmon and for adult and young delta smelt (below).

Flow data were obtained from the Dayflow accounting program (Jassby et al. 1995; see http://iep.water.ca.gov/dayflow). Net flows in Old and Middle Rivers (Figure 1) have been determined by the U.S. Geological Survey since 1987 (Ruhl and Simpson 2005; Ruhl et al. 2006; P. Smith, USGS, pers. comm.). X_2, or the distance up the axis of the Estuary to where the tidally-averaged near-bottom salinity is 2 psu, was determined from daily Delta outflow as described in Jassby et al. (1995). Data on salmon-tagging studies and trawl data were obtained from the Interagency Ecological Program's Bay Delta and Tributaries Project (BDAT) website (http://bdat.ca.gov/). Salvage data for all species, sample data and abundance indices for delta smelt, and zooplankton abundance data were obtained from the California Department of Fish and Game (K. Fleming, R. Gartz, K. Hieb, and K. Souza, pers. comm.). Zooplankton biomass was determined from abundance data (Kimmerer 2006).

Chinook Salmon

Migrating salmon suffer a one-time risk of entrainment, in that fish that survive through the Delta either arrive at the export facilities and are entrained, or migrate past Chipps Island and presumably become invulnerable to entrainment. Salmon that arrive at the export facilities and are successfully salvaged also pass Chipps Island on their way to sea, and are vulnerable to capture there.

The general approach was to use recapture rates of coded-wire-tagged (CWT) hatchery smolts released in or near the upper Sacramento River and recaptured in the Delta fish facilities or at Chipps Island. The number of fish recaptured at each location was used to calculate salvage and losses at the fish facilities and flux of fish past Chipps Island, which were accumulated over the season and then used to calculate proportional salvage and loss.

The Livingstone Stone National Fish Hatchery (LSNFH) on the upper Sacramento River has released winter Chinook smolts marked with CWT and clipped adipose fins each spring since 1998. The Coleman National Fish Hatchery (CNFH) has released tagged fall and late-fall Chinook smolts each spring since 1981. Tagged fish have been released in groups of 81 to approximately 300,000 with unique tag codes, and up to 14 separate tag codes with up to approximately one million fish have been released on a single date. Tagged fish are recaptured at various locations, and data are stored in the BDAT database. I estimated the flux of tagged fish past Chipps Island and the losses to the fish facilities for years starting with brood-year 1998.

The following assumptions were made throughout this analysis:

1. The proportional loss of CWT hatchery fish represents that of naturally-spawned Chinook salmon.
2. Mortality factors at the fish facilities are constant in time and with export flow.
3. Fish are randomly distributed in time and across the Chipps Island channel in the top 4 meters, and migrate equally by day or night at a constant speed unaffected by flow.
4. Sampling at Chipps Island and at the fish facilities is unbiased, and the net is 100% efficient.
5. All CWT fish caught have their tags read.

No comments

- n/a -

Assumption 1 is fundamental to this approach as well as to numerous other studies (e.g., Newman and Rice 2002), but at present is untestable. Possible biases introduced by the other assumptions are discussed below.

Each year, CWT smolts in several tag groups have been released on a single day (Table 2). LSNFH winter Chinook have been released between January 27 and February 5, except that fish were released on April 9 in 1998. CNFH Chinook have been released in November through April, with one release in July 2005 which was not used in this analysis. I treated all groups of fish released on a single day as a single release; recaptures were too few to estimate variability among groups within single days.

Parameter values in Equation 5 were previously established for regulatory purposes (NMFS 2004). A series of experiments with marked juvenile Chinook salmon was used to estimate the pre-screen proportional loss for the state facility ($1 - S_{p1}$), which had a mean of 85% and range of 63–99% (Gingras 1997). The regulatory value is 75% (NMFS 2004). The pre-screen loss term for the federal facility has been set at 15% without any justification other than that the federal facility lacks the large forebay (Clifton Court) leading to the state facility, which may enhance predation on fish arriving at the facility. Studies conducted when the louvers were installed (Skinner 1973) gave a louver efficiency E_1 of ~ 90%, although more recent data suggest lower louver efficiency: Karp et al. (1995) reported overall efficiency of 50% at the federal facility with substantial variation, and Bowen et al. (2004) reported 85% efficiency for the secondary louvers at the federal facility. Handling and trucking loss terms ($1 - S_{HT}$) together amount to 4%. Given the high uncertainty about the pre-screen loss and louver efficiency, and the low rate of loss due to handling and trucking, I simplified Equation 5 by setting $S_{HT} = 1$ for both facilities, and assuming the same pre-salvage survival term S_S for both facilities, combining both pre-screen mortality and loss through the screens:

$$\hat{A}_i = \left(\frac{1}{S_S} - 1\right)\hat{N}_i = \lambda \hat{N}_i \qquad (6)$$

Tagged fish are captured by the U.S. Fish and Wildlife Service (USFWS) Chipps Island trawl survey, which takes 10–20 trawl samples daily in spring and less often during other seasons (Brandes and McLain 2001). The number of tagged fish collected by the Chipps Island trawl during each survey was extrapolated to a "fish flux" from the mean catch per volume and the migration speed past Chipps Island. The midwater trawl net is 4.6 meters deep and 9.1 meters wide (Brandes and McLain 2001), and the volume sampled is based on readings of a flowmeter in the net mouth. Fish were caught at the fish facilities slightly more often by night than by day (data from 1996–2004, 39% of all salmon and 49% of the samples were by day), which could be due to higher predation rates during daylight, so we are justified in assuming roughly equal passage at Chipps Island by day and night.

The fish flux past Chipps Island for each day on which a survey was conducted was calculated as:

$$\hat{\Phi}_{dc} = \frac{\sum_{p=1}^{P_d} N_{dpc}}{\sum_{p=1}^{P_d} V_{dpc}} WZu\,, \qquad (7)$$

which is the fish per unit volume multiplied by cross-sectional area and migration speed. Previous analyses have used the time spent sampling to provide a time-scale for migration (Brandes and McLain 2001), but that approach does not account for the migration speed of the fish, and is appropriate only for a stationary sampler. Migration speed u in Equation 7 was estimated at about 6 km/d based on the median date of recapture of tagged late-fall Chinook released at Ryde on the Sacramento River and caught at Chipps Island (Brandes and McLain 2001; Newman 2003). The fish flux was calculated for each day when a survey was conducted, and values were interpolated for days with no survey, then summed over the period between the first and last days when fish were captured:

$$\hat{\Phi}_c = \sum_{d=1}^{D} \hat{\Phi}_{cd}\,. \qquad (8)$$

No comments

- n/a -

Table 2. Chinook salmon. Summary of data from mark-recapture studies. Source is Coleman National Fish Hatchery (C) or Livingstone Stone National Fish Hatchery (L). LSNFH fish were all winter Chinook; Coleman fish were fall, late-fall, or spring Chinook. Dates are for the brood year if later than October, or for the next year if in January–June.

Source	Brood Year	Release Date	Recapture Dates		Length at Release (mm)	Number Released	Catch		
			Initial	Final			Chipps Is.	SWP	CVP
C	1997	11/10	11/26	03/09	118	66316	22	2	0
C	1997	12/09	12/19	03/16	134	66244	34	11	5
C	1997	01/12	01/18	03/18	137	61048	26	0	1
C	1997	01/13	01/19	03/16	141	63100	63	0	0
C	1997	01/14	01/20	03/16	137	67408	54	0	3
C	1997	01/22	01/27	03/18	138	57046	31	0	3
C	1997	03/04	03/25	05/15	56	27628	34	0	0
C	1997	03/06	03/27	05/11	59	35122	23	0	0
C	1997	03/31	04/16	05/22	64	37067	162	0	0
C	1997	04/07	04/19	05/29	65	33392	87	0	0
C	1997	04/22	04/28	06/03	72	28585	336	0	0
C	1997	04/23	05/01	06/03	66	32007	53	0	0
C	1998	11/12	11/24	02/05	116	66119	32	1	0
C	1998	12/15	12/22	03/30	120	64546	48	2	1
C	1998	01/04	01/11	05/26	126	59032	110	5	1
C	1998	03/31	04/29	05/09	59	29869	3	1	0
C	1998	04/20	04/26	05/20	78	24239	158	7	0
C	1998	04/21	05/01	05/23	69	32464	37	0	0
C	1998	04/27	05/05	05/28	75	34513	133	3	2
C	1998	04/28	05/05	05/13	78	34037	28	0	0
C	1999	11/12	11/27	01/28	110	70500	6	2	1
C	1999	12/09	12/20	02/19	110	75948	16	8	3
C	1999	12/21	01/03	02/21	110	83383	9	6	0
C	1999	01/04	01/19	04/20	120	79868	53	63	28
C	1999	01/12	01/21	03/21	120	81680	14	8	6
C	1999	04/07	04/15	04/28	75	33820	50	1	0
C	1999	04/14	04/20	05/21	77	32504	258	2	0
C	1999	04/21	04/26	05/29	78	35228	256	0	0
C	2000	11/03	12/11	01/21	113	58050	6	1	2
C	2000	12/08	12/25	02/26	119	54568	0	5	1
C	2000	01/02	01/17	04/23	128	62127	53	51	18
C	2000	01/09	01/20	03/15	129	65284	11	9	4
C	2000	04/13	04/23	05/13	73	62634	186	0	1
C	2000	04/27	05/07	05/30	76	62325	217	2	0

No comments

- n/a -

Source	Brood Year	Release Date	Recapture Dates		Length at Release (mm)	Number Released	Catch		
			Initial	Final			Chipps Is.	SWP	CVP
C	2001	11/14	11/28	04/27	120	88039	11	4	4
C	2001	12/12	12/21	03/01	120	73856	9	23	5
C	2001	01/04	01/10	03/08	135	65237	55	15	6
C	2001	01/08	01/14	04/23	120	77418	283	155	51
C	2001	04/18	04/25	05/27	77	79730	419	2	0
C	2001	04/25	05/03	05/29	77	71246	289	0	0
C	2002	11/08	12/06	01/06	102	67650	13	5	3
C	2002	12/02	12/18	05/01	117	59887	50	81	29
C	2002	01/02	01/08	03/31	125	66571	166	656	221
C	2002	01/15	01/22	03/21	131	74760	21	46	15
C	2003	11/28	12/11	02/27	126	65339	37	16	6
C	2003	12/31	01/08	04/06	130	72716	166	333	81
C	2003	01/02	01/08	03/24	127	69247	137	222	67
C	2003	01/30	02/11	03/17	146	64983	3	35	6
C	2003	04/16	04/24	05/14	79	75162	58	0	0
C	2004	11/05	12/10	01/03	121	87000	3	1	1
C	2004	11/29	12/14	01/31	117	69993	24	1	1
C	2004	01/04	01/11	03/03	134	32348	231	124	20
C	2004	01/13	01/27	02/27	134	69795	6	25	1
C	2005	12/02	12/12	02/10	116	80014	47	18	5
C	2005	01/03	01/08	03/22	141	82691	126	14	5
C	2005	01/19	01/27	03/06	141	65496	20	2	1
L	1998	01/28	03/15	04/19	70	10243	21	8	0
L	1999	01/27	02/22	05/01	80	1145	4	1	0
L	2000	02/01	03/05	04/04	80	4826	8	2	0
L	2001	01/30	03/07	05/07	80	62138	24	2	2
L	2002	01/30	02/14	04/14	82	8131	34	26	12
L	2003	02/05	02/20	04/09	88	11568	21	26	6
L	2004	02/03	02/22	03/31	87	8584	21	1	1
L	2005	02/02	02/17	03/27	86	15603	20	3	6

No comments

- n/a -

All recaptured fish from each release group were included in estimates of fraction salvaged and lost at the export facilities. Smolts were recaptured over various time intervals, with occasional stragglers recaptured weeks to months later than others in the same group (Figure 2). A relationship was calculated between proportional salvage and export flow averaged over the migration period (see below), but averaging export flow evenly over the migration season would give excessive weight to the later period when few fish were migrating. I therefore calculated a weighted mean export flow during the migration season, using the total daily catch at the fish facilities and Chipps Island as the weighting factor. The total daily catch was first interpolated to fill in days with no survey, then smoothed using a 5-day running mean:

$$N_{w\delta} = \frac{\sum_{d=\delta-2}^{\delta+2} \sum_{p=1}^{P_d} (N_{dp1} + N_{dp2}) + N_{dc}}{5}. \quad (9)$$

For each release group, I calculated total salvage and total losses (Equation 6) over the season as a proportion of the fish leaving the Delta. Proportional salvage P_S is unaffected by pre-salvage survival, whereas proportional loss P_L is very sensitive to the magnitude of S_S (see below). The proportional salvage for the migration period is the ratio of total salvage to the sum of salvage and migration past Chipps Island:

$$\hat{P}_S = \frac{\hat{N}_1 + \hat{N}_2}{\hat{N}_1 + \hat{N}_2 + \Phi_c}. \quad (10)$$

This proportion has a slight bias (<10%) because some fish are salvaged but not counted and subsequently pass Chipps Island. This calculation does not require knowledge of mortality patterns within the Delta or the details of alternative migration pathways. Proportional salvage was related to weighted export flow by a generalized linear model with a log link function and error distribution proportional to the mean (McCullagh and Nelder 1989). This model was fit for the combined data from the two hatcheries, including all data points with > 6 fish recaptured, and with source (hatchery) as a covariate. Additional covariates tried in this model were Sacramento River flow and position of Delta cross-channel gates (0 = both gates closed, 1 = both gates open), both weighted means over the migration season as described above for export flow.

Proportional loss is the total loss divided by the total number of fish departing the Delta either via loss at the export facilities or migration past Chipps Island:

$$\hat{P}_L = \frac{\hat{\Lambda}_1 + \hat{\Lambda}_2}{\hat{\Lambda}_1 + \hat{\Lambda}_2 + \Phi_c} = \frac{\lambda}{\lambda + \frac{1}{\hat{P}_S} - 1}, \quad (11)$$

in which the bias due to double-counting is negligible. The difference in denominators of the left-hand term of Equation 11 and Equation 10 arises because pre-salvage mortality is not included in Equation 10. The principal sources of uncertainty in the calculations of proportional loss arise from great uncertainty about the pre-salvage survival of fish at the fish facilities, and the migration speed of the fish. Although the estimate of migration speed could be refined, the lack of resolution of the pre-salvage survival is the principal impediment to even estimating –much less reducing–the errors in the estimates of

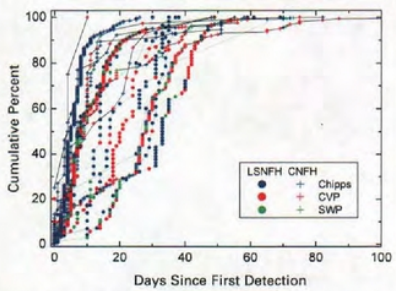

Figure 2. Chinook salmon. Examples of cumulative percent of coded-wire-tagged smolts captured at the fish facilities and at Chipps Island. All releases from LSNFH are shown, and a sample of 10 releases from CNFH. Each symbol represents an individual fish.

No comments

- n/a -

proportional losses. I estimated $\hat{P}_L$ as a function of export flow based on the fitted value of $\hat{P}_S$ from the above relationship with export flow, and alternative assumed values of pre-salvage survival.

Delta Smelt

In contrast to the situation for salmon, the loss of delta smelt to entrainment can be considered a continuous mortality, for which a greatly simplified expression in the absence of natural mortality is:

$$P_L = 1 - \prod_{d=1}^{D}\left(1 - \frac{A_x}{A}\right). \qquad (12)$$

The product is calculated over the entire season of vulnerability.

Two groups of delta smelt are prominent in the salvage estimates from the fish facilities: adults from mid-December to mid-April, and larvae and juveniles from mid-April to mid-July (Figure 3). From approximately mid-July to mid-December, the fish are in brackish water, and few are salvaged in the fish facilities. I therefore focused on losses of adults and larvae/juveniles. Adults are also captured in the spring Kodiak trawl survey (Bennett 2005, see http://www.delta.dfg.ca.gov/data/skt/), and young fish are captured in the spring–summer 20-mm survey of late larvae and juveniles (Dege and Brown 2004, see http://www.delta.dfg.ca.gov/data/20mm/).

The general approach was to estimate entrainment as a mortality (since successful salvage is assumed to be negligible), and multiply the corresponding survival values for each day of exposure to entrainment (Equation 12). The sum of net flows in Old and Middle Rivers (Figure 1) was used to estimate the movement of fish toward the fish facilities. Net flow is southward toward the export facilities when export pumping is large compared to flow in the San Joaquin River. Salvage of adult and young delta smelt is usually low when this flow is positive, although substantial salvage of adult smelt occurred at the federal facility in some years of positive Old and Middle River flow (Figure 4).

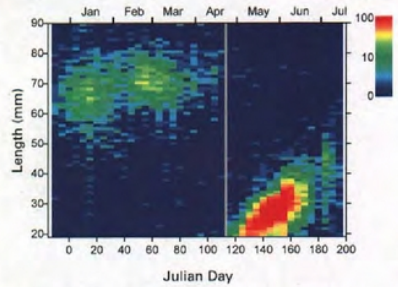

Figure 3. Delta smelt. Combined salvage at south Delta fish facilities for 1997–2005. Image plot showing numbers of fish by length and day, according to log scale at right. Larger fish are adults, and small ones are larvae and juveniles, roughly separated by the vertical line. Larvae smaller than 20 mm are generally not counted. Very few fish were caught between July and mid-December.

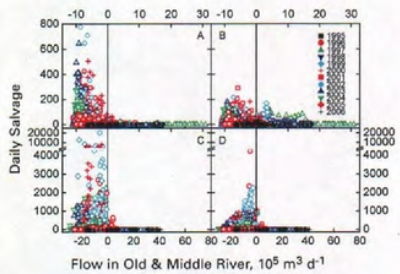

Figure 4. Daily salvage of delta smelt at the fish facilities vs. flow in Old and Middle Rivers, positive northward, 1995-2006. (A) and (B) are adults; (C) and (D) are juveniles. (A) and (C) are for the state facility; (B) and (D) are for the federal facility.

No comments

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Adults

The general approach for adult delta smelt was to divide estimated daily entrainment by the monthly estimated population size from the Kodiak trawl survey to get a daily proportional loss rate, which was accumulated over each day in the month and each month in the season (December–April):

$$\hat{P}_1 = 1 - \prod_{mo=12}^{4} \prod_{d=1}^{d(mo)} \left(1 - \frac{\Phi_{ds}}{A_{mo}}\right). \quad (13)$$

Natural mortality was not considered explicitly in this formulation because most of the losses occur early in the season before the population begins to decline. The principal difficulty with this method is that the fish flux is determined from the salvage sampling program, whereas the population size is determined from the Kodiak trawl data; thus, differences in efficiency between the two programs introduce an unknown parameter. I estimated this parameter as explained below by using Kodiak trawl data from stations in the southern Delta, where the fish are most vulnerable to entrainment.

Principal assumptions were:

1. The Kodiak trawl survey takes a representative sample of the adult delta smelt population.
2. Entrainment is proportional to the combined southward flow in Old and Middle Rivers.
3. All delta smelt entrained toward the export facilities are lost from the population.
4. The efficiency of sampling by the fish salvage facilities is constant.

The first assumption is unlikely to be true given the fixed stations of the Kodiak survey and the concentration of stations in some areas. An alternative approach is to calculate mean catch by sub-region, extrapolate to abundance by sub-region, and sum these values across sub-regions. Doing so results in only a small change in the calculated population size (e.g., see Kimmerer and Nobriga 2005). Assumption 2 is not strictly true since some adult delta smelt are reported from the salvage facilities even when flow is northward, probably because of dispersion (Figure 4A and B). However, this relationship was applied only during times when flow was southward, when advection would have dominated the entrainment flux. Although adult smelt do not drift passively, the patterns in Figure 4A and B support the idea that entrainment is related to the southward flow toward the export facilities. Adult and juvenile delta smelt do not tolerate much handling, and most are probably killed in the salvage process (Bennett 2005). Assumption 4 is unlikely to be true, and violation of this assumption introduces error variance into the calculations.

The Kodiak trawl program has taken surveys from January–May since 2002 but only the three to four surveys using standard stations were included (surveys designated by single digits). Based on reported lengths, all fish appeared to be adults, except for those smaller than 60 mm in May. Catch per volume was calculated assuming a volume filtered of 6,223 m^3, which is the median based on flowmeter readings and a mouth area of 12.5 m^2 (R. Baxter, California Department of Fish and Game, pers. comm.). The Kodiak trawl samples the upper ~ 2 meters of the water column, and adult delta smelt are most abundant in the upper half of the water column, ~ 4 meters. Population size throughout the habitat was calculated as the mean catch per m^3 multiplied by the volume of habitat shallower than 4 meters, about 0.9×10^9 m^3.

Data from the fish facilities included length for about 90% of the fish identified. Fewer than 1% of the fish caught and measured in May were adults—i.e., larger than 60 mm—so data from May were eliminated. About 40% of the fish measured in April were larger than 50 mm, and considered adults. This fraction was used to draw a random sample of the fish salvaged but not measured, which was added to salvage data for fish measured as > 50 mm in April. These fish, and all fish collected in December–March, were included in the analysis.

The daily proportional loss rate for both facilities is (from Equations 4 and 5, assuming no salvage is successful):

No comments

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$$\hat{P}_{Ld} = \frac{E_k(\hat{\Phi}_{d1} + \hat{\Phi}_{d2})}{\hat{D}_s V} = \frac{E_k\left(\frac{\hat{N}_{d1}}{S_{P1}E_1} + \frac{\hat{N}_{d2}}{S_{P2}E_2}\right)}{\hat{D}_s V} \quad (14)$$

The efficiency E_2 for the federal facility is about 13% (M. Bowen, U.S. Bureau of Reclamation, pers. comm.). However, neither E_1 nor the pre-screen survivals S_{Pi} are known for delta smelt, nor is E_k. To simplify the analysis, I combined the two parameters into one for each facility, and assumed that the two resulting values scale as the mean catch at the two facilities. For adult delta smelt from 1995–2006, on days when both facilities had non-zero catches (a total of 235 days), the median ratio of the catch per volume at the state facility to that at the federal facility was 0.95, with 10th and 90th percentiles of 0.2 and 3.8. If fish were arriving at the two facilities in equal abundance per unit volume, the combined efficiency parameters are not consistently different between the two facilities. Therefore, Equation 14 was rearranged to give:

$$\hat{P}_{Ld} = \frac{\theta(\hat{N}_{d1} + \hat{N}_{d2})}{D_s V}, \text{ where}$$

$$\theta = \frac{E_k}{E_1 S_{P1}} = \frac{E_k}{E_2 S_{P2}}. \quad (15)$$

Entrainment can also be estimated as the product of abundance per volume in the south Delta times flow in the south Delta, so:

$$\frac{N_{SD}\, Q_{SD}}{V_{SD}} = \theta\left(\hat{N}_{d1} + \hat{N}_{d2}\right). \quad (16)$$

The value of θ was estimated using the Kodiak trawl catches from four south Delta stations (902, 906, 914, and 915). Data from 2006 were excluded because flow in Old and Middle Rivers was northward most of the time. The model used for this calculation was rearranged from Equation 16, and N_{SD} was assumed to have a Poisson error distribution:

$$\hat{N}_{SD} \sim \text{Poisson}\left[\frac{V_{SD}\theta}{Q_{SD}}\left(\hat{N}_1 + \hat{N}_2\right)\right], \quad (17)$$

which was fit using a generalized linear model with a Poisson error distribution to determine θ. Inserting θ into Equations 15 and then 13 gives:

$$\hat{P}_L = 1 - \prod_{mo=12}^{4} \prod_{d=1}^{d(mo)} \left(1 - \frac{\theta(\hat{N}_{d1} + \hat{N}_{d2})}{A_{mo}}\right). \quad (18)$$

Salvage data for each day in a month were inserted into Equation 18 and divided by the monthly estimate of population size. Monthly estimates were extrapolated for two missing cases (April 2002 and January 2003), and to the previous December for all years, using the nearest non-missing month's data.

Usable salvage data are available for as early as 1995, but the Kodiak trawl data started in 2002. The mean catch per trawl in the fall midwater trawl survey for November–December was moderately well correlated with the subsequent population size from the Kodiak trawl (r = 0.86 for log-transformed data). This relationship was therefore used to estimate mean population size in spring of 1995–2006 from the midwater trawl data. This mean population size was then inserted into Equation 18 as a constant for December–April of each year to calculate annual proportional losses for 1995–2006.

Larvae/Juveniles

The general approach for young fish was similar to that for adults except that this calculation does not rely on reported salvage data, which can underestimate the abundance of small fish, and the extrapolation from daily to seasonal loss involves several additional complications. A flow-chart (Figure 5) shows the calculations required to estimate the seasonal loss, and to test some of the assumptions listed below. Several sources of error were propagated through the calculations.

The 20-mm survey has sampled twice a month during March or April to July from 1995–2005, at up to 52 stations throughout the upper Estuary (Dege and Brown 2004). I dropped surveys having fewer than 20 stations, and dropped stations in San Pablo Bay where delta smelt are uncommon. Catch per tow was converted to catch per volume (CPUE, catch per

No comments

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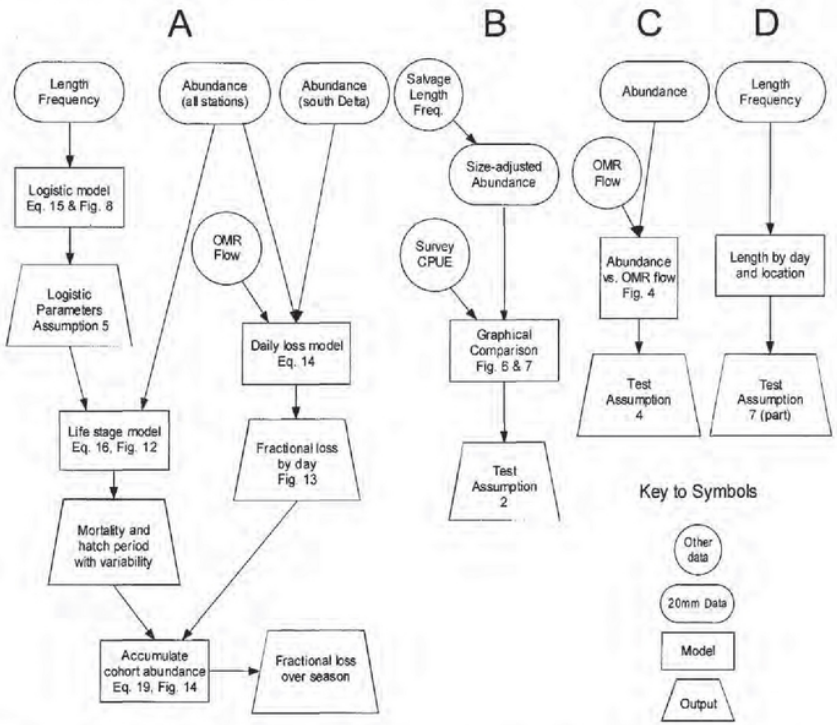

Figure 5. Flow diagram for calculations to estimate losses of juvenile delta smelt. (A) Main calculation of seasonal loss as a percentage of the population. B, C, and D are ancillary calculations to test assumptions: (B) Assumption 2; (C) Assumption 4; (D) Assumption 7. A key to symbols is shown at the bottom. OMR = Old and Middle River flows. CPUE = catch per volume.

No comments

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unit effort) assuming 855 m^3 volume per tow and net efficiency that increased to 100% with increasing size of the fish (see below). The proportional daily loss of fish to the export facilities based on a single survey was estimated as:

$$\hat{P}_{Ld} = \left(\frac{N_{SDs}}{A_s}\right)\frac{Q_{SD}}{V_{SD}}. \quad (19)$$

Six stations (902, 906, 910, 914, 915, and 918) in the southern Delta nearest the fish facilities were used to calculate N_{SD} for each survey.

To calculate the total loss for the entire time-period of the 20-mm survey involves several complicating factors. Delta smelt hatch over a period of several weeks to months. The proportional loss to entrainment early in the season applies only to the fish that have hatched, so the product of daily survival values (Equation 12) underestimates overall survival. Furthermore, natural mortality (i.e., that not attributable to export pumping) suffered by the fish that hatch early requires a further discount of the proportional loss suffered by these fish. This occurs because all of the fish leave the Delta about the same date, after which vulnerability to export effects is considered negligible (the last date of the survey; see Assumption 8 below). Fish that hatch early suffer a longer period of mortality before this date, and thus contribute less to the population; therefore, losses of fish from these cohorts have less effect on subsequent population size.

Assumptions: Principal assumptions for calculating daily loss for each survey were:

1. Delta smelt that arrive in the vicinity of the export facilities are lost from the population.
2. The six stations listed above provide estimates of CPUE that represent the part of the population in the water going to the export facilities.
3. Mean CPUE in all stations represents the entire population.
4. The relevant flow toward the export facilities is the southward flow in Old and Middle Rivers.

Additional assumptions needed to extrapolate daily to seasonal losses (explained below) were:

5. Capture efficiency of the 20-mm net can be described by a logistic function, increasing from 0 to 100% as fish length increases.
6. Fish hatch at a constant daily rate over some time-period.
7. Daily mortality is constant from the beginning of the hatch period until the last survey.
8. Fish remain in the Delta until some date (or temperature) rather than moving to higher salinity at a certain age.
9. Fish hatch at a 5-mm length and grow at ~ 0.3 mm d^{-1}.

Assumption 1 seems reasonable since most of the smaller delta smelt go through the louvers at the fish facilities and are lost from the system (see below), and the few that are salvaged probably do not survive (Bennett 2005). Assumption 3 is probably true for surveys of pelagic fish (Kimmerer and Nobriga 2005). A constant hatch rate (Assumption 6) greatly simplifies the calculations, and is unlikely to have a big effect on the outcome. Daily mortality

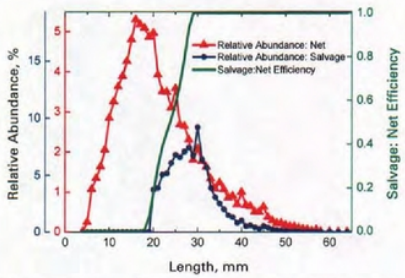

Figure 6. Larval/juvenile delta smelt. Length distributions for all fish caught in the 20-mm survey or in salvage, shown on different scales (left) so relative abundances overlap at ~ 30 mm. Also shown is the ratio of capture efficiency of the salvage sampling to the net sampling (right axis, solid line).

No comments

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(Assumption 7) is almost certainly not constant, but there are no data on which to base reliable estimates. The growth rate value is supported by Figure 6 in Bennett (2005), and is also the approximate mean value obtained by fitting straight lines to data on length at date.

Assumption 2 is supported by the similar temporal pattern of catches in the south Delta sampling stations and the salvage facilities (Figure 5B). To match these catches, it was necessary to account for poor sampling of small fish in the salvage facilities (Figure 6). A relative capture efficiency of the salvage facilities was calculated as the ratio of catch at each size in salvage to that in the net samples, normalized to a total of 1. Since the decline in relative abundance in the salvage data at lengths greater than the modal length was likely due to movement of the fish rather than capture efficiency, the efficiency above the mode was set to 1 (Figure 6). Then the abundance in net samples in the southern Delta was reduced by the calculated relative capture efficiency. The resulting catches per volume (examples in Figure 7) matched reasonably well in timing and magnitude, and were weakly but significantly correlated across all days when data co-occurred ($r = 0.4$, $p < 0.01$).

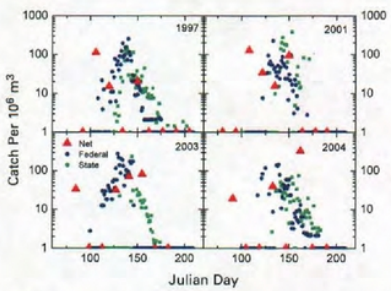

Figure 7. Examples comparing abundance of young delta smelt in the 20-mm survey and in the two fish facilities. Data from the 20-mm survey have been corrected by the relative capture efficiency of the fish facilities (green line in Figure 6) to allow direct comparison.

Assumption 4 (Figure 5C) is supported by the pattern of catch of juveniles in the salvage facilities vs. Old and Middle River flow (Figure 4C, D). Larval/juvenile delta smelt were rarely caught when flow was northward (positive).

Assumption 8 (Figure 5D) is supported by the salvage data in Figure 3: if smelt were moving to brackish water (and then becoming invulnerable to export entrainment) at a certain age, life stage, or length, the mean size in the export facilities would initially rise and then level off. Instead, the mean size increases throughout the spring, and the fish rather abruptly disappear (Figure 3, lower right). This pattern is also supported by the similarity in apparent growth rate from the 20-mm catches from the south Delta compared to that from catches from the entire system (not shown).

Net efficiency: The function describing capture probability as a function of fish length is:

$$E_L = \left(1 - \frac{1}{1 + ae^{bL}}\right) e^{kL}, \qquad (20)$$

where a, b, and k are parameters to be determined. The logistic term in parentheses is small at small size and increases sigmoidally to 1 at large size. The other term contains mortality (and declining capture efficiency) per increment of length to express the decreasing catch as fish grow. This term was used only to fit this equation, and only the logistic parameters a and b were used in subsequent analyses. Parameters were determined by using a least-squares optimization procedure (function *optim* in S-Plus, Venables and Ripley 2003) to fit Equation 20 to the overall length-frequency distribution. Data from each year were used to determine these parameters, which provided means and confidence intervals for each parameter.

The logistic fits to the length-frequency data show that the 20-mm net is 50% efficient at about 16 mm, with a 12-mm window around that value in which efficiency increases from 10% to 90% (mean parameters; Figure 8). The fit of the model to the overall length frequencies is good ($r^2 = 0.99$). The proportion of the population at 5-mm length (hatch

No comments

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length) varied approximately three-fold with parameters at their upper and lower 95% confidence limits (Figure 8B). These values for the logistic parameters were used to propagate error in subsequent analyses.

Mortality rates and hatch dates: These were estimated by fitting data from all stations for each year to the following equations:

$$\left\{\begin{array}{ll} A_{L,t} = H\, e^{-m(t-T_j)}, & T_0 \le T_j \le T_1 \\ A_{L,t} = 0, & T_j < T_0 \text{ or } T_j > T_1 \end{array}\right\},$$

$$L = (t - T_j)\, g \qquad (21)$$

which describes the number of fish of cohort j on each day t given that H fish hatched on day T_j during an interval (T_0, T_1), with constant growth rate g and mortality rate m. The daily hatch rate H cancels out of calculations of proportional losses, so this is an arbitrary parameter that was set to 1. The calculated abundance values $A_{L,t}$ were adjusted for inefficient sampling of small fish using the logistic function from Equation 20, then the length data were aggregated into four length classes of equal size to reduce the number of zeros in the data. The data from each year were then fitted to these equations by an iterative search procedure that minimized the sum of squared deviations between the data and the model to estimate the hatch period (T_0, T_1) and the mortality m.

Daily and seasonal losses. The proportional loss for each survey was determined from Equation 19. To determine daily losses P_{Ld} from the proportional loss by survey, I interpolated the fraction in parentheses in Equation 19 for days between surveys, and extrapolated the fraction for the first survey back to the calculated first hatch date T_0. These fractions were then multiplied by the daily value of Q_{SD}, the southward flow in Old and Middle Rivers. The resulting daily proportional loss is a mortality rate and comprises part of the mortality m determined using Equation 21. Natural mortality (i.e., mortality not due to export losses) was calculated as the difference between mortality determined using Equation 21 and the effective mortality due to export effects:

$$\hat{m}_n = \hat{m} - \overline{\ln(1 - \hat{P}_{Ld})} \qquad (22)$$

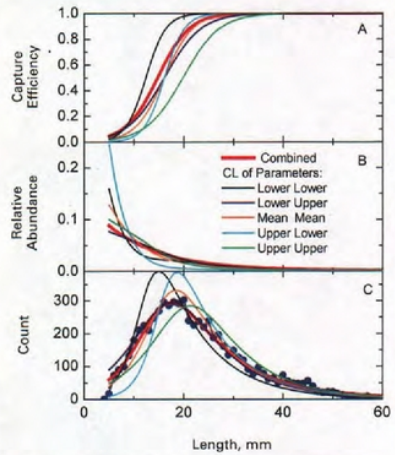

Figure 8. Fit of the net-efficiency model (Equation 20) to the count data from the 20-mm survey. Data for each year have been reduced to the same total number of fish (593) to even out all years. Each panel contains lines based on combinations of the two model parameters: both at their mean values, or either at their upper and lower 95% confidence limits. (A) Capture efficiency as logistic functions of length; (B) Relative abundance by length from the overall model; (C) Count data from the reduced data set (symbols) and model fits, which are proportional to the products of the curves in panels A and B.

where the average was taken over the season from T_1 to the last survey. I used these estimated mortality values for each year in the subsequent calculations, but made parallel calculations with no mortality for comparison.

Survival of each day's cohort j from its hatch date to the last survey day was calculated as:

$$\hat{S}_j = \prod_{T_j}^{T_f} e^{-\hat{m}_n}(1 - \hat{P}_{Ld}) \qquad (23)$$

The proportional loss of fish up to final day T_f was

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then determined from the abundance of all cohorts on that day divided by the abundance in the absence of export losses:

$$\hat{P}_L = 1 - \frac{\sum_j \prod_{T_i}^{T_f} e^{-\hat{m}_{ij}} (1 - \hat{P}_{Ld})}{\sum_j \prod_{T_i}^{T_f} e^{-\hat{m}_{ij}}} \quad (24)$$

The calculation was run for each year of the 20-mm survey separately to determine a proportional loss. Each year's calculation was run 100 times using three sources of variability. Variability in abundance ratio (in parentheses in Equation 19) was determined by bootstrap sampling of the abundance ratios determined from field data for each year; this variability was propagated by sampling from a normal distribution with mean and standard error from the bootstrap analysis, truncated to 1.6 standard deviations (middle ~ 90% of the values) to prevent extreme values. The logistic parameters for each run (Equation 20) were determined by sampling from a normal distribution with the mean and standard deviation of the parameter, determined as described above. The growth rate used in the model was determined by sampling from a uniform distribution over the interval (0.2, 0.4), since there is insufficient information to determine variability in growth rate.

Equations 19 and 24 were also used to calculate proportional losses for hypothetical export flows. I calculated Old and Middle River flow by assuming a 1:1 reduction of Old and Middle River flow for each increase in export flow. I also assumed that the spatial distribution of delta smelt does not change with the changes in Old and Middle River flow, provided that flow remains negative.

Output from a particle tracking model (DSM-2 PTM, Kimmerer and Nobriga 2008) was used in a comparison with the results from this analysis. The PTM was run for 30 days with particles released at 31 locations in the Delta. The proportion of particles lost to the pumping facilities was determined for each release location. These results were aggregated using a weighting factor equal to the proportion of delta smelt < 10 mm at sampling stations close to each release site during dry years. The use of small fish in dry years was meant to ensure weighting toward likely spawning locations, i.e., initial locations for larvae. The PTM results were analyzed in a regression including export flow, inflow, and an interaction term, and the predictions of this statistical model were used to compare PTM output to results of the above analysis of proportional losses.

The fall index of delta smelt abundance is used as the principal measure of status of the population. Previous reports (Miller et al. 2005) documented a relationship between spatial co-occurrence of delta smelt in summer with calanoid copepods—their principal food—and the fall midwater trawl index of delta smelt abundance. Using a slightly different approach, I determined a relationship between zooplankton biomass and summer–fall survival. The independent variable was the biomass of calanoid copepods during July–October in a salinity range of 0.15–2.1 psu, the range over which 50% of the smelt occur in the summer townet survey. The dependent variable in a least-squares regression was the log ratio of the fall midwater trawl index to the summer townet index, which is an index of survival.

RESULTS AND DISCUSSION

Chinook Salmon

The capture of individual marked fish at Chipps Island and the fish facilities typically lasted for approximately 1 month, with the capture rate usually high for about half of the time and then gradually declining (Figure 2). On some occasions, timing was bimodal, with a few fish arriving early and the remainder in a later pulse. There was no consistent difference between timing at Chipps Island and that at either of the fish facilities.

The estimated proportion of migrating fish salvaged at the export facilities increased with increasing export flow (Figure 9). Four data points based on a small number of fish caught (four to six) were excluded from the analysis. Including these points gave a similar model fit, but diagnostic plots revealed an upward bias in the distribution of residuals. Entering the source or run of fish in the statistical model did not improve the fit according to the

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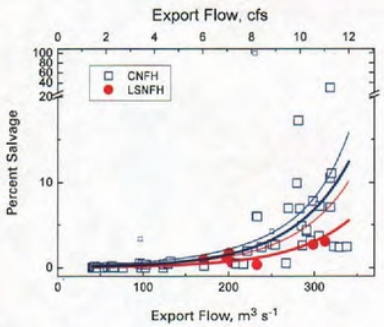

Figure 9. Chinook salmon. Relationship of estimated proportional salvage of tagged smolts at the fish facilities, P_S, to export flow. Small symbols represent data based on six or fewer fish caught, which were not used in determining the line. Lines are from a generalized linear model with log link function and variance proportional to the mean ($p < 0.0001$, 57 df), with source of fish as a categorical variable. Thick lines are predictions for fish from each hatchery; thin lines are upper 90% confidence limits of the predicted mean values.

Akaike Information Criterion (320.9 without, 321.3 with source of fish in the model), but the term for source of fish was marginally significant ($p < 0.1$), and the source term reflects the fact that the LSNFH values tended to be lower than those from CNFH at the higher export flows (Figure 9). Clearly, more data at high export flows would be useful in distinguishing between the results from the two hatcheries.

There was no apparent relationship between proportional salvage or total salvage and either Sacramento River flow or mean position of the gates controlling the Delta Cross-Channel. The relationship of proportional salvage to export flow (Figure 9) had a coefficient of variation for the prediction of about 20% at high export flows.

Proportional loss increased at an accelerating rate with decreasing pre-salvage survival (Figure 10). For pre-salvage survival of 50%, proportional loss is equal to proportional salvage. Proportional loss increases sharply as pre-salvage survival approaches 0, as is clear from Equation 6. Confidence limits on proportional loss are large (Figure 10), but the uncertainty about pre-salvage survival means that constraints on the true value of proportional loss are weak. Pre-salvage survival depends partly on pre-screen predation (Gingras 1997), but also on louver efficiency. NMFS (2004) raised questions about the efficiency of the louver systems under routine operations, when louvers must be lifted out of the water for cleaning and repairs.

Post-salvage mortality was assumed to be small, and is generally considered to be low because of high survival in tests of handling and trucking procedures (NMFS 1997). However, there is no information on survival of these fish after release, and anecdotal evidence suggests high predation rates on the released fish. If survival is low, salvage (Figure 9) would have to be reduced by the fraction of released fish that do not survive. This would have a substantial influence on losses only if pre-salvage survival were high (Figure 10).

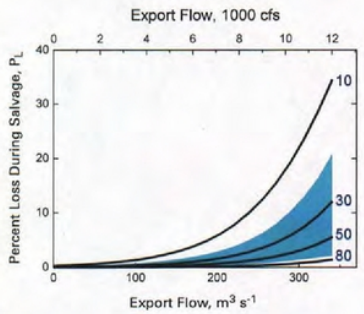

Figure 10. Calculated proportional loss of Chinook salmon, P_L, as a function of export flow and the pre-salvage survival term S_S, assumed to be the same for both fish facilities (Equations 6 and 11). Numbers on right give S_S as percent. Band gives 90% confidence limits around the 30% value based on the error term from Figure 9.

No comments

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Other sources of uncertainty include the swimming speed of the fish, sampling efficiency, and differences between results from fish raised in the two hatcheries. None of these is likely to be comparable to the uncertainty in pre-salvage survival. Swimming speed may vary among releases, e.g., with net flow at Chipps Island or temperature. It may also be biased, which would influence the absolute values of the salvage and loss proportions.

Since the Chipps Island flux is determined using nets, and that at the export facilities using salvage, any difference in efficiency between the two sampling methods that is not taken into account will introduce error. I assumed that net efficiency is 100%; a lower efficiency would result in an underestimate of the fish flux past Chipps Island. A comparison between a midwater trawl and a larger Kodiak trawl in the Sacramento River revealed no difference in fish per volume, suggesting that the efficiency of the midwater trawl is high (Brandes et al. 2000).

All of these calculations refer to direct losses only. Indirect losses may be large (NMFS 1997) but have not been estimated, nor has a method been developed to estimate them. This was supposed to have been the focus of investigations using mark-recapture approaches, but to date these studies have not provided insights into this question (Brown and Kimmerer 2006). Mark-recapture studies have shown that survival of fish released into the interior Delta is lower than that of fish released in the lower Sacramento River, and the ratio of these survivals is a weak function of export flow (Newman 2003). However, these results say nothing about the potential role of indirect mortality, i.e., the likelihood that fish die during migration from the Delta as a result of altered hydrodynamic conditions. This is clearly an area for further investigation.

Even without estimates of indirect loss, the losses in Figure 10 are higher than expected based on management targets for the Delta. Take limits at the state and federal fish facilities for winter Chinook salmon are based on a calculated 2% of the estimated passage through the Delta. This assumes that roughly half of the fish identified by size as winter Chinook are actually winter Chinook. The sources of the hatchery-tagged fish are unambiguous, and considerably more than 1% of them are lost at high export flows for any value of pre-salvage survival < ~ 20% (Figure 10).

Delta Smelt Adults

Monthly population estimates declined beginning approximately in March, when the adults begin to spawn and die (Figure 11A). Estimated losses to entrainment began in mid-December, peaked in January, and then declined sharply (Figure 11B) as the population declined and the southward flow in Old and Middle Rivers decreased (Figure 11C).

The calculated value of θ was 29 ± 20 (95% confidence limit, 13 df). If the Kodiak trawl were 100% efficient, approximately 30 times more fish were entrained than salvaged. This ratio would be even higher if the Kodiak trawl were <100% efficient. A louver efficiency of 13% (see above) combined with 75% pre-screen losses for both facilities gives an overall pre-salvage loss of 97%, consistent with the above ratio but likely coincidental given the uncertainties in both estimates.

With the estimated value of θ, the cumulative loss over the season ranged from 3% to 50% (Table 3). If the upper confidence limit of θ is used, the values range from 6% to 69%. These confidence limits are somewhat underestimated because sampling error in the Kodiak trawl survey could lead to higher or lower estimates of population size.

Examining data back to 1995, southward flow in Old and Middle Rivers was highest in 2002–2004 and low during the wet years of the mid-1990s (Figure 12A).

Table 3. Estimated cumulative losses of adult delta smelt to entrainment in the south Delta water export facilities.

Year	Cumulative % Loss	95% Confidence Limits
2002	15	5 – 24
2003	50	19 – 69
2004	19	6 – 31
2005	7	2 – 12
2006	4	1 – 6

No comments

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This pattern was followed by annual salvage estimates for December–March. Spring abundance was estimated accurately from the midwater trawl data, except for an over-estimate in 2003 (Figure 12B). During that year, no Kodiak trawl survey was taken in January, and the abundance in March was higher than that in February (Figure 11A), so that value is highly uncertain. The extrapolated Kodiak trawl estimates were higher for years before 2002 than during or after 2002 (Figure 12B). Calculated losses followed those determined above, with 2003 again the exception. The highest monthly salvage occurred during January 2003 (Figure 11B), again possibly reflecting an underestimate of population size in the Kodiak trawl data. Overall, mean proportional losses varied from near 0 to 23% (Figure 12C), with a trend reflecting that of Old and Middle River flow ($P_L = -3.7 + (1.1 \pm 0.4)\ Q_{SD}$, $r^2 = 0.75$, 10 df). The relationship of percent loss to X_2 was weak and not significant, presumably because Old and Middle River flow is a more proximate cause of variability in percent loss than X_2.

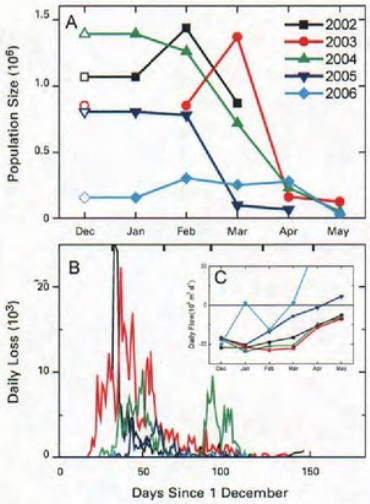

Figure 11. Adult delta smelt. (A) Estimated population size based on the Kodiak trawl survey; open symbols indicate that data for December were extrapolated back from the first survey of the following year; (B) Daily entrainment toward the fish facilities, which is salvage corrected for the ratio of capture efficiency of the Kodiak trawl to that of the fish facilities, so that these values are directly comparable to those in panel A; (C) Monthly mean of the daily combined flow in Old and Middle Rivers (positive northward, away from the export facilities).

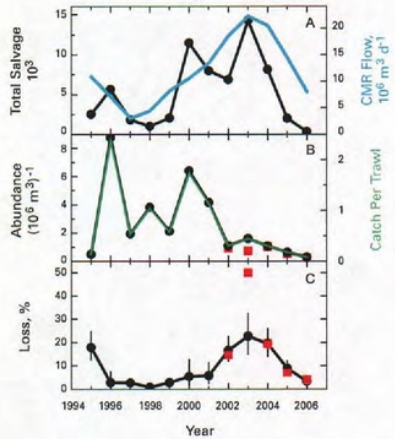

Figure 12. Reconstruction of export losses of adult delta smelt for 1995–2006. (A) Total salvage (line with circles) and Old and Middle River flow (line, right axis); (B) Predicted (line with circles) and measured (squares) population abundance, and mean catch per trawl for the fall trawl surveys in November and December (line, right axis); (C) Predicted (error bars, 5th and 95th percentiles) and measured (squares) proportional losses to export entrainment.

No comments

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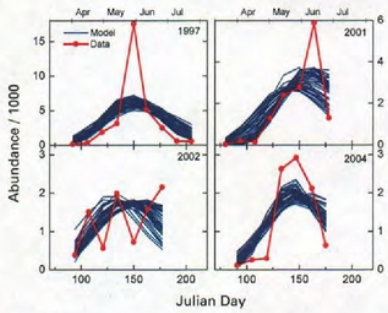

Figure 13. Larval/juvenile delta smelt. Examples of abundance by survey (line with circles) and example trajectories from repeated model runs with parameters sampled from their respective statistical distributions (thin lines).

Delta Smelt Larvae/Juveniles

The fits of the model of hatch dates and mortality (Equation 21) for each year were variable; of course the model failed to capture peaks in abundance (Figure 13), but the trends through the season were satisfactory for accumulating losses through the season. Modeled hatch dates and mortality rates varied among years (Table 4). These mortality rates seem low, but this is probably an artifact of the use of a single mortality rate for the entire period from hatch to migration.

The proportional loss data for each 20-mm survey showed a broad peak centered approximately in early April (Figure 14). Losses were low after mid-May and zero after mid-June. The seasonal or annual proportional loss was also highly variable among years, and roughly followed the maximum daily loss for each year (Figure 15). During the dry years 2001–2003, the losses were ~ 25%. Setting the natural mortality to zero raised the highest percentage loss to 37% (Figure 15). Increasing export flow to the maximum resulted in proportional losses up to 62%. The variation in annual loss was related to flow conditions ($P_L = -0.4 + (1.7 \pm 0.6)\ Q_{SD}$, $r^2 = 0.79$, 9 df), but this

Table 4. Juvenile delta smelt. Estimated hatch dates and mortality by year from the 20-mm survey.

Year	Natural Mortality mn, d-1	Hatch Dates Earliest	Hatch Dates Latest
1995	0.034	03/14	06/07
1996	0.039	03/16	05/13
1997	0.040	03/20	05/12
1998	0.027	03/11	05/02
1999	0.052	03/21	06/09
2000	0.029	03/25	05/15
2001	0.027	03/19	05/09
2002	0.038	03/07	05/12
2003	0.024	03/10	06/09
2004	0.030	03/13	04/28
2005	0.028	03/12	05/03

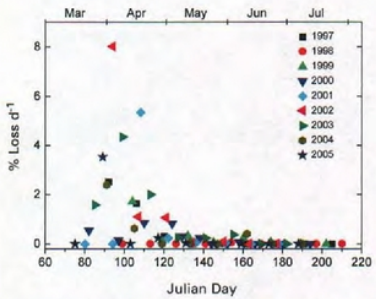

Figure 14. Seasonal pattern of daily proportional loss from the larval/juvenile delta smelt population with symbols and colors for each year.

No comments

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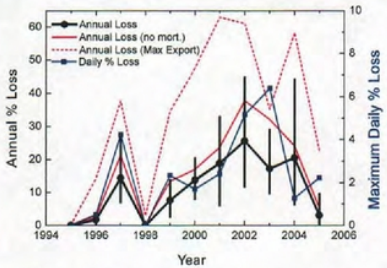

Figure 15. Estimated annual losses to export pumping of delta smelt from the 20-mm survey. The black line gives the estimated loss with 95% confidence limits allowing for mortality; red lines give annual losses without mortality (solid), and at the maximum export flow rate (dashed). The blue line with squares (right axis) gives the maximum daily percent loss determined in a single survey for each year.

relationship is tautological, since Old and Middle River flow was used explicitly in the calculations. This contrasts somewhat with the situation for adult delta smelt, for which the calculated losses were not based on flow, although flow was used in the calculation of θ (Equation 17).

The statistical analysis of output from the particle tracking model showed a reasonable ability to predict the loss of particles to export pumping from inflow and export flow (Figure 16). Placing the data from Figure 15 in the same framework gives predicted and calculated values that fall rather close to the same line, except for several values below the line at intermediate flow conditions and predicted loss rates (Figure 16). The calculated percent loss for 2005 was especially low, possibly because population abundance was so low.

The relationship of proportional loss to Old and Middle River flow (by assumption) and inflow and export flow (Figure 16) guarantees a relationship with X_2. Could this relationship underlie the weak negative relationship between X_2 and summer townet index for delta smelt after 1981 (Kimmerer 2002 Figure 8E)? A regression of summer townet index on X_2 for 1995–2005 had a slope of -0.11 ± 0.18 (95% CL, 22 df, p ~ 0.2). A regression of survival (1 – proportional loss) from the above analysis on X_2 had a slope of -0.009 ± 0.004 (9 df). The large confidence interval around the slope for the townet index includes the slope for the survival data. Applying the relationship in Figure 16 to all of the historical data for inflow and export flow replicates the X_2 effect that existed after 1981, but, in contrast to the historical data (Kimmerer 2002), there is no apparent change in the slope of the calculated X_2 effect. Thus, while the relationship of townet index to X_2 after 1981 is consistent with a mechanism based on high export losses during periods of landward X_2, this mechanism cannot explain the positive slope with X_2

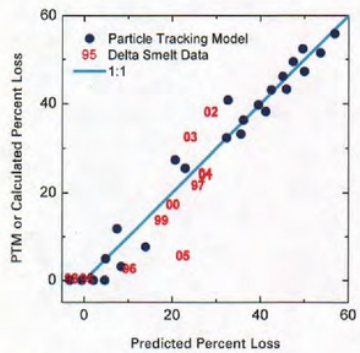

Figure 16. Larval/juvenile delta smelt. Predicted percent loss to the population by regression using log of Delta inflow and log of export flow as predictors (with interaction), and particle-tracking model results as the dependent variable (circles), with the line indicating a 1:1 relationship. The regression is: log (y) = 4.29 – (0.36 ± 0.17) log(inflow) – (0.90 ± 0.11) log(export flow) + (0.10 ± 0.03) log(inflow) × log(export flow), parameters with 95% confidence limits. Estimates of delta smelt losses from Figure 15 with no natural mortality (to match the particle tracking model results) are plotted against predictions from the above statistical model using mean flow conditions during the hatch period; numbers indicate years.

No comments

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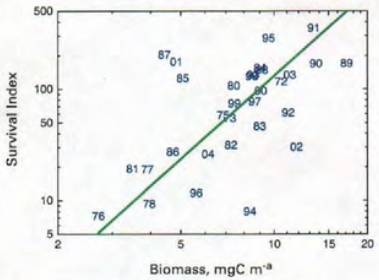

Figure 17. Relationship of survival index (fall trawl index / summer townet index) of delta smelt vs. mean zooplankton biomass during July–September for all stations in a salinity range of 0.15 to 2.09, the central 50% of the summer delta smelt distribution. The line is the geometric mean regression for log(10)-transformed data, y = 2.48x – 0.36. The correlation coefficient for the log-transformed data is 0.58 with a 95% confidence interval of (0.26, 0.78).

observed before 1981 (Kimmerer 2002). The causal mechanism for that relationship, and the reasons for the change, remain unknown (Bennett 2005).

The summer–fall index of survival varied over a range of 50-fold, and was significantly related to summer zooplankton biomass in the low-salinity zone (Figure 17). This may indicate food-limited survival. Observations of evidence for food shortage using histopathological methods (Bennett 2005) provides some support for this interpretation.

Population Consequences

Are these proportional loss rates excessive? This question cannot be answered using science alone. From a scientific perspective, all we can do is compare these losses with other sources of mortality or other data about the populations.

For Chinook salmon, a loss rate on the order of 10% or less, depending on pre-screen mortality (Figure 10), is less than fishing mortality: harvest index for all Chinook salmon off California in recent years has been around 40% (Williams 2006), which is close to fishing mortality rate for reasonable values of natural mortality. The harvest index for winter Chinook has probably been closer to 20% in recent years (Grover et al. 2004). From a population maintenance standpoint, the calculated loss rate at the export facilities would be a significant component of direct anthropogenic mortality. Furthermore, to the extent that the ocean fishery is supported by the large fall-run hatcheries, fishery losses could be offset by higher hatchery production. However, this level of additional mortality at the export facilities may place constraints on the rate of recovery of the listed winter- and spring-run stocks, and on ocean harvest of stocks (such as the fall run) that are not listed. Furthermore, these constraints may grow for winter Chinook if export flows continue to be kept high in winter to reduce impacts in spring.

Clearly, the big unknown is the pre-screen mortality. Although experiments have been conducted to attempt to determine this value, these have been hampered by incomplete design and by high variability. Furthermore, systemic problems with the operations and maintenance of the fish facilities (NMFS 2004) may prevent not only determining these factors but reducing them to an acceptable level. Thus, it is imperative that experimental designs be developed to better quantify pre-salvage survival if the current export configuration is to remain.

Delta smelt may suffer substantial losses to export pumping both as pre-spawning adults and as larvae and early juveniles. In contrast to the situation for salmon, pre-salvage mortality has been constrained in the calculations for adult delta smelt, and its effects eliminated from the calculations for larval/juvenile delta smelt. Combining the results for both life stages, losses may be on the order of 0–40% of the population throughout winter and spring. The estimates have large confidence limits, which could be reduced by additional sampling, particularly to estimate θ in Equation 18. If there is interest in improving these estimates further, some attempts should be made to examine the assumptions not fully tested above, particularly those used in extrapolating larval abundance to hatch dates.

No comments

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Although the upper bound of this range represents a substantial loss, the effect of this loss is complicated by subsequent variability in survival (Figure 17). If this variability is uncorrelated with entrainment losses, then these losses will contribute little to the variability in fall abundance index. The simplest way to evaluate this is by regression of fall midwater trawl index on winter-spring export flow, but this relationship is contaminated by the downward step change in abundance in approximately 1981–1982, together with the long-term upward trend in export flow (mainly up to the mid-1970s, see Kimmerer 2004). Including this step in a regression model eliminates the effect of export flow on the fall midwater trawl index (coefficient = -1.5 ± 2.4, 95% CL, 36 df). It seems unlikely that the downward step change was due to the earlier increase in export flow; furthermore, despite substantial variability in export flow in years since 1982, no effect of export flow on subsequent midwater trawl abundance is evident.

This is not to dismiss the rather large proportional losses of delta smelt that occur in some years; rather, it suggests that these losses have effects that are episodic and that therefore their effects should be calculated rather than inferred from correlative analyses. In the absence of density dependence, using means in Figure 15 with natural mortality, fall abundance should have been reduced by ~ 10% during 1995–2005. This would have an equivalent effect of reducing the summer–fall survival index by 10%. This would have made little difference to fall abundance in the context of the approximately 50-fold variation in summer–fall survival (Figure 17), and would be difficult to detect through correlation.

Although summer–fall survival appears to dominate variability in abundance of delta smelt in fall (Figure 17), this does not imply that control of export effects would be fruitless, as these effects can be considerable during dry years. Management of delta smelt should incorporate any opportunities that arise to improve habitat or food supply and to reduce any negative impacts of predation or toxic contamination. However, current evidence does not provide a clear path toward improving the status of delta smelt using these factors.-Manipulating export flow (and, to some extent, inflow) is the only means to influence the abundance of delta smelt that is both feasible and supported by the current body of evidence, even though export effects are relatively small. The results presented here can be used to suggest when, and under what conditions, control of export effects would be most helpful.

ACKNOWLEDGMENTS

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No comments

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No comments

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No comments

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APPENDIX DOC. 11

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FEBRUARY 2008

SAN FRANCISCO ESTUARY & WATERSHED SCIENCE

Investigating Particle Transport and Fate in the Sacramento-San Joaquin Delta Using a Particle Tracking Model

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ABSTRACT

Movements of pelagic organisms in the tidal freshwater regions of estuaries are sensitive to the movements of water. In the Sacramento-San Joaquin Delta—the tidal freshwater reach of the San Francisco Estuary—such movements are key to losses of fish and other organisms to entrainment in large water-export facilities. We used the Delta Simulation Model-2 hydrodynamic model and its particle tracking model to examine the principal determinants of entrainment losses to the export facilities and how movement of fish through the Delta may be influenced by flow. We modeled 936 scenarios for 74 different conditions of flow, diversions, tides, and removable barriers to address seven questions regarding hydrodynamics and entrainment risk in the Delta. Tide had relatively small effects on fate and residence time of particles. Release location and hydrology interacted to control particle fate and residence time. The ratio of flow into the export facilities to freshwater flow into the Delta (export:inflow or EI ratio) was a useful predictor of entrainment probability if the model were allowed to run long enough to resolve particles' ultimate fate. Agricultural diversions within the Delta increased total entrainment losses and altered local movement patterns. Removable barriers in channels of the southern Delta and gates in the Delta Cross Channel in the northern Delta had minor effects on particles released in the rivers above these channels. A simulation of losses of larval delta smelt showed substantial cumulative losses depending on both inflow and export flow. A simulation mimicking mark-recapture experiments on Chinook salmon smolts suggested that both inflow and export flow may be important factors determining survival of salmon in the upper estuary. To the extent that fish behave passively, this model is probably suitable for describing Delta-wide movement, but it is less suitable for smaller scales or alternative configurations of the Delta.

KEYWORDS

tidal processes, water diversions, particle tracking model, San Francisco Estuary, Chinook salmon *Oncorhynchus tshawytscha*, delta smelt *Hypomesus transpacificus*

No comments

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SUGGESTED CITATION

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INTRODUCTION

In tidal river estuaries, freshwater flows affect hydrodynamic phenomena important to biotic communities. Examples include the geographic match or mismatch of chemically and structurally appropriate habitat attributes (Peterson 2003), strength of entrapment phenomena such as gravitational circulation and residual landward bottom currents that concentrate biota and assist retention in rearing habitats (Cronin and Forward 1979; Kimmerer et al. 2002), and flow pulses that transport larvae to rearing habitats (Dew and Hecht 1994). Thus, freshwater depletions and changes in the timing of freshwater inputs affect estuarine biota, often negatively (Jassby et al. 1995; Livingston et al. 1997).

The landward reach of California's San Francisco Estuary, known as the Sacramento-San Joaquin Delta, may be the only place in the world where significant freshwater is diverted from within a tidal estuary. Reservoir releases throughout the watershed are managed to maintain most of the Delta as a permanently freshwater ecosystem to support a significant redistribution of California's water resources from north to south (Kimmerer 2002). Four large water diversions owned by the U.S. and State of California governments collectively export an average of nearly 7 cubic kilometers per year ($km^3\ yr^{-1}$) from the Delta (Table 1). More than 95% of the water exported from the Delta is taken by the two largest diversions: the Jones Pumping Plant of the federal Central Valley Project (hereafter, CVP) and the State Water Project's Banks Pumping Plant (hereafter, SWP). Existing regulations allow for up to 65% of river inflows to be diverted during certain months. The exported water is pumped to agricultural, municipal, and industrial users to the south and west; an estimated 22 million Californians use water exported from the Delta.

In addition to the water exported out of the Delta, an estimated net 0.1 $km^3\ yr^{-1}$ also is removed during April–September to irrigate farmlands within the Delta (Brown 1982). The within-Delta farmlands are irrigated by approximately 2,200 comparatively small, privately-owned water diversions scattered throughout the system (Herren and Kawasaki 2001).

Numerous fish species migrate through or live in the upper San Francisco Estuary during all or part of their life cycles (Moyle 2002). Thus, in addition to altered hydrodynamics, the large-scale removal of freshwater from the Delta adds the potential for significant entrainment of fishes from the upper estuary. Entrainment of the early life stages of fish has been a long-standing concern (Stevens et al. 1985; Moyle et al. 1992; Brandes and McLain 2001). Elaborate facilities operate continuously at each export plant to separate fish from diverted water and return them to the estuary (Brown et al. 1996). Although mortality of some species at these facilities is probably high (e.g., Bennett 2005), correlative evidence of major entrainment effects on fish population dynamics has not been forthcoming (Kimmerer et al. 2001; Newman 2003; Bennett 2005).

A quantitative understanding of linkages between Delta hydrodynamics and fish entrainment risk has been hindered by difficulties in modeling the Delta's complex network of tidally-influenced channels, incremental changes in SWP and CVP water opera-

Table 1. Summary of annual export volumes (km^3) from the four state and federal water diversions in the Sacramento-San Joaquin Delta for water years following the Bay-Delta Accord (1995–2005). The Contra Costa and Tracy diversion facilities are part of the federal Central Valley Project. The Harvey O. Banks and North Bay Aqueduct diversion facilities are part of the State Water Project.

Water Diversion	1st Year of Operation	Average Volume (range)
Contra Costa	1940	0.15 (0.12 – 0.23)
Tracy (CVP)	1951	3.1 (2.6 – 3.5)
Banks (SWP)	1968	3.6 (2.1 – 4.9)
North Bay Aqueduct	1988	0.05 (0.03 – 0.07)

No comments

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tions, and the large natural inter-annual and seasonal variability in inflow. During the latter half of the twentieth century, the number of water diversions increased (Table 1), as did total water export volumes (Kimmerer 2002). Furthermore, the number of flow control structures, such as barriers and flood gates, has increased and their operation schedules have changed through time. Proposals for further modifications continue.

We used the Delta Simulation Model-2 hydrodynamic model (DSM2 HYDRO) and its associated particle tracking model (PTM) to examine the principal determinants of entrainment losses to the export facilities, under assumptions discussed below. We explored numerous combinations of freshwater inflow, export flow, and tide for a variety of particle release sites. Our goal was to provide information about Delta hydrodynamics, water diversions, and barrier operations pertinent to management of the Delta for fish. We addressed the following questions regarding hydrodynamics and entrainment risk in the Delta: (1) What effect do spring versus neap tides have on particle fate? (2) How do release location, hydrology, and time interact to influence particle fates? (3) What is the best index of export flows in the Delta to index the probability of entrainment of neutrally-buoyant particles and (possibly) resident and migratory fish? (4) What is the effect of in-Delta agricultural diversions on entrainment loss and particle residence time? (5) What is the effect of permanent and temporary barriers on entrainment loss and particle residence time? (6) How can the entrainment of the larvae of threatened delta smelt (*Hypomesus transpacificus*) be related to hydrodynamic conditions? (7) How do freshwater inflow and export flow affect the predicted passage out of the Delta of particles released at sites in the northern Delta where Chinook salmon (*Oncorhyncus tschawytscha*) smolts are released for experiments on survival?

METHODS

Study Area

Numerous alterations of the Sacramento-San Joaquin Delta influence hydrodynamics and the movement of fish in the system (Figure 1). For example, the Yolo Bypass, an artificial floodplain of the Sacramento River, is managed to take most of the winter flood flows and prevent flooding of urban areas (Sommer et al. 2001). The Delta Cross Channel (DCC) connects the Sacramento River with the interior Delta by way of a pair of movable gates, which are closed during floods and when salmon are migrating downstream. Temporary rock barriers are installed at various sites in the southern Delta to maintain water levels for agricultural diversions, and one barrier is placed at the head of Old River to prevent salmon smolts from entering it during their migration down the adjoining San Joaquin River. One objective of closing the DCC and the barrier at the head of Old River is to minimize salmon losses that can be attributed to water project operations.

Hydrodynamic Model

DSM2 HYDRO is a one-dimensional (1-D) numerical model that simulates non-steady state hydrodynamics in a network of riverine and estuarine channels using a standard numerical method (the Preissman scheme). (See http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/). The chief advantages of this model are its speed, and the fact that the California Department of Water Resources (CDWR) has expended a tremendous amount of effort and care in developing, calibrating, and testing this model. The model grid consists of 416 nodes and 509 links representing channels, and open-water areas, which are represented as reservoirs where mixing occurs. Seventeen hydraulic barriers and gates are also included. DSM2 HYDRO's primary dependent variables are stage and flow; the model boundary conditions are stage at Martinez to the west, water diversions in the Delta, and stream flows at the landward limits of tidal influence. DSM2 HYDRO was calibrated to empirical flow and stage data (May 1988, April 1997, April 1998, September–October 1998; CDWR 2001). The model's friction parameters for each of ~50 regions were adjusted until simulated values best matched observed daily average and instantaneous flow and stage data. The model calibration was validated by comparing simulated flow and stage with field data from 1990–1999. Results of this calibration and validation are available in the form of maps with select-

No comments

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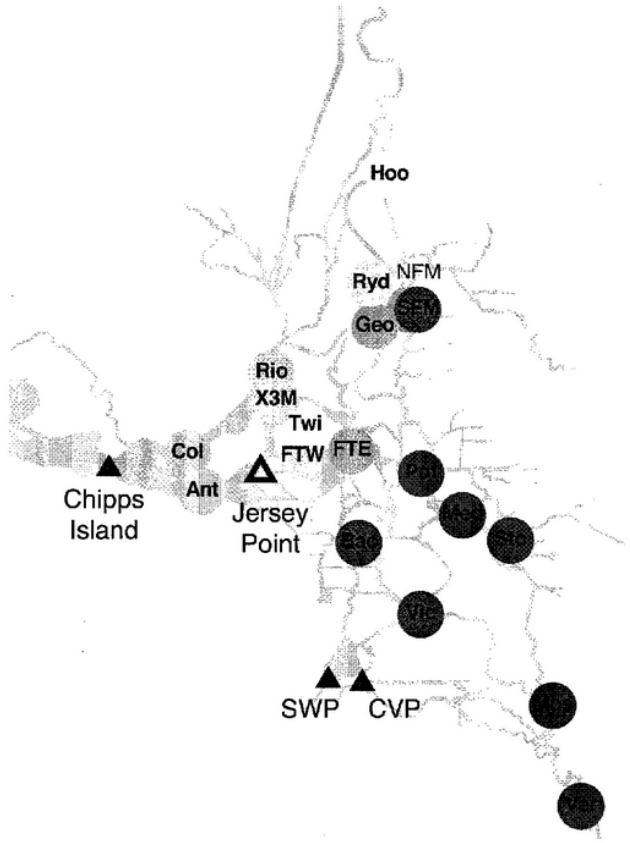

Figure 1. Map of the Sacramento-San Joaquin Delta showing release sites used in the particle tracking model. Sites are identified by codes listed in Table 4, and color-coded by the mean losses from each site to the SWP and CVP pumps. Blue triangles identify additional locations where particle passage was recorded: Chipps Island in the western Delta, and the federal and state water export facilities. The open triangle denotes an intermediate passage location at Jersey Point; others are at Georgiana Slough (Geo), the nearby DCC (not shown on map), and Rio Vista (Rio). The NFM site is covered by the SFM symbol. The Sac site is just north of the area shown on the map.

No comments

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able nodes that link to graphical displays of model results and data (see http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/dsm2studies.cfm.).

DSM2 QUAL is a transport module that has been similarly calibrated against conductivity measurements at various Delta locations. This provides some assurance that the movement of substances, and therefore also neutrally-buoyant particles, is accurately represented, since both models use the same hydrodynamic output. However, PTM (see below) uses a very different scheme for velocity profiles and for mixing at junctions. Furthermore, model accuracy varies depending on the length of the simulation and the location of particle releases. The most recent calibration is available, also in the form of graphical displays, at http://modeling.water.ca.gov/Delta/studies/calibration2000/.

The DSM2 particle tracking model (PTM) is a quasi-3-D extension of DSM2 HYDRO (Culberson et al. 2004). The PTM represents movement of particles through advection in the mean flow together with a synthetic dispersion (Wilbur 2000; 2001). Each particle has a random component of movement—a random walk (Visser 1997)—and its position in the channel is tracked. Lateral velocity profiles are assumed to have a fourth-order polynomial description, and vertical profiles are logarithmic. Thus, particles may encounter velocities that differ substantially from the mean flow. These profiles are the same for all channels and therefore do not take into account channel shapes, nor do they make use of the change in vertical profiles that should accompany the bottom friction coefficients used to tune the hydrodynamic model. The combination of random movement and velocity shear results in dispersion of particles. However, upon reaching a junction or an open-water area, a particle is completely and instantaneously mixed, destroying information about its previous relative position in the channel. This is likely to have a significant effect on dispersion but this cannot be determined without re-coding the PTM. Velocity profiles used in the PTM were determined by fitting the profiles to velocity data collected at 16 sites in the Delta (Oltmann 1998; Wilbur 2000). The simulated quasi-3-D profiles were checked using simulations of dye concentration data collected from three stations following a single dye release on the San Joaquin River; arrival time was reproduced well, but dispersion was less well predicted (Wilbur 2000).

Despite the extensive use of the DSM2 family of models to solve important management problems in the Delta, the calibrations and validations described above do not provide sufficient information for users to assess the accuracy or reliability of model output. There is no published record of the overall statistical properties of the models. To avoid relying on such uncertain foundations, we have conducted a partial analysis of the statistical properties of HYDRO and QUAL in relation to field data, and present our findings in the Appendix. This analysis is quite encouraging about the utility of these modules for the analysis of movements of water and salt on the scale of the Delta. However, we have not evaluated the extent to which the PTM reliably records the movement of particles. The comparisons with field data described above do not constitute a sufficient calibration of PTM. This shortfall could be addressed indirectly through a comparison of particle releases in PTM with tracer releases in QUAL, but that is beyond our scope. Furthermore, the basic formulation of the PTM has not been subjected to peer review.

Although the DSM2 models are simpler than others in use in this and other estuaries, the number of different dimensions of a modeling problem can become unwieldy even with this model. We chose to simplify the analysis by our choices of conditions to model, and our approach to the analysis. We used synthetic hydrology and repeating tides, which were either spring tides or, in a few runs, neap tides. We focused on spring tides to maximize dispersion effects, which appeared to be small (see Results). Inflows and export flows were constant during each model run, and distributed among the various sources and sinks based on historical data from the DAYFLOW accounting program for 1980–2002 (http://www.iep.ca.gov/dayflow/). Inflow was distributed by a constant proportion, except for the Yolo Bypass, which flows only under flood conditions (Table 2). Export flow was constant for the North Bay Aqueduct (0.9 $m^3 s^{-1}$) and Contra Costa Canal (0.09 $m^3 s^{-1}$), and the remainder was apportioned between the CVP and SWP (Table 2). Agricultural diversions were set to winter values

No comments

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Table 2. Distributions of inflow and export flow by source for each model run.

Inflow		Inflow by Source ($m^3 s^{-1}$)			
cfs	$m^3 s^{-1}$	Sacramento R.	Yolo Bypass	San Joaquin R.	Eastern Delta
12,000	340	292	0	40	8
21,000	595	493	6	78	18
38,000	1,077	837	32	162	47
67,000	1,899	1,331	158	306	104
120,000	3,401	1,844	802	547	208
Export Flow		**Export Flow by Source ($m^3 s^{-1}$)**			
cfs	$m^3 s^{-1}$	SWP	CVP	Contra Costa Canal	North Bay Aqueduct
2,000	57	20	37	0.09	0.9
6,000	170	92	78	0.09	0.9
10,000	284	164	120	0.09	0.9

Table 3. Summary of model runs. Base runs were conducted with no agricultural diversions, south Delta barriers removed, and Delta Cross Channel (DCC) closed only for inflow greater than 38,000 cfs. "All" includes base runs, runs with agricultural diversions, releases from the north Delta with the DCC closed, and releases from Vernalis and Mossdale with various barrier configurations. In the lower part of the table, "Tide" refers to releases from all sites with neap and spring tides, "Ag Barriers" to releases from many sites with agricultural and fish barriers in place, and "Replicates" to multiple releases from the Hood site on the Sacramento River to test variability with different random number seeds.

Inflow		Export Flow									
		Cfs	2,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000
cfs	$m^3 s^{-1}$	$m^3 s^{-1}$	57	142	170	198	227	255	283	312	340
12,000	340		All	Base	All	Base	Base	Base	All		
21,000	595		All		All	Base	Base	Base	All	Base	Base
38,000	1,077		Base		Base				Base		
67,000	1,899		Base		Base				Base		
120,000	3,401		Base		Base				Base		
12,000	340		Tide Replicates Ag Barriers		Ag Barriers				Tide Replicates		
38,000	1,077				Replicates						
120,000	3,401		Tida		Replicates				Tide		

No comments

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(0.9 $m^3 s^{-1}$), except for a subset of runs in which they were set to typical summer values (127 $m^3 s^{-1}$). Our use of minimum agricultural diversion demand in most runs reduced particle losses to agricultural diversions to < 1% in all runs. This maximized the numbers of particles that remained in Delta channels for evaluation of study questions not involving these diversions. This choice was motivated by recent studies that suggest fish losses to small diversions are likely much less than expected based on quantities diverted (Nobriga et al. 2004; Moyle and Israel 2005). In most runs, temporary barriers in the south Delta were absent, and the Delta Cross Channel gates were open at inflow below 600 $m^3 s^{-1}$ and closed above, except in specific runs. These choices somewhat limit the interpretation of our results, but even so we modeled 936 scenarios for 74 different conditions of flow, diversions, tides, and barriers (Table 3, Figure 2).

Data Analysis

For each model run, 4,000–5,000 particles were released at one of up to 20 sites (Table 4; Figure 1). Four to five thousand was approximately the maximum number of particles for which all particle fluxes could be calculated for a 90-day simulation. We always tried 5,000 particles first. If all particle fates could not be calculated, we re-ran the simulation using 4,000 particles. Equal numbers of particles were released at 15-minute intervals over the first 25 hours of each simulation to eliminate bias due to releasing particles on a particular tidal stage (Culberson et al. 2004). Model outputs consisted of hourly cumulative proportions of particles that passed selected control points (Figure 1). Except for analysis of tidal effects, data were filtered with a Godin low-pass filter (24 hours) and averaged over each day. Data at the beginning of the series were replaced by a straight daily average since the tidal filter removes the first 24 data points. Daily averages were then truncated to 90 days for all analyses.

Particles were considered to have left the Delta if they passed Chipps Island (Figure 1) or entered either the SWP or CVP pumping plants or agricultural diversions. Intermediate points were used only to assess the pathways that the particles had taken.

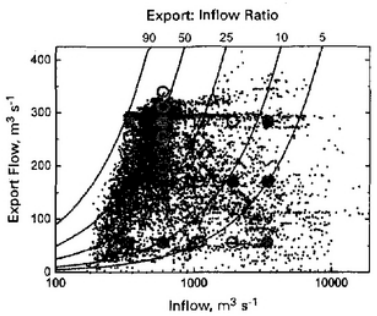

Figure 2. Daily export flow and inflow from the Dayflow accounting program for 1980–2002 (blue symbols) and values used in the model (red). Open symbols are base run only, filled symbols are other runs as described in Table 3. Squares are combinations used in examples (Figures 5 and 6). Green lines give isopleths of export:inflow (EI) ratio.

Generally, the profile of particle passage was asymmetrically sigmoid, with a rapid initial increase in slope followed by a protracted approach to an asymptote. For some release sites, particularly those in the southeastern Delta, there were two inflections in the recovery curves, as the particles took a shorter and a longer path to the recovery site. In a few cases, particles were still accumulating at endpoints at an accelerating rate at the end of the model run.

In many runs, particularly those at low flow for release points in the central and southern Delta, a substantial fraction of the particles remained in the Delta after 90 days. To estimate the ultimate fate of these particles, we extrapolated the curves of cumulative passage to infinite time. This extrapolation used a negative exponential curve fitted to the data past the last inflection point. The inflection point was determined by smoothing the curve with a 9-day running mean, and determining the locations of peaks in the data after differencing, i.e., subtracting each value from the previous value. The last peak in the differenced series was taken as the point of the final inflection. If there were no inflection, the

No comments

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Table 4. Release and recovery points and codes used in the figures.

Release Site	River	Code	DSM2 Node	Study Questions
Vernalis	San Joaquin	Ver	1	1, 2, 3, 4, 5
Mossdale	San Joaquin	Mos	7	1, 2, 3, 4, 5
Stockton	San Joaquin	Sto	21	1, 2, 3, 4, 5, 6
Medford Island	San Joaquin	Med	25	1, 2, 3, 4, 5, 6
Potato Slough	San Joaquin	Pot	32	1, 2, 3, 4, 5, 6
Twitchell Island	San Joaquin	Twi	42	1, 2, 3, 4, 5, 6
Antioch	San Joaquin	Ant	46	1, 2, 3, 4, 5, 6
Bacon Island	Old	Bac	92	1, 2, 3, 4, 5, 6
Frank's Tract East	n/a	FTE	103	1, 2, 3, 4, 5, 6
Frank's Tract West	n/a	FTW	226	1, 2, 3, 4, 5, 6
Victoria Canal	Middle	Vic	113	1, 2, 3, 4, 5, 6
Three-Mile Slough	n/a	X3M	240	1, 2, 3, 4, 5, 6
South Fork Mokelumne	Mokelumne	SFM	261	1, 2, 3, 4, 6
North Fork Mokelumne	Mokelumne	NFM	281	1, 2, 3, 4
Georgiana Slough		Geo	291	1, 2, 3, 4, 5, 7
Sacramento	Sacramento	Sac	330	7
Hood	Sacramento	Hoo	338	1, 2, 3, 4, 5, 7
Ryde	Sacramento	Ryd	344	1, 2, 3, 4, 5, 7
Rio Vista	Sacramento	Rio	351	1, 2, 3, 4, 6
Collinsville	Sacramento	Col	354	1, 2, 3, 4, 6

curve was fitted to the entire data-set. We estimated the ultimate fraction of particles passing the selected location as the asymptote of the fitted curve.

In some cases the curve could not be fit to the data, or the fit was poor; generally, this occurred under low-flow conditions when particles began arriving at distant points late in the simulation and were continuing to accumulate at the end of the simulation rather than approaching an asymptote. In those cases, the 90-day value was used as an estimate of the ultimate value.

In addition to the ultimate fate of particles, we calculated a measure of residence time. The value chosen was the time for 75% of the particles to leave the Delta. We selected this value because we were most concerned about how long it takes a group of particles (representing plankton) to leave the Delta, but we also wanted a statistically robust metric. In a handful of cases, 75% of the particles had not left the Delta by the end of the model run, and this time had to be determined on the extrapolated curve as described above. In one case it was determined by eye.

The ultimate fraction of particles lost to the export facilities and, in some model runs, to agricultural diversions, was modeled as a function of the export: inflow (EI) ratio. The EI ratio is used in management of the Delta because it is assumed to provide a measure of the influence of south Delta diversions (Newman and Rice 2002). By regulation, the EI ratio must not exceed 35% during February-June or 65% for the rest of the year. The model was a logistic curve fit to the data by using an optimizing program to minimize the sum of squared differences between the data and the curve. The curve was fit separately for each release site. In contrast to particle fate, the relationship of residence time to inflow and export

No comments

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flow was examined graphically, since no underlying model seemed to apply to all release sites.

All analyses were conducted in S-PLUS (Venables and Ripley 2003). Analyses were checked at several steps to eliminate programming errors. Checks included random or systematic comparisons of unfiltered and filtered output, graphical examination of cumulative particle passage with model outputs superimposed, and other such cross-checks. Model output is available from the authors upon request.

Case Studies

We conducted two case studies that may be helpful in thinking about managing the Delta to protect fish populations. Larvae and early juveniles of delta smelt occur in the Delta in spring when they are vulnerable to entrainment in the south Delta export facilities (Moyle et al. 1992, Bennett 2005). We used data from the California Department of Fish and Game 20-mm survey of late larval and juvenile fish (Dege and Brown 2004), selecting surveys from three years (2001–2003) of low outflow, and averaging catch per trawl of <10mm larvae for each station over all surveys. The assumption was that in these dry years the population would be slow to move out of the Delta, so the abundance of small fish could be used to approximate the spatial distribution of hatching. Each PTM release site was linked with the nearest sampling station, and the mean catch per trawl was used to provide a weighting factor for the release site. The proportion of particles that moved within 30 days from each site to the export facilities, and the mean loss weighted by delta smelt abundance, were determined for each set of flow conditions and examined graphically.

Juvenile Sacramento River Chinook salmon may be exposed to the export pumps if they stray from the Sacramento River during migration to the sea. Mark–recapture experiments have been conducted in winter in the northern Delta to examine the effect of pumping on endangered winter Chinook (Brandes and McLain 2001; Newman 2003). Fish marked with coded-wire tags are released at Ryde on the mainstem Sacramento River and in Georgiana Slough, from which they move with the net flow into the interior Delta (See Figure 1). Fish are recaptured either in a trawl survey at Chipps Island or in the ocean fishery. The ratio of apparent survival of the two groups of fish is used as a measure of the relative survival by the two pathways, and is then related to export flow. Results of these and similar experiments conducted in the spring have been inconclusive regarding the influence of export flow and DCC gate position on subsequent survival (Newman and Rice 2002; Newman 2003). We used the ratio of particles passing Chipps Island from releases in Georgiana Slough and at Ryde as a parallel measure of "survival," and related that to inflow and export flow.

RESULTS

Replicate particle releases with different random number seeds resulted in minor variability in the ultimate fate of particles (Table 5). Standard deviations of the percentage of particles arriving at export facilities or Chipps Island were generally ~ 0.5% or less. This introduces some error into our calculations, which has a minor effect on the parameters of our models.

Raw data, expressed as the cumulative percentage of particles passing a point, show tidal effects that vary with location, and to some degree, between spring and neap tide (Figure 3). For releases along the Sacramento River and western Delta with low inflow (340 $m^3 s^{-1}$) and export flow (57 $m^3 s^{-1}$), tidal effects were strong for particle flux past Chipps Island because large tidal excursions coincided with strong spatial gradients in concentration (Figure 3A).

Table 5. Ultimate fate of particles from replicate releases at the Hood site.

Final Location	Inflow	Export	Mean Particles	% of Standard Deviation
Chipps Island	340	57	83.4	0.44
Chipps Island	340	283	15.6	0.57
CVP	340	283	26.9	0.31
SWP	340	283	49.8	0.45
Chipps Island	1,077	170	94.1	0.15
Chipps Island	3,401	170	98.5	0.13

No comments

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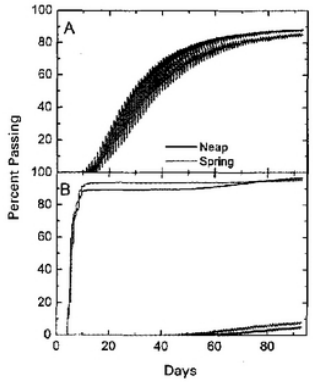

Figure 3. Cumulative passage at Chipps Island and export facilities during during low inflow and export flow and spring and neap tides for: A) Releases at Hood and recoveries at Chipps Island, and B) Releases at Vernalis and recoveries at export facilities (top) and Chipps Island (bottom).

Effects in the southern Delta were much less pronounced because of smaller tidal excursions and a longer transit time, which reduced spatial gradients (Figure 3B). Differences between spring and neap tides were most apparent in tidal variability and less so in timing of movement and ultimate fate. The principal effect of spring tides was to spread the particles out, increasing the variety of pathways that they took.

Particle fates on spring and neap tides did not differ markedly (Figure 4). The general trends were for lower losses to export pumping and longer times to leave the Delta on spring tides than on neap tides. The difference in losses was most pronounced in the eastern Delta (~ 10% in some cases), although releases from the southern Delta had high proportional increases in the fraction of particles that left the Delta via Chipps Island. For example, about 9% of the particles released at Vernalis on a spring tide eventually passed Chipps Island, whereas fewer than 1% of the particles did so on a neap tide. The tidal

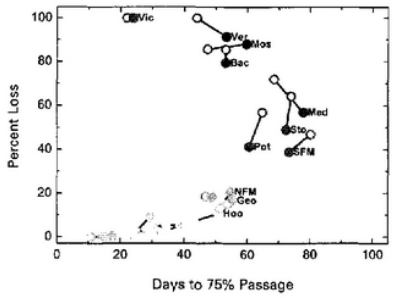

Figure 4. Effect of spring vs. neap tides on time for 75% of particles to leave the Delta vs. the proportion of particles lost to export facilities for low inflow (340 $m^3 s^{-1}$) and export flow (57 $m^3 s^{-1}$). Open symbols, neap tide; filled symbols, spring tide; lines connect spring and neap points. Symbol colors represent initial locations as in Figure 1. Labels on some points give release location (see Table 4); others are omitted for clarity.

influence on residence time was strongest along the Sacramento and San Joaquin Rivers, and occurred because more particles were mixed into alternative pathways from which they took longer to exit the system. All of these differences were much smaller at higher flow and export levels (not shown).

Subsequent results are for spring tides only, since tide had relatively small effects on the ultimate fate of particles, but could extend residence time in the Delta under some conditions. The influence of net flows in the Delta is illustrated by example model runs from releases at Hood under four contrasting flow conditions (Figure 5). With low inflow and export flow, only about 85% of the particles had left the Delta by the end of the 90-day run (Figure 5A). The passage of particles was delayed by movement of particles into the central Delta, which increased travel time. In contrast, low inflow and high export flow caused most particles to go to the export facilities (Figure 5B). With high inflow, the fate of the particles was determined rapidly, and a smaller fraction entered the central Delta (Figure 5C). Even with high export flow, relatively few particles ended up at the south Delta export facilities if inflow was high (Figure 5D).

No comments

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The fate of particles was reversed for releases in the San Joaquin River at Mossdale (Figure 6). There, most of the particles ended up at the export facilities, particularly the CVP, except that high inflows moved a substantial fraction to Chipps Island, and a larger fraction were entrained into the SWP (via the lower San Joaquin River) than was the case with low inflows.

Combining the results of all model runs under spring tides with no agricultural diversions, no agricultural barriers, and the DCC open at flows below 600 $m^3 s^{-1}$, we see the predicted effect of flows on the ultimate fraction of particles exported (Figure 7). For each release site, the fraction lost to export flow could be modeled as a logistic function of the export:inflow (EI) ratio. The parameters of the logistic function differed for each site, so that very high EI ratios were necessary to move large fractions of particles from the north Delta to the pumps, whereas only at the lowest EI ratios would substantial fractions of particles from the southern Delta escape entrainment. Variations in fit of the data to the model under high and low flows with similar EI ratios can be seen, for example, in the parallel rows of points for releases at Franks Tract East (Figure 7). These variations suggest that the EI model is not perfect, but no alternative model was found that provided a superior fit to the data.

The above model is over-simplified in that the ultimate fate of the particles can be interpreted only in the context of the time it takes to reach that fate. The day on which 75% of the particles had left the Delta (Figure 8) generally decreased with increasing inflow, reflecting the decrease in hydraulic replacement time with increasing flow (gray lines in Figure 8). In the northern Delta, the 75% time was close to the hydraulic replacement time, whereas in the central and southern Delta it was often much longer. Effects of export flow also varied substantially among release locations. For release sites in the northern Delta, increasing export flow increased net flow and decreased residence time at low inflow. In the central Delta, this effect was reversed at low inflow, because increasing export flow decreased net flow; at higher inflows the effect of export flow in the central Delta was additive as in the northern

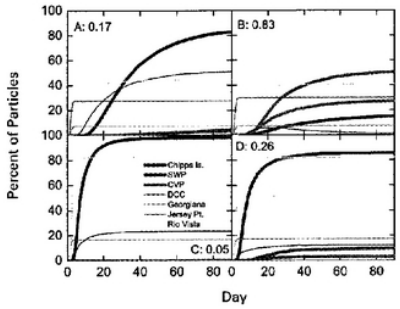

Figure 5. Time course of tidally-averaged particle passage for releases from Hood during spring tides for four flow conditions. Thin lines denote intermediate locations, and thick lines denote final locations by which particles leave the model domain (Figure 1). Numbers give export:inflow ratios. A and B have inflow at 340 $m^3 s^{-1}$, C and D have inflow at 1,078 $m^3 s^{-1}$. A and C have export flow at 57 $m^3 s^{-1}$, and B and D have export flow at 283 $m^3 s^{-1}$.

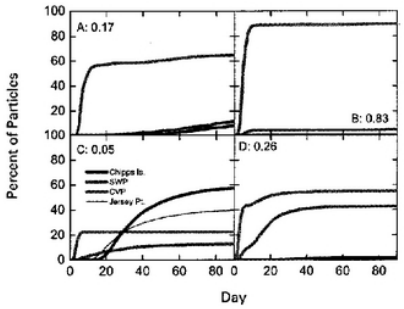

Figure 6. As in Figure 5, for releases at Mossdale, intermediate locations include only Jersey Point because few or no particles from Mossdale reached the other intermediate locations.

No comments

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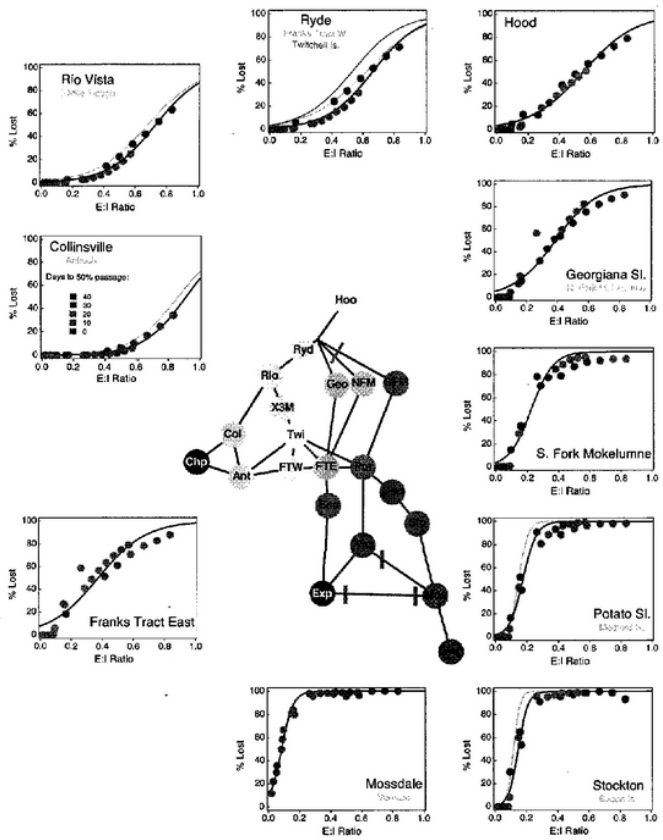

Figure 7. Percent of particles lost to export pumps for spring tide runs with no agricultural diversions and 24 combinations of inflow and export flow. Data are shown for selected release sites, color-coded by the time needed for 75% of particles to leave the Delta. Lines are logistic functions fit to the data, and are dark for selected sites and light gray for other sites with similar responses. Central diagram is a schematic arrangement of the sites in Figure 1, with principal links between sites. Short lines represent barriers including the DCC in the northern Delta, the Head of Old River barrier in the south Delta (dark yellow), and south Delta agricultural barriers (pink).

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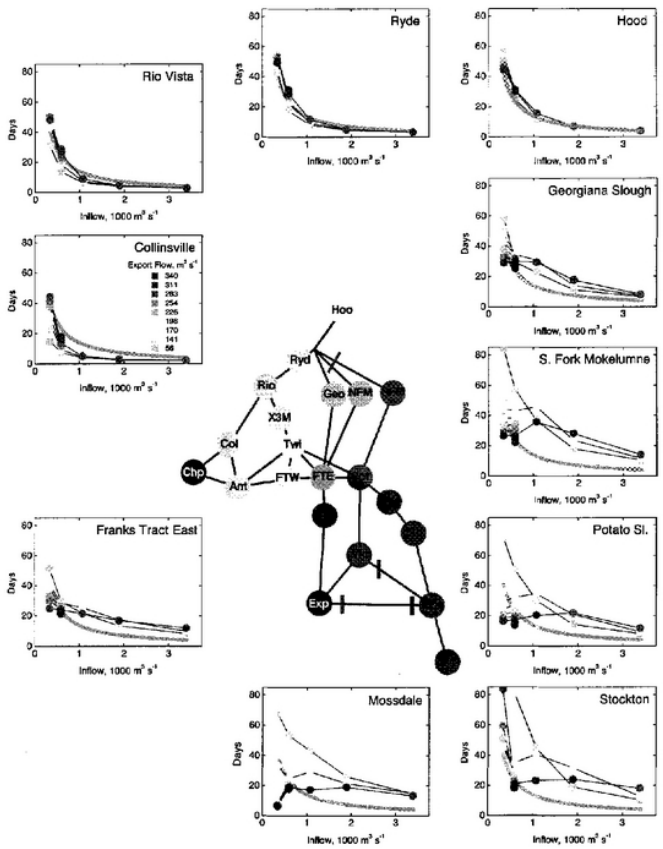

Figure 8. Relationship between the time for 75% of particles to exit the Delta and inflow and export flow. Diagramed as in Figure 7. Colors on graphs scale export flow from the lowest (green) to the highest (red). Heavy gray lines give the hydraulic residence time, calculated as the volume of the Delta (1.2×10^9 m^3) divided by total Delta inflow.

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Delta (e.g., the South Fork of the Mokelumne River, Figure 8). The response of residence time to inflow in the southern Delta was mixed: at low export flow, the response was similar to but much longer than hydraulic replacement time, whereas at high export flow, the effect of inflow was muted or even reversed (e.g., Mossdale, Figure 8).

Residence time for releases at Mossdale and Stockton differed in some revealing ways despite the proximity (29 river km) of these two stations. Particles released at Mossdale can enter upper Old and Middle Rivers and go west directly to the export facilities, whereas particles released at Stockton get to the export facilities only by way of the San Joaquin River and southerly net flow in lower Old and Middle Rivers. This means that low inflow and low to moderate export flow can result in long residence times; for example, at the lowest combination of inflow and export flow, the time for 75% of the particles to leave the Delta from Stockton exceeded 90 days (Figure 8).

The effect of agricultural diversions on the fate of particles is rather predictable: higher agricultural diversions increase the proportion of particles lost to total diversions. This has the effect of shifting the logistic curves in Figure 7 to a lower EI ratio (Figure 9) and somewhat decreases the residence time. Combining all results, the EI ratio resulting in a given percent loss decreases predictably across all release sites (Figure 10). The effect of agricultural diversions on the time for 75% of the particles to leave the Delta depends on release site: this time increases for sites in the northern Delta and decreases for sites in the central or southern Delta (Figure 11). This is because the ultimate fates differ: particles released in the northern Delta go mainly to Chipps Island, and are retarded from going there when agricultural diversions reduce outflow. Particles released in the central and southern Delta tend to have high residence times at low flows, but residence times are reduced by losses to agricultural diversions.

The effect of the Delta Cross Channel on the ultimate fate and timing of particles released in the northern Delta was unexpected (Figure 12). For releases at Georgiana Slough and Ryde, closing the DCC increased the percentage of particles entrained in the

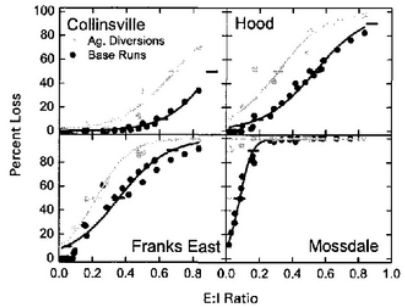

Figure 9. Examples of the effects of agricultural diversions. For these four release sites, the relationship of percent of particles lost to the pumps and agricultural diversions is plotted against export:inflow ratio for base runs (shown in Figure 7) and runs with agricultural diversions set to their summer maximum. Short horizontal lines give the quantiles at which export:inflow ratios were calculated for Figure 10.

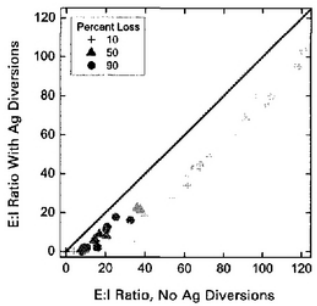

Figure 10. Summary of effects of agricultural diversions for all release sites, showing the required export:inflow ratios for 10, 50, and 90% combined losses to export pumping in the south Delta and agricultural diversions. Each point is derived from logistic curves as in Figure 9. Colors correspond to stations in the diagram in Figure 1.

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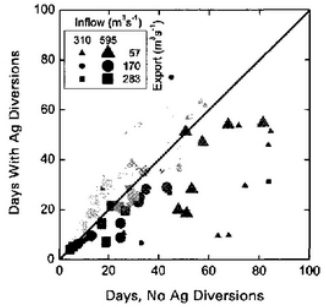

Figure 11. Effect of agricultural diversions on the time at which 75% of particles have left the Delta. Symbol colors represent initial locations as in Figure 1. Symbol sizes give inflow in two categories, and shapes give export flow in three categories.

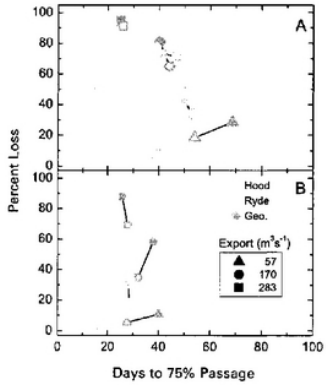

Figure 12. Effect of DCC on time for 75% of particles to leave the Delta vs. proportion of particles lost to the export facilities. A) Inflow of 340 $m^3 s^{-1}$; B) Inflow of 595 $m^3 s^{-1}$. Open symbols mean DCC open; filled symbols mean DCC closed. The effect of opening the DCC is shown by a line connecting a closed symbol to an open symbol for each set of conditions. Symbol colors represent initial locations as in Figure 1, and shapes give export flow in three categories.

pumping plants and decreased the percentage that passed Chipps Island. For Georgiana Slough, closing the DCC at low export flow rates also increased the residence time of particles. Effects on particle fate were more pronounced at higher flows, while effects on residence time were more pronounced at lower flows.

Closing the DCC alters the pathways of particles from the Sacramento River to the central Delta, but has relatively little effect on overall entrainment except for the release site in Georgiana Slough (Figure 13). Releases at Sacramento and at Hood (Figure 13A, B) had very similar responses. With the DCC closed, about the same proportion of particles was lost to pumping as when it was open; to make up for the loss of the DCC pathway, a greater proportion of particles arrived at the export facilities through Georgiana Slough, Three-Mile Slough at moderate to high export rates, and the lower San Joaquin River at high export rates.

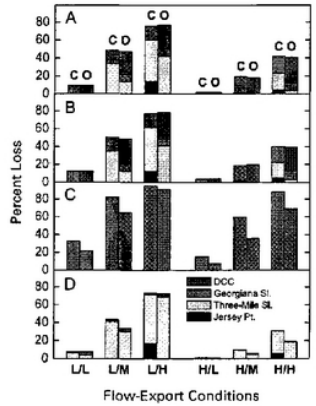

Figure 13. Delta Cross Channel effects. Contributions of various pathways to percentage of particles lost to combined CVP and SWP pumping. Each bar gives the contribution of each of four pathways. Release sites were: A) Sacramento; B) Hood; C) Georgiana Slough; D) Ryde (see Figure 1). Flow and export conditions are given in Table 2. C and O in panel A means position of the DCC gates (closed or open) and applies to all panels.

The temporary barriers in the southern Delta had modest effects on the ultimate fate and residence time of particles (Figures 14–15). Adding the three agricultural barriers (Figure 7) reduced losses from the southern and central Delta at low export rates, and either increased (southern Delta) or decreased (central to northern Delta) the residence time of particles (Figure 14). At higher export rates, the only effect of the barriers was to increase residence time of particles released in the southern Delta. The barrier at the head of Old River (Figure 1) reduced losses by ~20% and increased particle residence time at the lowest export rates; at higher export rates, nearly all of the particles were lost to export pumping, irrespective of barrier position.

The simulation of delta smelt losses showed substantial cumulative losses could occur under some flow conditions (Figure 16). Losses increased with increasing export flow and with decreasing inflow. The simulation of mark–recapture experiments of Chinook salmon in the northern Delta showed similar results (Figure 17). The ratio of particles passing Chipps Island from releases in Georgiana Slough to those from Ryde increased with inflow, and decreased strongly with increasing export flow, particularly when inflow was low to moderate. The effect of opening the DCC was to increase the predicted recovery ratio (Georgiana Slough:Ryde).

DISCUSSION

The fundamental assumptions of a particle tracking model (PTM) are that the hydrodynamic representation is reasonably accurate, and the behavior of the particles represents some behavior of interest. DSM2 represents flow and salinity quite accurately (Appendix), reflecting the great effort that has gone into refining the bathymetric data and into calibrating the model to Delta conditions. This has come about mainly because DSM2 is being used as a tool for managing water and for keeping salinity below limits, though it is unfortunate that none of the calibration information has been published and subjected to peer review given this reliance on the model. Thus, we have a reasonable degree of confidence that the basic hydrodynamic and water quality modules pro-

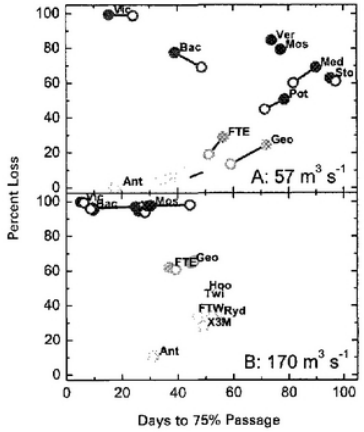

Figure 14. Effect of south Delta agricultural barriers on time for 75% of particles to leave the Delta vs. proportion of particles lost to export facilities. Open symbols, barriers absent; filled symbols, barriers in place. Symbol colors represent initial locations as in Figure 1.

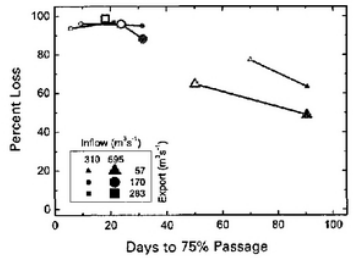

Figure 15. As in Figure 14 for the barrier at the Head of Old River, releases at Mossdale only; releases at Vernalis have nearly identical patterns.

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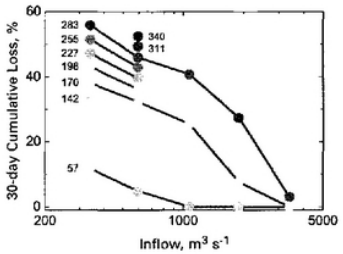

Figure 16. Effect of changing inflow and export flow on modeled fractional losses of delta smelt larvae over a 30-day period. Lines connect data with the same export flow indicated by color. Numbers give export flows.

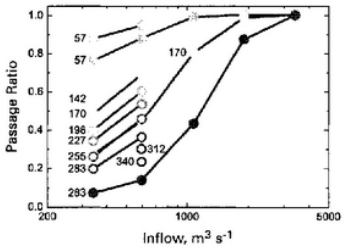

Figure 17. Effect of export flow, inflow, and DCC gate position on the ratio of proportion of particles passing Chipps Island from releases in Georgiana Slough to that for releases at Ryde. Symbols are the same as in Figure 16 except: open symbols mean DCC open; filled symbols mean DCC closed. Numbers give export flows.

vide usable output. However, the PTM has not been calibrated, and it differs enough from the water quality module to suggest caution in interpreting our results. In particular, tidal effects would be most strongly influenced by the method used to track particles through junctions, namely through complete mixing at each junction. This method is less likely to influence advective transport than dispersion, and the results of these model runs suggest advection-dominance most of the time (Figure 4).

The use of PTMs for investigating ecological issues has been increasing (e.g., Garvine et al. 1997; Brown et al. 2005; North et al. 2005). This reflects better hydrodynamic modeling, improved resolution of organism behavior, and greater interest in how organism movement interacts with flow fields. Another stimulus for interest in PTMs is that conceptually they are related to individual-based models (IBMs), and can be considered a simplified case of IBMs. Indeed, IBMs are often embedded as PTMs in models of ocean circulation or mixing (e.g., Batchelder et al. 2002; Hofmann et al. 2004).

Our use of a PTM focuses on life stages of fish with limited mobility, particularly delta smelt larvae, and our region of interest is the entire Delta. We chose not to give particles behavior in these model runs because we had little basis for determining what that behavior should be. Thus, the results presented here may be less applicable to larger, more competent organisms (but see Implications for Chinook Salmon, below).

One striking result of our modeling is that selecting a particular time period, such as the larval period of a fish, gives results that might be easy to interpret for that particular purpose but which will also be difficult to relate quantitatively with environmental conditions. For example, low export flows result in relatively low entrainment from all stations, but they also cause very slow transport through the southern Delta. Thus, a short time horizon might give an optimistically low proportion of particles entrained in the south Delta pumping plants, simply because the particles are still mostly at large in the Delta at the end of the model run. This is why we focused on the ultimate fate of the particles, and used residence time (as

scaled by the time for 75% of the particles to leave the Delta) as an additional measure.

A consequence of this is that simple questions (e.g., what proportion of particles are entrained under a given set of conditions) have no clear answer. Instead, the answer depends on the time horizon, which in turn depends on the overall flow conditions and the site of the release. We are, furthermore, not inclined to define a "zone of influence" of the pumps on the basis of our results, since the probability of entrainment depends on time horizon which, in many cases, is too long to be useful for analyzing the movements of larval fish. By the end of the modeled time period, the fish would already have metamorphosed, and their behavior would have become more complex.

The export:inflow (EI) ratio proved useful as a predictor of the ultimate fate of particles, subject to several caveats. We were surprised at how well the logistic models of EI ratio fit the data on proportional entrainment (Figure 7), because our working hypothesis was that the EI ratio was too simplistic, and too much based on net, non-tidal flow, to be useful. The EI ratio was useful as a predictor of probability of entrainment, provided the model was allowed to run long enough to resolve the particles' ultimate fate. Over shorter time periods, the EI ratio is less predictive because of the dependence of residence time on overall flow conditions (Figure 8). Furthermore, the relationship of percent loss to EI ratio was logistic, which makes sense given the mechanisms but also requires a nonlinear fit to the data.

The relationship of particle residence time to flow conditions was expected. Hydraulic replacement time (i.e., volume of the Delta divided by inflow) is roughly proportional to the inverse of inflow (Figure 8), and this is reflected in the time for 75% of particles to leave the Sacramento River (where export effects are small). At low inflows, dispersion and export flows have a greater relative impact, so the residence time is shorter than the hydraulic replacement time. In the southern Delta, by contrast, particle residence times were generally much longer, and strongly influenced by export flows. This illustrates a contrast between the river-dominated northern Delta and the southern Delta where advection is weak and driven largely by export pumping. However, in both regions, net particle movements were largely determined by advection, with tides serving mainly to spread out and delay the passage of particles by the observation points (Figures 3–4).

Agricultural diversions have the effect of lowering the EI ratio needed for a given percentage loss to diversions, i.e., shifting the curves in Figure 7 to the left as in Figure 9. This effect is strongest in the south Delta because entrainment probability is so high under most flow conditions. The effect of agricultural diversions on residence time depends on the initial release site, and varies with inflow and export flow, but would be difficult to predict in general.

Implications for Chinook Salmon

Salmon smolts are not particles; they have complex behaviors and are strong swimmers. We do not know what cues them to navigate downstream and out to the ocean. However, there are two reasons why PTM results may be informative with regard to salmon. First, whether the fish have strongly directed movement or not, they swim in the channels where they are subject to tidal and residual currents, and thus they will be distributed among alternative pathways during downstream migration, since it seems unlikely that they can distinguish among pathways. Although this distribution may differ from that of the water, it will still result in a dispersive movement pattern. Second, a recent unpublished report on radio tracking of larger yearling Chinook salmon concluded that the movement of the fish could not be distinguished from tidal excursions, and that any seaward-directed movement must be subtle (Vogel 2004). We do not claim that the specific results presented here represent actual movements of salmon; rather, these results indicate what factors may or may not be important in determining how salmon smolts may move through the Delta.

The DCC had smaller effects than anticipated, with virtually no effect on the ultimate fate of particles released upstream of it, and a small effect on residence time. Apparently, closing the DCC gates sim-

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ply raises head in the Sacramento River, causing more water and particles to enter the central Delta via other pathways (Figure 13). This contrasts with results of paired mark–recapture experiments with hatchery-reared salmon, which gave a significant effect of gate position in two of three alternative statistical analyses (Newman 2003).

Releases downstream, particularly those in Georgiana Slough, had a greater probability of entrainment in the export pumps when the DCC was closed than when it was open, because of the greater southward net flow in Georgiana Slough and presumably also Three-Mile Slough. Releases at Sacramento and Hood had almost identical fates, indicating that few particles were diverted into Steamboat and Sutter Sloughs to the north of the mainstem Sacramento River, where they would escape entrainment into the central Delta.

Model runs to examine the proportion of particles that arrive at Chipps Island of those released in Georgiana Slough vs. in the mainstem Sacramento River at Ryde showed that both inflow (related to Sacramento River flow) and export flow had important influences. At the highest inflows, the ratio of particle passage was close to 1 (Figure 17). At lower inflows, fewer of the particles released in Georgiana Slough arrived at Chipps Island compared to the Ryde releases, and this effect was stronger at higher export flows. Data from mark–recapture experiments (Brandes and McLain 2001; Newman 2003) gave rather different results for tagged hatchery-reared salmon: most of the survival ratios were low, even when river flow was high (median 0.26 for inflow > 1,000 $m^3 s^{-1}$; data from P.L. Brandes, U.S. Fish and Wildlife Service, pers. comm.), and survival ratios were only weakly related to export flow and apparently not to inflow or river flow. There are several potential reasons for this difference. It may merely reflect the difference in behavior between salmon smolts and neutrally-buoyant particles. The fish appear to survive poorly in Georgiana Slough, irrespective of flow, possibly because of differences in habitat conditions between the mainstem Sacramento River and the interior Delta (Nobriga et al. 2005). In addition, the recapture rate for the Chipps Island trawl is low and therefore highly variable, and recaptures of the fish released in Georgiana Slough may be biased low because the longer migration period results in lower daily recapture rate. Despite all these differences, the PTM results suggest that river flow may be an important variable in determining which way the salmon go and their probability of survival, and should be included in the design and analysis of future studies.

The movable barriers in the southern Delta had a relatively small effect on losses from releases at Mossdale and Vernalis, and a moderate effect on particle residence time. Losses were reduced with the barriers in place, but only at moderate inflow. The barrier at the head of Old River is there to protect salmon from entrainment, but it has little effect on particle fate under flow conditions that result in high entrainment without the barrier.

The Vernalis Adaptive Management Program (VAMP, SJRGA 2006) is intended to reduce entrainment of Chinook smolts migrating down the lower San Joaquin River, and to investigate the influence of alternative river flows and export flows on the survival of marked salmon. The EI ratio typical of the VAMP experimental period is around 10% (as defined here), so entrainment losses should be low (Figures 6C, 7). However, at low flow in the San Joaquin River and low export flow, the time for passage can be very long, with the likely result of higher mortality and lower detection, at least in the Chipps Island trawl survey. Results of the VAMP studies have often shown very low survival for fish released at Mossdale or just below the junctions with Old and Middle Rivers, and relationships of survival to flow conditions appear weak. We believe this is partly because of the small range of inflow and export flow being tested.

Implications for Delta Smelt

Previous analyses have suggested that delta smelt larvae may be highly vulnerable to export losses (Bennett 2005). Furthermore, the delta smelt population is further seaward and away from the export facilities when freshwater outflow (roughly equal to inflow minus export flow) is high and the salt field is seaward (Dege and Brown 2004). Our PTM results

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suggest a direct link between the position of the smelt population as determined by outflow, and losses as determined by export flow (Figure 16). Results of analyses of larval delta smelt losses are rather similar to those from our PTM studies (Kimmerer 2008). These findings may be enough to recommend strong protective measures for delta smelt in spring (March–May) of low outflow years when they are highly vulnerable to export losses.

We are less confident about estimating entrainment effects on other life stages, since delta smelt appear able to maintain their position in the estuary, generally in brackish water, beginning at the late larval stage. During their spawning migration they are again vulnerable to export effects, but because adult movements may be directed, the PTM is less suitable for analyzing the probability of entrainment of these fish without an improved understanding of adult migratory behavior.

CONCLUSIONS

This project demonstrates the capabilities and some of the uses of the PTM. The key lesson seems to be the importance of residence time in measuring and interpreting the fate of particles.

Limitations of the model should also be borne in mind. Since DSM2 is calibrated to the existing Delta, it is not a particularly suitable tool for examining alternative physical configurations such as levee failures. It does not represent stratification, does not conserve momentum at channel junctions, and may not represent open-water areas of the Delta very well. However, for examining Delta-wide movements of particles meant to represent fish, these drawbacks appear fairly minor compared with the problem of defining the behavior of the fish. To the extent that fish allow themselves to be dispersed by tidal and river currents, this model is likely suitable for describing Delta-wide movement. This conclusion is contingent upon comparisons of the model with QUAL or, better, 2-D or 3-D model runs, to provide a firmer basis for using DSM2.

Numerous opportunities remain for studies using this model. We examined a limited suite of environmental conditions, and, in particular, we did not vary the proportions of flow between the Sacramento and San Joaquin Rivers, or between the export facilities. Future studies could also make use of the PTM's capability for assigning behaviors to particles, although 3-D models now becoming available will be much more useful and reliable for that purpose.

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No comments

- n/a -

APPENDIX. EVALUATION OF THE CALIBRATION OF DSM2.

Although considerable effort has gone into calibrating, testing, and validating Delta Simulation Model 2 (DSM2), none of this work has been published. Here we compare DSM2 output with field data for stage, flow, and specific conductance. There are no data to calibrate DSM2–PTM directly. The PTM could be tested against the water quality module QUAL for cases of scalar release at several locations, but this has not been done. Thus, the results here should give an indication of how well the hydrodynamic module performs and how well mixing is represented, but there may still be issues with the translation to particle tracking that cause the PTM to be inaccurate.

Stage and flow: Model output and data on stage (elevation, m) and flow ($m^3 s^{-1}$) at 15-minute intervals were obtained from the Department of Water Resources (C. Enright, pers. comm.). Plots using some of these data are available at http://www.iep.ca.gov/dsm2pwt/calibrate/Run56vsRun1/index.html. We selected April 1997 and April 1998 for comparisons because the data were complete for several stations in both time periods.

For each station, year, and variable, we adjusted the model data forward or back in time to obtain the highest correlation to determine how much the model led or lagged the field data. This was always < 1 hour. Regression analysis of the field data against the model gave a slope and correlation coefficient. Correlations, mean differences (data – model), and mean ratios (data:model) were calculated on data averaged by day. A good fit of the model to data would result in a correlation coefficient close to 1, a slope of 1, mean difference of 0, and mean ratio of 1.

In most cases, there was excellent agreement between the model and data (Table A1, example in Figure A1). Correlations of raw data were always close to 1, and correlations of daily-averaged data were almost all > 0.9. Slopes of the regressions (data on model) tended to be somewhat below 1 for stage, while slopes for flow were all between 0.9 and 1.1. Mean differences in stage were substantial in a few cases, notably Jersey Point and Three Mile Slough. Mean differences in flow were usually small in relation to daily means; the largest mean difference (Jersey Point flow in 1998) was ~10% of the mean of the data. Amplitudes of the model output generally exceeded those of the data by up to 25% for stage, but were within 11% for flow.

Based on these results, the model appears to provide a simulation of stage and flow variability that reasonably represents the field observations. The most obvious deviation between model and data was for stage at two stations. This is probably due to errors in the datum for each of these tidal gages: if these were real errors, the representation of flow would be seriously in error. The other notable discrepancy is in tidal amplitude; the greater amplitude of stage in the model is not reflected in greater amplitude in flow, suggesting that frictional effects may be slightly exaggerated in the model. However, since our interest is in water movement, the accurate representation of flow patterns at all stations is encouraging.

Salinity: Model output has been framed in terms of specific conductance rather than salinity. Unlike salinity, specific conductance is not a conservative property and therefore not a clear indicator of mixing. Salinity is defined as a polynomial function of specific conductance that is slightly curved throughout its range. Furthermore, some salinity enters the Delta through agricultural runoff, so at low levels salinity is likewise ambiguous as a tracer of mixing. The result of these sources of uncertainty is that the use of specific conductance for calibrating the QUAL model is most reliable at higher values.

Output from the QUAL module was provided by the California Department of Water Resources (CDWR) as daily means for several nodes from1990–2006. We downloaded data from the IEP website (http://www.iep.ca.gov/dss/all/) from five stations in Suisun Bay and the western Delta that matched QUAL nodes. One of these stations, Three Mile Slough, had an incomplete data record and was not used. The remaining stations had more than one reported value for some days. For example, the Mallard Slough (river kilometer 75) station included five different records, which were either "real-time" or "historical," the former considered preliminary according to the website. Data were reported at different intervals (daily, hourly, or

No comments

- n/a -

Table A1. Summary of calibration data for DSM2 for April 1997 and April 1998. Lag is the number of minutes (15-minute increments) the model output had to be advanced to provide the best fit to the data. The slopes are for x = lagged model data and y = observed; 95% confidence limits determined after sampling the data-set to eliminate auto-correlation were 0.02 to 0.04. The daily correlation is based on applying a Godin low-pass filter to remove tidal signals and averaging the data by day, then determining the correlation. The mean difference is data - model, and the amplitude ratio is the mean of the ratio of daily amplitudes in the data to those in the model.

Location	Year	Lag (min)	Correlation	Slope	Daily Correlation	Mean Diff	Amplitude Ratio
Stage (m)							
Jersey Point	1997	0	0.99	0.94	0.95	0.27	0.94
Jersey Point	1998	0	0.99	0.91	0.99	0.25	0.89
Old River	1997	30	0.99	0.84	0.91	0.00	0.85
Old River	1998	15	0.99	0.80	0.98	0.02	0.80
Middle River	1997	30	0.99	0.83	0.90	0.06	0.85
Middle River	1998	15	0.99	0.81	0.99	0.03	0.80
Dutch Slough	1997	-15	0.99	0.97	0.93	0.13	0.97
Dutch Slough	1998	-15	0.99	0.93	0.98	0.05	0.94
Sac. R. above DCC	1997	15	0.98	0.82	0.91	0.01	0.83
Sac. R. above DCC	1998	15	1.00	1.05	1.00	-0.08	0.75
Three Mile Slough	1997	-15	0.99	0.95	0.94	0.18	0.95
Three Mile Slough	1998	-15	0.99	0.89	0.97	0.16	0.88
Flow ($m^3 s^{-1}$)							
Jersey Point	1997	15	1.00	0.91	0.95	3	0.91
Jersey Point	1998	15	1.00	0.90	0.92	105	0.93
Old River	1997	0	0.99	1.08	0.95	8	1.05
Old River	1998	15	1.00	1.05	0.97	-9	1.04
Middle River	1997	30	0.99	0.98	0.95	8	1.00
Middle River	1998	45	0.99	0.94	0.99	-4	0.98
Dutch Slough	1997	15	0.99	0.98	0.83	3	0.94
Dutch Slough	1998	30	0.99	0.94	0.94	11	0.91
Sac. R. above DCC	1997	45	0.99	1.06	0.99	-14	1.11
Sac. R. above DCC	1998	0	1.00	0.94	1.00	7	1.03
Three Mile Slough	1997	15	0.99	1.02	0.95	-6	1.06
Three Mile Slough	1998	30	0.99	0.94	0.97	-2	0.97

No comments

- n/a -

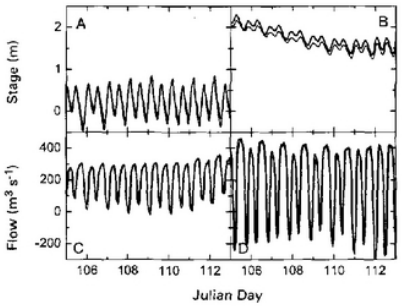

Figure A1. Examples of comparison of DSM2 model output (blue) with data (red) from USGS flow-measuring stations, including comparisons with largest time lags and poorest fits. A, B, stage; C, D, flow. A, C, starting date 15 April 1997; B, D, starting date 15 April 1998. A, D, Middle River near DSM2 Node 124; B, C, Sacramento River above the Delta Cross Channel (near Node 341).

every 15 minutes) and from different sources (CDWR, California Data Exchange Center, or U.S. Bureau of Reclamation). Some data were identified as having come from a bottom sensor. Nearly all of these data sources overlapped each other to some degree, and none had a complete record. We selected 2002–2006 for analysis because data were more complete than from other times.

To derive a consensus value for specific conductance at each station on each date, we simply took the medians of all the data for each date. This approach results in some error due to the limited availability of data from the bottom sensors. However, stratification in this part of the estuary is weak most of the time, and inspection of the data showed that field data from different sources were more similar to each other than to the model output. Once medians were calculated, there remained some missing values for all of the stations. These were filled in for each station by first determining which other station was most closely correlated with it, then constructing a generalized additive model with loess smoother (since we had no expectation about the form of the relationship) and filling in gaps by prediction. From the four stations with 1,827 records each, a total of 220 data points were filled by prediction, and six remaining gaps were filled by interpolation. This gave a complete 5-year record of specific conductance to compare with the model output. This comparison was made by linear regression and also by examining medians and 10th and 90th percentiles of the difference between data and model, and the percent difference.

The comparison of the model with data was generally good (Figure A2). The model tracked the summer high-salinity periods well. Scatter-plots (Figure A3) show how scatter increased with distance from the ocean, and with salinity. These increasing errors reflect, in part, the relatively low values of specific conductance; the possible influence of agricultural runoff at the more landward stations; and, in some cases, obvious spikes in the data that suggest the data are unreliable at those points. In some cases,

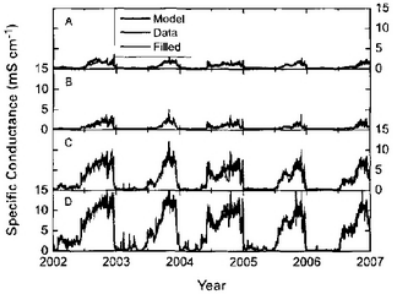

Figure A2. Time series of model output with measured data for specific conductance at 4 stations in 2004-2006. Model results are complete for the entire time period; measured results are complete except where filled by green lines. Note the difference in scales among stations; maxima in the four panels in terms of salinity (practical salinity scale) are 12, 9, 2.1, and 1.6. Stations are on the Sacramento River at: A, Chipps Island (river kilometer 75); B, Collinsville (river kilometer 81); C, Emmaton (river kilometer 92, halfway between Collinsville and Rio Vista); and D, on the San Joaquin River at Jersey Point (river kilometer 18, ~99 km from the mouth of the estuary).

No comments

- n/a -

Table A2. Summary of calibration data for DSM2 QUAL, daily data for 2002–2006. Locations are shown on Figure 1 except for Emmaton, which is at river kilometer 92, between Collinsville and Rio Vista. Median difference and percent difference are data - model.

Location	Correlation	Intercept	Slope ± CL	Median with 10th and 90th percentiles	
				Difference	Percent difference
Chipps Island	0.98	20	1.02 ± 0.07	25 (-777 – 1373)	4 (-26 – 49)
Collinsville	0.96	9	0.97 ± 0.10	6 (-808 – 742)	1 (-39 – 39)
Emmaton	0.89	30	0.85 ± 0.18	7 (-403 – 98)	4 (-40 – 29)
Jersey Point	0.91	48	0.83 ± 0.13	7 (-376 – 109)	3 (-32 – 27)

noticeable deviation of the model from the data occurred over a span of time (e.g., at Jersey Point early in summers, Figure A2A). These deviations were more noticeable in drier years (not shown), and could reflect uncertainty in the estimates of Delta outflow and particularly San Joaquin River flow during these periods. These flows are estimated from a water balance that relies on very uncertain estimates of net water consumption in the Delta (http://www.iep.ca.gov/dayflow/documentation/).

Consistent with the above observations, the statistical properties of the comparisons declined going from Chipps Island landward to Jersey Point (Table A2; correlation coefficients declined and slopes became flatter). However, the percentage differences between modeled and measured data did not vary much among sites.

These results also support the use of the DSM2 family of models for our particle-tracking work. The good correspondence between model and data in specific conductance means that the model is getting the salt balance about right, implying that longitudinal mixing is reasonably well-depicted. Furthermore, the close correspondence of model output and flow data, particularly the small mean differences in net flow in Table A1, imply that the model depicts net transport with reasonable accuracy.

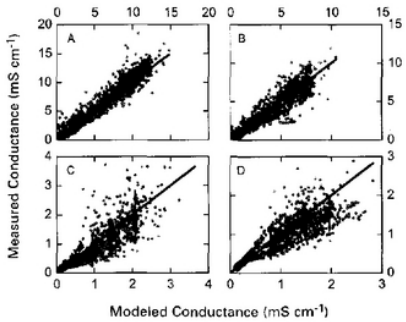

Figure A3. Data in Figure A2 as scatter-plots. Small circles, daily comparisons. Error bars, means with 10th and 90th percentiles of the data binned into 10 equal-size classes of model output and plotted against the model means by class. Straight line, 1:1 line.

No comments

- n/a -

No comments

- n/a -

APPENDIX DOC. 12

A Retrospective Estimate of the Economic Impacts of Reduced Water Supplies to the San Joaquin Valley in 2009

By Jeffrey Michael, Richard Howitt, Josué Medellín-Azuara, and Duncan MacEwan[1]

September 28, 2010

The effect of reduced water supplies as a result of drought and environmental pumping restrictions in 2009 on the San Joaquin Valley economy was, and continues to be, the subject of significant discussion. Economic effects were quantified in terms of agricultural production, revenues, and jobs and income. In the midst of a severe recession, it is no surprise that job loss estimates generated the most interest and debate. In the months following the 2009 growing season, data have been released that offer a clearer picture of the effects of reduced water supplies. As such, the purpose of this report is to take a retrospective look back at 2009 and summarize changes in agricultural production and employment in the San Joaquin Valley due to reduced water supplies. Model results and survey data now closely coincide and provide conclusive evidence on the final effects of reduced water supplies in 2009.

During 2009, the authors of this report independently issued conflicting estimates of the job losses due to reduced water supplies to San Joaquin Valley agriculture. The varying estimates generated significant controversy. As more reliable data has become available, the differing estimates are converging to a relatively narrow range. By issuing a joint retrospective report, our intention is to provide an accurate range of estimates for policy and planning purposes and place the focus on the similarities rather than the differences.

Before getting to the estimates, it important to emphasize two additional points on which we agree. First, a significant increase in the amount of water transfers was critically important to reducing the negative impacts of water scarcity. A higher than anticipated level of water transfers is a key reason these revised estimates of losses are smaller than we estimated last year. Building on these successful transfers will be important in minimizing the losses from future

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No comments

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water shortages. Second, the impacts of reduced water availability were highly concentrated geographically on the west sides of Fresno, Kings, and Kern counties. Although our impact estimates are now lower, they still represent very large losses for these communities in the southwest part of the San Joaquin Valley.

In this report we use two approaches to estimating the economic impact of drought and environmental pumping restrictions on San Joaquin Valley agriculture. We first present the approach conducted by the University of the Pacific which uses the 2009 County Crop Reports[2] (Crop Reports) issued by Agriculture Commissioners of the eight San Joaquin Valley Counties to calculate the change in harvested acres and crop revenue. The 2009 data in the Crop Reports is still preliminary and subject to future revision, but represent the most current official estimates of 2009 crop production. The second approach, conducted by the University of California at Davis, uses the Statewide Agricultural Production Model (SWAP)[3] calibrated exactly in inputs and outputs to a normal water and price year (2005). Using realized water deliveries and transfers in 2009, SWAP estimates changes in agricultural production and revenue resulting from drought and environmental pumping restrictions. The revenue losses are then put into an input-output model to estimate additional employment and income losses in related industries with slight differences in the input-output models used in each approach. In a final step, the impacts are separated into the effects of drought and environmental restrictions, and here the two approaches also differ. Finally, we compare the estimated losses in jobs to those recorded by EDD surveys and the QCEW as context and corroboration for both estimates.

Change in Harvested Acres

Changes in harvested acres reflect the localized effects of drought on San Joaquin Valley agriculture. Counties including Kern, Kings, and Fresno show significant losses while other Counties including Madera, Merced, San Joaquin, Stanislaus, and Tulare show steady or increases in harvested acres between 2008 and 2009 based on Crop Reports. There was also significant variation within Counties, for example, within Fresno County, east-side regions saw little change in harvested acres compared to west-side regions. This is a reflection of both the localized effects of drought and pumping restrictions on regions dependent on State and Federal Project deliveries and/or groundwater pumping.

According to the Water Transfer Database[4] compiled by the University of California at Santa Barbara from water transfers reported in the Water Strategist, there was over 500,000 acre feet of water transferred for agricultural use in 2009. The United States Bureau of Reclamation (USBR) has suggested that this figure may actually be as high as 800,000 acre feet. In addition to water transfers, realized local surface water supplies to east-side Valley regions were higher than

[2] Available at County Agricultural Commissioner websites. These reports are based on initial surveys that are then compiled and analyzed by NASS, at which point they will become final estimates. The NASS report is not yet available, but can be found in the future at http://www.nass.usda.gov
[3] http://swap.ucdavis.edu
[4] http://www.bren.ucsb.edu/news/water_transfers.htm

No comments

- n/a -

initially anticipated. Higher local surface water supplies and increased levels of groundwater pumping allowed production to shift to relatively water rich regions on the east-side of the Valley. Combined with a shift in cropping pattern to lower water use crops, actual crop losses and land fallowing were lower than originally projected.

Table 1. Known Water Transfers for San Joaquin Valley Agriculture in 2009

Transfer (af/yr)	Avg Price/af	Seller	Buyer
7,292	129.75	San Luis & Delta Mendota WA	Westlands Water District
33,420	223.83	San Joaquin River Exchange Contractors WA	Westlands Water District
24,932	161.90	Yuba County Water Authority	Westlands Water District
60,000	33.89	Yuba County Water Agency	California DWR
15,000	39.71	Yuba County Water Agency	SWP Contractors and San Luis & Delta-Mendota WA
16,100	52.95	Yuba County Water Agency	SWP Contractors and San Luis & Delta-Mendota WA
88,900	132.38	Yuba County Water Agency	SWP Contractors and San Luis & Delta-Mendota WA
74,102	145.62	17 entities through Drought Water Bank	9 entities through Drought Water Bank
750	8.07	Ventura County	14 SWP Contractors
1,250	4.03	Ventura County	14 SWP Contractors
216,474	n/a	San Joaquin River Exchange Contractors WA	USBR, San Luis & Delta Mendota WA, and Madera ID
538,220	93.21		

The first approach to calculating change in acreage tabulates change in crop acres between 2008 and 2009 using 2009 preliminary Crop Reports, as shown in Table 2. The entire decline in harvested acres occurred in the three counties most impacted by reduced water deliveries from the Delta and drought: Fresno, Kern and Kings. 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. Vegetable production was able to shift north and east from water limited areas on the southwest side of the Valley. In particular, processing tomato production reached record levels in 2009 as processors were very successful in shifting production to new areas. Preliminary crop reports show significant growth in processing tomato, melon and other miscellaneous vegetable acreage in Stanislaus, Merced, and Tulare counties in 2009. Some of the new vegetable acreage was shifted from field crops, but others included new acreage brought into production in response to the drought. In particular, Stanislaus County reported record levels of harvested acres, and conversations with County agriculture officials confirmed that thousands of new acres were planted in 2009 in response to the land fallowing in other areas of the Valley using supplemental water supplies and groundwater.

No comments

- n/a -

Table 2. Change in Harvested Acres Between 2009 and 2008 from County Crop Reports.

	San Joaquin Valley Total	Fresno, Kings, and Kern Counties	Other San Joaquin Valley Counties
Field Crops	-246,143	-202,824	-43319
Seed	-4,420	-8469	4049
Vegetables	20,482	-21769	42251
Fruit and Nuts	12,462	2150	10312
Total Acres	**-217,619**	**-230,912**	**13,293**

(Note: Harvested acres differs slightly from crop report summaries, because we exclude rangeland and unirrigated pasture land from harvested field crop acres. Source: County Crop Reports available on the website of each Counties' commissioner of agriculture. Other San Joaquin Valley Counties include Tulare, Madera, Merced, Stanislaus, and San Joaquin.)

The one year change in acreage in Table 2 is insightful, but does not tell the full story. First, the Valley experienced three years of drought from 2007 to 2009, and the impact of reduced water supplies was already being felt to some extent in 2008. Comparing 2009 to 2006, the last year of full contract water deliveries, shows a total decline of 256,000 harvested acres in Fresno, Kings and Kern counties, an additional decline of 25,000 acres. Second, although there was no total harvested acreage change in fruit and nut crops, it would be incorrect to assume that there was no loss to these high-value permanent crops. Over the past decade, there has been a rapid increase in permanent crop plantings in Fresno, Kings and Kern counties, particularly almond orchards, and it is likely that fruit and nut acreage would have increased substantially more with full water supplies. Data on almond plantings and recent trends in fruit and nut acreage growth suggest that fruit and nut harvest in the San Joaquin Valley would have increased by an additional 25,000 acres in 2009, mostly almonds. Thus, the first approach estimates roughly 243,000 acres were fallowed due to reduced water supplies to the San Joaquin Valley in 2009. This includes approximately 256,000 fallowed acres in Fresno, Kings, and Kern Counties, and a gain of 13,000 acres in other Counties in response to the shortages elsewhere.

The second approach to estimating change in crop acres uses the SWAP model calibrated to a normal water year with average prices, namely 2005. In light of significant structural changes in agriculture in the San Joaquin Valley between 2006 and 2008, it is also important to consider changes between 2009 and the last normal water and price year. This better reflects the full combined effect of drought and pumping restrictions. We explicitly model the known water transfers (Table 1) and increased east-side water supplies in SWAP. We note that, aside from the updated water data, the model is unchanged from previous reports using this approach. Water transfers account for about 538,000 acre feet of water shifted involving regions in the San Joaquin Valley. Increased east-side water supplies account for an additional 225,000 acre feet.

No comments

- n/a -

Table 3 summarizes change in total acres for the total water supply reduction, drought plus environmental pumping restrictions.

Table 3. Estimated Change in Harvested Acres Due to Drought and Pumping Restrictions in 2009 from the UC-Davis SWAP Model.

Crop Group	West-side Regions	East-side Regions	Kern	San Joaquin Valley Total
Vegetables	-1,598	-33	-1,018	-2,649
Grain/Cotton	-132,470	-5,298	-62,710	-200,477
Fruit & Nuts	-1,566	-792	-3,415	-5,773
Alfalfa	-11,411	-2,011	-11,497	-24,919
Field	-8,349	-8,865	-10,707	-27,920
Grapes	-380	-171	-2,810	-3,361
Proc. Tom	-2,873	-5	-606	-3,483
Total	**-158,646**	**-17,175**	**-92,762**	**-268,583**

Preliminary estimates based on remotely sensed satellite images of crop cover estimate that between 260,000 and 290,000 acres were fallowed[5] due to combined water shortages in 2009. The SWAP model calibrated against realized water conditions, as described above, in 2009 yields an estimated 269,000 acres out of production due to drought and environmental pumping restrictions. The results of the model, 269,000, are very close to those estimated using remote sensing data, 260,000. The largest declines are in various field crops, with moderate declines in fruit and nut acreage. However, to the extent that orchards were deficit irrigated during the current drought, there are long term carry over effects on yield which may speed up replanting times leading to additional costs in the future.

The most striking result from analyzing Crop Reports and SWAP model results is the disparity between regions within the San Joaquin Valley. West-side Valley regions show significant losses in harvested acres due to drought and environmental pumping restrictions. In fact, when broken down into more detailed SWAP model regions the difference is even more striking. We return to this effect in the context of revenue losses, in the following section. In contrast, east-side regions show increases, or slight decreases, in acres across the same time frame. This is largely explained by differences in water source between regions, as summarized in Table 4. The west-side of the San Joaquin Valley relies on State Water Project (SWP) and Central Valley Project (CVP) deliveries for over 80% of water in an average water year compared to only 14% for east-side regions. Consequently, in severe drought years and/or with increased environmental pumping restrictions west-side regions and Kern County can be expected to experience relatively higher losses. In the short run, increased groundwater pumping may be a feasible, albeit more costly, solution to replace reduced water supplies. However, during drought and pumping restrictions over several years, as was the case from 2007-2009, this may draw down the water table which increases pumping costs and leads to long term water quality considerations.

[5] Personal communication with David's Engineering, Davis, CA. September 27, 2010.

No comments

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Table 4. Water Supply Proportion in an Average Water Year for San Joaquin Regions

Region	CVP and SWP	Local Surface Water	Groundwater
East-side	14.80%	52.60%	32.60%
West-side	85.05%	4.96%	9.99%
Kern	57.27%	12.92%	29.81%

Change in Agricultural Revenues

Changes in agricultural revenues due to drought and environmental pumping restrictions follow directly from changes in harvested acres. As such, they also reflect the localized effects of drought on San Joaquin Valley agriculture. We summarize changes in agricultural revenues using the two approaches in this section.

The first approach, using Crop Reports, is detailed in Table 5. Crop losses are valued using typical 2008 prices to allow for comparisons and to be consistent with the base year of the economic impact model in the next section. Cotton and grain production experienced the largest acreage declines, followed by other field crops, most of which is silage. Most of the lost nut and fruit acreage was allocated to almonds which yielded an average of $3,500 per acre in 2008. Because vegetable acreage substantially increased in San Joaquin Valley as a whole in 2009, no vegetable production is included. For the entire San Joaquin Valley, the $342.6 million decline is 2.3% of total crop production exceeding $15.1 billion in 2008.

Table 5. Estimated Acreage and Revenue Losses due to Reduced San Joaquin Valley Water Supplies from County Crop Reports.

Crop	Decrease in Harvested Acres	Per acre value	Revenue Loss
Cotton	-70,000	$1,400	-$98,000,000
Alfalfa Hay	-25,000	$1,500	-$37,500,000
Other field crops	-53,000	$1,200	-$63,600,000
Grain	-70,000	$800	-$56,000,000
Nuts and Fruit	-25,000	$3,500	-$87,500,000
Total	**-243,000**		**-$342,600,000**

(Per acre values are set at typical 2008 prices for consistency with the input-output model, and to separate water effects from the large 2009 decline in field crop prices partially due to the dairy crisis.)

The second approach uses the SWAP model, with realized water deliveries in 2009, to estimate total change in agricultural revenue by region and crop. The water scenario is the same as that used in May 2009, and a subsequent update in September 2009. The scenario reflects the final, actual, water deliveries to the San Joaquin Valley 2009. Specifically, 10% CVP agricultural water service contract, 100% for all Settlement and Exchange regions, 100% Friant Class 1, 0%

No comments

- n/a -

Friant Class 2 and 40% SWP. The only change to the model is to allow for water transfers and increased east-side local surface water supplies, as discussed previously.

Change in agricultural revenue due to drought and pumping restrictions is summarized in Table 6. All dollars are reported in $2008. We estimate that $368 million was lost due to drought and pumping restrictions across the entire San Joaquin Valley. This represents a 2.5% decline in revenue[6] across the entire San Joaquin Valley. Of the $368 million in losses, $328 million (89%) is in Kern and the west-side regions.

As discussed in the acres section, there is significant variation in changes in revenue across regions in the San Joaquin Valley. West-side regions that are more reliant on State and Federal Project deliveries realize higher fallowing, and thus higher revenue losses than east-side regions. Additionally, regions adjust water use by shifting cropping patterns to lower water use crops. Finally, stress irrigation and increased groundwater pumping in west-side regions can have long term effects on yields, water quality, and revenues in the future. To the extent that these are not included, these cost estimates represent a lower bound.

Table 6. Estimated Change in Revenues Due to Drought and Pumping Restrictions in 2009 from UC-Davis SWAP model. (dollar values in thousands).

Crop Group	West-side Regions	East-side Regions	Kern	San Joaquin Valley Total
Vegetables	-$9,487	-$446	-$6,654	-$16,587
Grain/Cotton	-$149,085	-$12,813	-$52,098	-$213,996
Fruit & Nuts	-$14,455	-$9,973	-$30,447	-$54,874
Alfalfa	-$13,159	-$6,674	-$16,231	-$36,065
Field	-$5,370	-$8,651	-$4,499	-$18,519
Grapes	-$1,799	-$347	-$13,396	-$15,542
Proc. Tom	-$10,850	-$36	-$1,616	-$12,502
Total	**-$204,204**	**-$38,939**	**-$124,940**	**-$368,084**

To illustrate the importance of regional differences for the effects of drought and pumping restrictions, Figure 1 shows a map of revenue changes in the San Joaquin Valley. The largest revenue losses are concentrated in Kern County and west-side Valley Regions. However, it is important to note that there is significant variation within Counties which is not captured when analyzing County level survey estimates and Crop Reports. For example, within Fresno County west-side regions, specifically Westlands Water District, realize losses in revenue over 10% whereas the east-side of the County sees unchanged to slightly positive revenue growth. The west-side of Fresno County relies heavily on SWP and CVP deliveries, which are cut significantly under drought and pumping restrictions. The same is true within Kern County

[6] Note, total SWAP output value for the San Joaquin valley is 13.6 billion dollars. SWAP model regions are agronomic regions that may omit agriculture in fringe areas of some Counties, which accounts for approximately $800 million in omitted agriculture.

No comments

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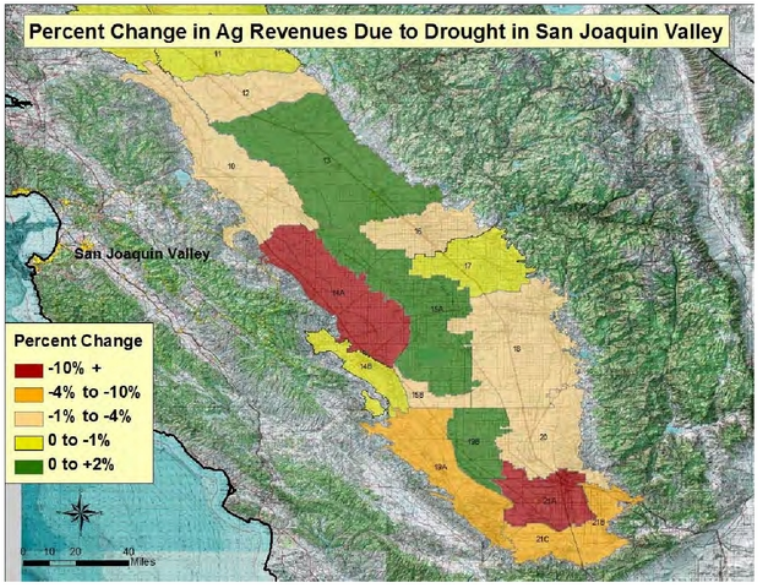
where regions with relatively higher groundwater availability realize small increases in revenues compared to regions dependent on Project deliveries which see declines in revenue up to 14%.

Figure 1. Map of Percent Change in Agricultural Revenues Due to Drought



Change in Agricultural Employment

Before estimating the effect of drought and environmental pumping restrictions on agricultural employment, we summarize the actual total change in agricultural employment in the San Joaquin Valley during the drought. There are many factors, including water availability, that cause agricultural employment to change from year to year. The total changes in employment put the subsequent estimates into context and demonstrate that they area of a reasonable scale.

Two sets of highly reliable data are now available to examine the total change in agricultural employment in the San Joaquin Valley between 2008 and 2009. The California EDD has finalized its 2009 agricultural employment survey results and the QCEW is a census of jobs from

No comments

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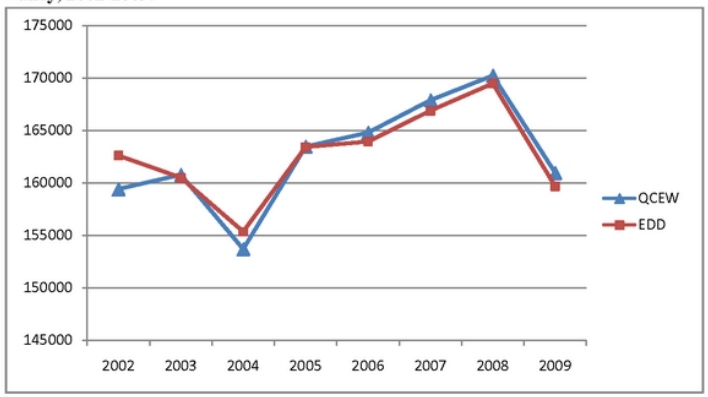
unemployment tax filings of agricultural employers. Both sources are more accurate than the employment estimates released each month by California EDD that initially showed an increase in farm jobs in 2009. In order to focus more closely on crop production, we exclude direct employment from Animal Production enterprises (NAICS 112) and show the sum of Crop Production employment (NAICS 111) and Support Activities for Agriculture (NAICS 115) which is primarily farm labor contractors. Animal Production enterprises also hire contract labor, but Crop Production accounts for the vast majority of contract labor. Thus, this focus reduces, but does not completely eliminate, the influence of animal operations such as dairy farms on employment levels.

Figure 2 graphs the two data series between 2002 and 2009, the years for which both have consistent data. Both data sources track closely over time. Between 2008 and 2009, employment decreased by nearly 9,800 jobs (5.8%) in the EDD data and decreased by 9,300 (5.5%) in the QCEW data. When 2009 is compared to the last normal water and price year, 2005, jobs decline by 3,750 (2.3%) in the EDD data and 2,500 (1.5%) in the QCEW data. This data suggests that reasonable estimates of water-related employment loss should be between 2,500 and 9,800 lost jobs. The next section shows that the estimates from both approaches fall within this range.

Figure 2. Crop Production and Agricultural Support Employment in the San Joaquin Valley, 2002-2009.



Estimating Change in Employment Due to Drought and Pumping Restrictions

The impact of the lost agricultural revenue on jobs and income in the San Joaquin Valley can be calculated with an input-output model. The IMPLAN model is used to translate a change to final sales or output from farms into total jobs, income and output within the region. The impact on

No comments

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jobs, income, and output are categorized as direct, indirect, and induced effects. Direct effects are the changes in employment to direct farm employees, and direct changes to income from farm employee compensation, farm proprietor income, and other farm income. Indirect effects represent the iterative impacts from farms' purchase of intermediate inputs such as fuel, chemicals, transportation services, accounting and professional services, and labor supplied by agricultural labor contractors. Induced effects reflect local household consumption expenditures of direct and indirect sector employees. Examples of induced effects include employee's local expenditures on retail goods, housing, restaurants, recreation, medical services, and other goods and services. Output measures total final sales of businesses within the region and therefore double-counts some expenditures, whereas income measures value-added at each level of economic activity. Although it is a useful measure of economic activity, output is not directly comparable to commonly cited value-added based measures of the economy such as Gross State Product. Income is a preferable measure of the change in regional economic welfare within a region, and facilitates comparisons to other economic data.

The University of the Pacific analysis utilizes IMPLAN 3 and 2008 base data to create an input-output model for the eight counties in the San Joaquin Valley. IMPLAN 3 is the most recent update to the software, and the 2008 base economic data is used to be consistent with the 2008 agricultural prices used throughout the report. Although data in the IMPLAN model is calibrated to local conditions in the base year, the industry production functions are based on historical national averages and require some adjustments to capture San Joaquin Valley agriculture's unusually heavy reliance on contract labor. For example, in 2008, direct employment on San Joaquin Valley crop farms averaged 65,000, whereas the agricultural support services sector averaged 105,000 jobs primarily with farm labor contractors. In contrast, crop farms in California outside the San Joaquin Valley directly employed 110,000 workers, and there were only 74,000 agricultural support services jobs in these areas. If we used the IMPLAN default production functions, only about half of the 105,000 agricultural service workers in the Valley would be hired by San Joaquin Valley farms, so we increased contract labor purchases across crop sectors until the regional farm sector used all the agricultural service workers in the region. We also made some minor adjustments to direct employment by detailed farm sector to match the published estimates for 2008 from the California EDD and Department of Food and Agriculture. These adjustments cause our estimates of lost employment and income to be considerably larger than if we had utilized the IMPLAN models default levels, but the results more accurately describe local conditions and more closely match the data on actual employment losses. UC Davis employs IMPLAN Version 2.0 and the California County database for the base year 2006. The ten IMPLAN default crop categories were grouped into six crop groups to better reflect SWAP output, namely: grain, vegetable and melon, tree nut, fruit, cotton and all other crops. As discussed in the preceding paragraph, the default IMPLAN production functions do not reflect current conditions in California. Consistent with previous analysis by UC Davis, we adopt a different approach than that of University of the Pacific to adjust the IMPLAN model. We modified the default IMPLAN production functions coefficients to match the reported

No comments

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proportion of contracted labor (as agricultural services NAICS 115) in the EDD 2006 breakdown of agricultural employment. Overall, the coefficient change was slightly less than double the default value. We allow the production function to then re-balanced using the IMPLAN default algorithm. No additional adjustments were used.

Results

Using the Crop Report data, the University of the Pacific approach estimates a total of $342.6 million in revenue losses across the San Joaquin Valley due to drought and pumping restrictions. Table 7 shows the impact of the $342.6 million decline in San Joaquin Valley agricultural output (from Table 5). Total job loss, including, all multiplier effects totals 5,567. The indirect effects include approximately 2,850 agricultural services jobs, so the total job loss of 5,567 breaks down to 4,515 agricultural jobs and 1,052 non-agricultural jobs. Total lost income is $287 million which includes an estimated $136.3 million in employee compensation and $150.7 million in non-employee farm income. The $342.6 million decline in farm output resulted in an additional $243.2 million decline in regional economic output for a total output decline of $585.8 million.

Table 7. San Joaquin Valley Impact of Reduced Water Supplies based on a $342.6 million decline in output estimated from Crop Reports.

Impact Type	Employment	Income	Output
Direct Effect	-1,663	-$145,787,345	-$342,600,000
Indirect Effect	-3,096	-$89,179,500	-$142,944,720
Induced Effect	-808	-$52,010,240	-$100,230,032
Total Effect	**-5,567**	**-$286,977,005**	**-$585,774,720**

Using results based on the SWAP model, the University of California at Davis approach estimates a total of $368.1 million in lost agricultural revenues due to drought and pumping restrictions (see Table 6). Table 8 shows the impact of the $368.1 million decline in agricultural output in the San Joaquin Valley. Total job loss, including, all multiplier effects totals 7,434. Total income loss is estimated at $278 million with a $796 million decrease in output.

Table 8. San Joaquin Valley Impact of Reduced Water Supplies based on SWAP Model Results of $368.1 (2008) million decline in agricultural revenues.

Impact Type	Employment	Income*	Output
Direct Effect	-2,117	-$90,700,000	-$359,300,000
Indirect Effect	-2,823	-$75,000,000	-$152,300,000
Induced Effect	-2,494	-$113,000,000	-$284,400,000
Total Effect	**-7,434**	**-$278,700,000**	**-$796,000,000**

*As total labor income.

No comments

- n/a -

Breaking Down the Effect of Drought and Environmental Pumping Restrictions

Thus far we have used two approaches to estimate the change in acreage, revenues, and jobs and income due to the combined effects of drought and environmental pumping restrictions in the San Joaquin Valley. Equally as important is the proportional effect of drought and pumping restrictions, considered separately. In this section we provide an estimate of the percent of economic losses attributable to pumping restrictions which differ from share of water supply lost to pumping restrictions.

The first approach, conducted by the University of the Pacific, is to allocate 25% of economic losses to pumping restrictions and 75% to drought in proportion to their average relative contribution to reduced water deliveries. This simple approach does not take a stance on whether the drought is an incremental impact on the environmental restrictions or whether the environmental effects are incremental to the drought. Table 9 shows the allocation of losses between the two causes. The effect of environmental pumping restrictions is estimated at 1,392 lost jobs, a $71.7 million decline in income, and a $146.4 million decline in output.

Table 9. Relative Impacts of Drought and Pumping Restrictions based on decline in output estimated from Crop Reports, and proportional changes to economic losses and water supplies.

Impact Type	Employment	Income	Output	Acres	Revenue
Drought	-4,175	-$215,232,754	-$439,331,040	-182,250	-$256,950,000
Pumping Restrictions	-1,392	-$71,744,251	-$146,443,680	-60,750	-$85,650,000
Total Effect	**-5,567**	**-$286,977,005**	**-$585,774,720**	**-243,000**	**-$342,600,000**

The second approach, conducted by UC Davis, runs two scenarios in the SWAP model, one with drought only and one with drought and environmental pumping restrictions. In contrast to the University of the Pacific approach, this allows for modeling the shift in cropping pattern and production across regions with and without pumping restrictions. As such, this captures the marginal adjustments by farmers in response to pumping restrictions and the allocation of effects is not a strict percentage across all categories. The effect of pumping restrictions on San Joaquin Valley agriculture depends solely on the amount of water restricted for delivery, which depends on the type of water year. In average and wet years, pumping restrictions account for a higher total amount of water reductions relative to drought years. This is a function of both the legal aspects of the Wanger ruling and the fact that in wet and average years there is more water available, thus it is feasible to allocate more to fish without damaging agriculture. It's estimated that pumping restrictions account for 500,000 af in a critical year and up to 2,000,000 af in wet years. Since 2009 was a dry year, we attribute 500,000 af of reduced water supplies due to environmental pumping restrictions.

No comments

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Table 10 summarizes the results of the two SWAP model runs. The total effect is estimated at $368 million in lost revenues, 7,500 jobs, and 268,000 fallowed acres. The drought alone accounts for $222 million in revenue losses which translates into 4,400 jobs lost including 1,300 direct and 3,100 indirect and induced. Under drought only, an estimated 138,700 acres are fallowed. We estimate that environmental pumping restrictions accounted for $146 million in lost agricultural revenues in 2009, representing 39% of the total combined effect of reduced water supplies. Additionally, of the estimated 7,500 jobs lost 3,000 can be attributed directly to pumping restrictions for fish, representing 40% of total agricultural jobs lost due to reduced water supplies in 2009. Finally, of an estimated 268,500 fallowed acres, 129,800 can be attributed directly to pumping restrictions, representing 36% of total fallowing.

Table 10. Relative Impacts of Drought and Pumping Restrictions based on decline in output estimated from SWAP.

Impact Type	Employment	Income	Output	Acres	Revenue
Drought	-4,460	-$166,900,000	-$477,200,00	-138,700	($222,000,000)
Pumping Restrictions	-2,973	-$111,800,000	-$318,800,000	-129,800	($146,000,000)
Total Effect	**-7,434**	**-$278,700,000**	**-$796,000,000**	**-268,500**	**($368,000,000)**

Conclusion

This report conducted a retrospective look at 2009 to estimate the total effect of reduced water supplies due to drought and environmental pumping restrictions for agricultural regions in the San Joaquin Valley. Economic impacts were summarized in terms of change in acres, revenues, employment, and income for San Joaquin Valley. No attempt was made to quantify the long term effects of groundwater overdraft, stress irrigation, or rotational adjustments due to the prolonged drought. To the extent that these effects are important, all estimates in this report represent lower bounds on total economic impacts.

This report considers two approaches to estimate the total economic impacts of drought and water pumping restrictions on San Joaquin Valley agriculture. The approaches and the results they yield are similar in many ways, but there are three significant differences. The first approach conducted by the University of the Pacific utilized County Crop Reports to estimate the decrease in agricultural production, and allocated impacts between drought and environmental pumping restrictions. The second approach, conducted by UC Davis, uses the Statewide Agricultural Production Model (SWAP) calibrated exactly to an average water and price year to estimate changes in agricultural production due to realized water deliveries and water transfers in 2009. This approach also uses the SWAP model to estimate changes in agricultural production attributable to drought alone and environmental pumping restrictions alone. Both approaches also use slightly different input-output models to estimate total economic impacts including indirect and induced effects. The results of both approaches were compared to direct measures of agricultural employment change to ensure consistency and reasonableness. Table 10

No comments

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summarizes the total economic impact on the San Joaquin Valley of reduced water supplies for agriculture in 2009. Table 11 summarizes the portion of the total impacts attributable to the environmental restrictions on Delta water pumping.

Table 10. Total Economic Impact of Drought and Pumping Restrictions on San Joaquin Valley Agriculture in 2009.

	Pacific	UC-Davis
Fallowed Acres	243,000	269,000
Agricultural Revenue	-$342,600,000	-$368,084,000
Employment	-5,567	-7,434
Income	-$286,977,005	-$278,700,000
Output	-$585,774,720	-$796,000,000

Table 11. Total Economic Impact of Pumping Restrictions on San Joaquin Valley Agriculture in 2009.

	Pacific	UC-Davis
Fallowed Acres	61,000	129,800
Agricultural Revenue	-$85,650,000	-$146,000,000
Employment	-1,392	-2,973
Income	-$71,744,251	-$111,800,000
Output	-$146,443,680	-$318,800,000

To conclude we want to emphasize the importance of regional differences within the San Joaquin Valley and even within specific Counties. At the County level, Fresno, Kings, and Kern are the most significantly affected by drought and pumping restrictions in terms of fallowed acres, lost revenue, and lost jobs. However, even County level data masks some of the regional differences. Agronomic regions within Fresno County realize revenue losses ranging between 1.5% growth, in the East-side of the County, to over 10% declines, in Westlands Water District. These differences indicate a strong economic gradient and emphasize the importance of water markets for mitigating the localized effects of reduced water supplies. Looking forward to 2011, early

No comments

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weather predictions are attributing a high probability to another dry year. Following dry years in 2006-2009 and with increased attention on Delta exports, California agriculture faces significant challenges.

No comments

- n/a -

No comments

- n/a -

APPENDIX DOC. 13

San Luis & Delta-Mendota Water Authority

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January 14, 2013

By Regular and Electronic Mail
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RE: Delta Stewardship Council Proposed Rulemaking

Dear Chairman Isenberg and Council Members:

The State Water Contractors, Inc. and San Luis & Delta-Mendota Water Authority, collectively referred to herein as the "Public Water Agencies",[1] submit this letter pursuant to the Notice of Proposed Rulemaking the Delta Stewardship Council ("Council") submitted to the Office of Administrative Law ("OAL") on November 16, 2012. The Public Water Agencies value the role the Legislature established for the Council. However, the regulations the Council submitted to OAL on November 16, 2012 and propose for adoption ("Proposed Regulations") go well beyond statutory authorities granted to the Council through the Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code, § 85000 et seq., "Delta Reform Act" or "Act"). For that reason, as well as the Proposed Regulations failing to meet other important OAL requirements, the Proposed Regulations, if adopted, would be unlawful. The Public Water Agencies respectfully request that the Council revise the Proposed Regulations, consistent with these comments, before the Council considers their adoption.

I. INTRODUCTION

As detailed below, the Proposed Regulations include a number of provisions that fail to meet the standards of necessity, authority, clarity, consistency, reference, and non-duplication set forth in the Government Code. The Public Water Agencies and their member agencies object to the Proposed Regulations particularly because in numerous respects they exceed and conflict with the limited authority the Legislature conferred upon the Council through the Delta Reform Act.

In the Initial Statement of Reasons, the Council asserts that "implementation of the proposed regulatory policies is necessary in order to *achieve* the coequal goals as enumerated in the 2009 Delta

[1] Descriptions of the Public Water Agencies are included in Attachment 1 hereto.

No comments

- n/a -

Reform Act."[2] The Council further states that "[t]he authority vested in the Council to make consistency determinations ensures that Delta-related activities will be coordinated and legally enforceable under the oversight of the Council." (Initial Statement of Reasons at p. 14.) Thus, the Council conceives of its role as that of a "super-regulatory" agency with approval authority over all "Delta-related actions."[3] In a similar vein, the Council states that "Section 5005 is aimed at achieving [the] policy of reduced reliance on the Delta and improving regional self-reliance *by requiring a significant reduction in the amount of water used, or in the percentage of the water used, from the Delta watershed.*" (Initial Statement of Reasons at p. 4, emphasis added.) It is striking that the Council asserts this outcome as an apparent central responsibility of the Council to achieve, through its appellate review of Delta Plan consistency certifications, notwithstanding the clear absence of such authority in the Delta Reform Act.

Nowhere does the Delta Reform Act authorize or require the Council to act as a "super-agency" with the authority or mandate to "achieve" the coequal goals through its appellate review of covered actions for consistency with the Delta Plan, or to impose reductions in water use from the Delta or the Delta watershed. Such action by the Council would exceed the authority conferred upon it in the Delta Reform Act. The Act simply requires the Council to "develop, adopt, and commence implementation of the Delta Plan pursuant to this part that *furthers* the coequal goals." (Wat. Code, § 85300(a), emphasis added.) Specifically, the Act states that "the Delta Plan shall include subgoals and strategies to *assist in guiding* state and local agency actions related to the Delta"; the Delta Plan "may also identify specific actions that state or local agencies *may* take to implement the subgoals" (*ibid.*, emphasis added); and "[t]he Delta Plan shall *promote* statewide water conservation, water use efficiency, and sustainable use of water" (*id.*, § 85303, emphasis added).

As evidenced by the Legislature's specific word choices, there was no intent to provide or even imply a regulatory role for the Council with regard to broad water management activities. Indeed, to the contrary, the Council and the Delta Plan are directed to provide guidance and advisory recommendations to further the achievement of various pertinent state policies, with the *limited* exception of establishing an administrative scheme for reviewing appeals of consistency certifications only applicable to statutorily defined "covered actions" undertaken *in* the Delta and Suisun Marsh.

Notably, the state policy in the Delta Reform Act pertaining to reduced reliance on the Delta to meet *future* water supply needs through a statewide strategy is not included in the statutory objectives the Legislature determined are inherent in the coequal goals (*id.*, § 85020), and it is conspicuously absent from the specifically described elements of the Delta Plan (*id.*, § 85300 et. seq.). Thus, nothing in the Delta Reform Act empowers the Council to force "significant reductions" in water use from the Delta watershed, or a significant reduction in water exports to meet current or historic water supply needs.

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[2] State of California, Delta Stewardship Council, California Code of Regulations, Title 23. Water, Division 6. Delta Stewardship Council, Chapter 2. Consistency with Regulatory Policies Contained in the Delta Plan, Initial Statement of Reasons 14 ("Initial Statement of Reasons"), http://deltacouncil.ca.gov/sites/default/files/documents/files/3%20-%20InitialStatementReasonDraftNov2012.pdf.

[3] "Delta-related actions" is not a term defined in the Act or in the Proposed Regulations. By statute, the Council has no authority to adjudicate appeals over consistency certifications for all "Delta-related actions," but only for statutorily defined "covered actions."

No comments

- n/a -

Moreover, the Delta Reform Act expressly recognizes the continuing authority of other state and federal regulatory regimes over the management and regulation of water and other resources in the Delta. (See, e.g., Wat. Code, §§ 85031(d), 85032.) This was made clear in the final analysis of SBX7-1 considered by the Senate before voting on the Act. The analysis concludes that the various savings clauses in the bill "maintain SWRCB jurisdiction and preserve regulatory authority generally, in order to clarify that the new Delta Stewardship Council is NOT a super-regulatory agency that trumps other regulatory agencies such as SWRCB and DFG."[4] Thus, the substantive mandates that the Council seeks to promulgate and enforce are inconsistent with the Delta Reform Act and other statutes.

In addition, the coequal goals are set forth in the statute as state *policy*. As demonstrated below, these policies are not legislative mandates, and they are clearly not mandates that the Legislature authorized the Council to enforce. Instead, the Delta Plan is expressly defined in a way that acknowledges it is but one tool that will provide policy makers with an important source of guidance for, and a means of tracking progress toward, achieving the coequal goals established by the Legislature. Rather than creating an agency charged with regulating the State's water resources, the Legislature established a framework for a collaborative and synergistic approach to improving overall Delta management and contributing to the achievement of the coequal goals by the pertinent local, state and federal agencies already responsible for carrying out or regulating various components of the Delta Plan.

Because the Council is not authorized to impose substantive mandates regarding water use through the Delta Plan, the Public Water Agencies respectfully request that the Council revise its proposed regulations to remove any such mandates.

II. LEGAL STANDARD FOR REGULATIONS

At the most fundamental level, the Proposed Regulations must be within the scope of the Council's statutory authority and consistent with controlling law. (Gov't Code, § 11342.1 ["Each regulation adopted, to be effective, shall be within the scope of authority conferred and in accordance with standards prescribed by other provisions of law"].) An administrative agency such as the Council has no inherent power; it possesses only those powers granted to it by the Constitution or by statute. (*Security National Guaranty, Inc. v. California Coastal Commission* (2008) 159 Cal.App.4th 402, 419.) "That an agency has been granted some authority to act within a given area does not mean that it enjoys plenary authority to act in that area." (*Ibid.*) Thus, any act taken in excess of the power conferred upon an agency is void. (*Ibid.*)

Similarly, no regulation adopted by a state agency is "valid or effective unless consistent and not in conflict with the statute and reasonably necessary to effectuate the purpose of the statute." (Gov't Code § 11342.2; see *Sabatasso v. Superior Court* (2008) 167 Cal.App.4th 791, 796 ["agencies do not have discretion to promulgate regulations that are inconsistent with the governing statute or amend the statute or enlarge its scope," citation omitted]; *Rich Vision Centers, Inc. v. Board of Medical Examiners* (1983) 144 Cal. App. 3d 110, 114 [an agency "may exercise such additional powers as are necessary for

[4] Bill Analysis for SBX7-1 as amended November 3, 2009, p. 15, available at http://www.leginfo.ca.gov/pub/09-10/bill/sen/sb_0001-0050/sbx7_1_cfa_20091104_035148_asm_floor.html.

No comments

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the due and efficient administration of powers expressly granted by statute, or as may be fairly be implied from the statute granting the powers"].)

Government Code section 11349 *et seq*. governs the OAL review of regulations. OAL must make determinations of the necessity, authority, clarity, and consistency of proposed regulations in addition to ensuring compliance with the other procedural and substantive mandates of the Administrative Procedure Act ("APA"). As explained below, a number of provisions in the Proposed Regulations fail to meet the OAL's standards and must be removed or revised accordingly.

III. DEFICIENCIES WITH PROPOSED REGULATIONS

A. The Proposed Regulations Exceed The Council's Authority Granted To It Through The Water Code

To be valid and effective, the Council must demonstrate that the Proposed Regulations are authorized by the Delta Reform Act, and do not conflict with controlling law. "Authority," as defined by Government Code section 11349(b), means "the provision of law which permits or obligates the agency to adopt, amend, or repeal a regulation." Proposed regulations are also invalid if they impair or conflict with the statute they purport to implement. (*California Association of Psychology Providers v. Rank* (1990) 51 Cal.3d 1, 11; *Esberg v. Union Oil Co.* (2002) 28 Cal.4th 262, 269.) The Proposed Regulations fail these standards as they exceed and transgress the Council's statutory authority and conflict with controlling law.

1. The Substantive Mandates in Proposed Sections 5004 and 5005 Exceed the Council's Statutory Authority and Conflict with Controlling Law; Therefore, They Must Be Removed from the Proposed Regulations

Section 5004: The requirements imposed through this section of the Proposed Regulations are intended to govern certifications of consistency filed by state or local public agencies with regard to covered actions. The proposed requirements, however, are not fully set forth in the Proposed Regulations. On page 59 of the current draft of the Delta Plan, it states: "If the covered action is found to be inconsistent, *the project may not proceed until it is revised so that it is consistent with the Delta Plan*." (Emphasis added.) In other words, the Council claims the authority to preempt already established statutory processes and to itself *prohibit* the action from moving forward until it has determined the project is consistent with the Delta Plan. That claim of what is essentially permitting authority is inconsistent with the language of the Delta Reform Act, as well as its legislative history. It also is unenforceable because it is an unlawful "underground regulation" that has not been submitted to OAL.

The Plain Language of the Delta Reform Act Does Not Authorize the Council to Prohibit a Covered Action Until It Determines It Is Consistent with the Delta Plan: Under the Delta Reform Act the proponent of a proposed action potentially affecting the Delta must determine if it is a "covered action." If the agency determines it is a covered action, it must certify to the Council that it is consistent with the Delta Plan. (Wat. Code, § 85225.) Absent an appeal, the agency may continue to pursue regulatory

No comments

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approvals and implement the action. If the certification is appealed, the Council must determine whether the certification is supported by substantial evidence. If the Council determines the certification is not so supported, it remands it to the agency. (Wat. Code, §§ 85225.10-85225.25.)

On remand the "agency may determine whether to proceed with the covered action." (Wat. Code, § 85225.25.) Its options are to (i) "proceed with the action" as proposed or (ii) proceed with "the action as modified to respond to the findings of the council." (*Ibid.*) In either case it must, "prior to proceeding with the action file a revised certification of consistency that addresses each of the findings by the council." (*Ibid.*) That is the end of the certification process. Nothing in this language prohibits the agency from proceeding with the covered action even if the Council has deemed it inconsistent, so long as the agency files a revised certification addressing the Council's findings. The Council's assertion that a covered action is prohibited unless the Council deems it consistent simply is not supported by the plain language in the Delta Reform Act.

The Delta Reform Act's Legislative History also Undermines the Council's Assertion of Authority to Prohibit Implementation of a Covered Action Until an Appeal Is Resolved to the Council's Satisfaction. The October 2008 Delta Vision Strategic Plan, an early step in developing the governance structure that resulted in the Delta Reform Act, would have created a Council as a "regulatory and oversight body" with numerous and broad regulatory authorities. (Delta Vision Strategic Plan, pp. 121-24.) These would have included the power to determine the consistency of covered actions and to "ensure federal and state consistency with the [Plan]." (Delta Vision Strategic Plan, pp. 123-24.) The Delta Reform Act significantly pared these proposals down. In particular, the authority to determine consistency in the first instance and the authority to "ensure" consistency overall before a project may be implemented are both absent from the Delta Reform Act.

The legislative history of the Delta Reform Act demonstrates that the Legislature purposefully removed provisions that would have authorized the Council to prevent an inconsistent "covered action" from being implemented. Proposed Conference Report No. 1, dated September 9, 2009, contains an appeals process similar to that in the enacted Delta Reform Act. Like the enacted version, it provided that a covered action may be implemented if no appeal is filed to the consistency certification. However, the *pre-print* version of section 85225.25 provided:

> Upon remand, the state or local agency may determine not to proceed with the covered action or may modify the appealed action and resubmit the certification of consistency to the council. A proposed covered action appealed pursuant to these provisions shall not be implemented until the council has adopted written findings, based on substantial evidence in the record, that the covered action, as modified, is consistent with the Delta Plan.

Delta Reform Act section 85225.25 *as enacted* is significantly changed from this earlier version. While the prior version gives the agency the option of either not proceeding with the action or modifying the action to satisfy the Council, the enacted version gives the agency the option to "proceed with the action" *without* modification, or as modified, provided it files a revised certification. Finally, the

No comments

- n/a -

Legislature pointedly removed the prohibition that the proposed action "shall not be implemented" without a Council consistency determination. Despite the Legislature's purposeful refusal to adopt a statute mandating that a covered action shall not be implemented absent a Council blessing, the Council is attempting to reinsert that rejected mandate. This attempt clearly is an illegal alteration, amendment and enlargement of the statute that is beyond the Council's authority. (Gov't Code, §§ 11342.2 & 11349.1; see also OAL Handbook, p. 19.)

These changes to subsequent versions of the Act and the language of the Delta Reform Act expressly permit implementation of a covered action when the Council disagrees with an implementing agency's consistency certification. Upon remand from an appeal, an agency is not required to modify a proposed covered action, but only to file a revised certification addressing the Council's findings. The plain language of the Act and its legislative history manifest the Legislature's intent to preserve the authority of state and local agencies to proceed with "covered actions" even if the Council ultimately disagrees with a proffered consistency certification.

Attempts to Implement Underground Regulation Are Unlawful: The APA specifically prohibits an agency from making use of a rule which meets the definition of a "regulation" but has not been submitted to the OAL for approval, referred to as an "underground regulation." (Gov't Code, § 11340.5(a); OAL Handbook, pp. 12-16.) "Underground regulations" are a means to avoid the requirements of the APA and can take the form of "'policies,' 'interpretations,' 'instructions,' 'guides,' 'standards,' or the like, and are contained in internal organs of the agency." (OAL Handbook, pp. 13-14, citing *Armistead v. State Personnel Board* (1978) 22 Cal.3d 198.)

Here, the Council claims the authority to prohibit an agency from proceeding with a project unless the Council has deemed it consistent with the Delta Plan: "If the covered action is found to be inconsistent, the project may not proceed until it is revised so that it is consistent with the Delta Plan." (Draft Delta Plan at p. 59.) As explained above, this proposed rule is not within the Council's authority. Nevertheless, the Council has included it in the Delta Plan.[5]

Although the Council has not designated it as a Regulatory Policy, it clearly would meet the definition of "regulation" under Government Code Section 11342.600, that is, a "rule, regulation, order or standard" contained in a Delta Plan adopted by the Council purportedly "to implement, interpret, or make specific the law . . . administered by it." The proposed mandate meets the three part test specified in the OAL Handbook at p. 14: (1) it is a rule of standard or general application with respect to the consistency process; (2) it is a policy adopted by the Council to implement or make specific the law administered by it; and (3) it is not exempt under the APA.

The Council's assertion of the authority to prohibit implementation of an action it deems inconsistent with the Delta Plan is not supported by the language or legislative history of the Delta

[5] The Council is authorized to adopt "administrative procedures governing appeals" that are not required to be submitted to OAL. (Wat. Code, § 85225.30.) However, the provision at issue is not procedural. It is instead a substantive rule of law affecting the State's or a public agency's ability to carry out its statutory responsibilities, and it impairs the property rights of an entity applying for the permit or other approval at issue.

No comments

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Reform Act and is an unlawful "underground regulation." The Council's assertion of authority is unenforceable and should be deleted from the Delta Plan.

Section 5004(b)(3): The Proposed Regulations state that "[a]s relevant to the purpose and nature of the project, *all covered actions must document use of best available science* (as described in Appendix 1A)." (Emphasis added.) The Council asserts that this regulatory requirement is necessary for consistency with the Delta Plan "to ensure that all significant actions [affecting the Delta] utilize best available science or adaptive management in particular." (Initial Statement of Reasons at p. 2.)

The use of best available science in evaluating the merits of a covered action should be encouraged. However, this proposed regulation exceeds the Council's authority to the extent that it imposes higher standards for state and local agency actions than can be found in the Delta Plan or elsewhere in controlling law. (*See, e.g.*, Code Civ. Proc., § 1094.5(c) [substantial evidence in light of the whole administrative record]; Pub. Resources Code, § 21168.5 [abuse of discretion established for purposes of CEQA if a determination or decision is not supported by substantial evidence]; Cal. Code Regs., tit. 14, § 15384 [defining substantial evidence].) The Council lacks authority to limit or alter the scope of local agency discretion by requiring that all covered actions that have a significant impact on the achievement of the coequal goals must use (and document the use of) best available science and adaptive management, *even where no other applicable law imposes such a requirement*.

The Council's stated basis for this requirement is that "despite the Delta's special status, there are no overarching guidelines or best management practices to ensure that all significant actions utilize best available science or adaptive management in particular." (Initial Statement of Reasons at p. 2.) However, the Delta Reform Act does not require proponents of covered actions to support their decisions with the best available science or utilize adaptive management in all situations . The *Council's* adoption of the Delta Plan must be supported by the best available science. (Wat. Code, §§ 85302(g), 85308(a).) But nothing in the Act authorizes the Council to impose that evidentiary standard on covered actions. In addition, the Delta Plan itself can be based upon the best available science without requiring every covered action to also be based on the best available science. Thus, the proposed requirement is not reasonably necessary for the Council to fulfill its obligation to use the best available science.

In addition, such a requirement would result in a new standard for implementing agency decision making. This new standard could, in turn, expose implementing agencies and the Council to potential litigation over the intensively fact-specific determination whether an implementing agency has used the best available science, whether it has adequately documented such use, and whether the Council's determination to that effect in a certification appeal is supported by substantial evidence in the administrative record.

To the extent that such a requirement is already imposed by other statutes or regulations, the regulation is duplicative, and would add nothing but another layer of paperwork to an implementing agency's regulatory burden. Thus, the proposed requirement is not only unauthorized, unnecessary, and administratively burdensome, it could lead to unintended consequences for implementing agencies as well as the Council.

No comments

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The requirement that all covered actions that significantly impact the achievement of the coequal goals must use and document the use of the best available science should be removed from the Proposed Regulations.

Section 5004(b)(5): This subsection requires a certifying agency that will carry out a covered action to also certify that "the covered action complies with all applicable laws pertaining to water resources, biological resources, flood risk, and land use and planning[,]" and if the certifying agency will approve or fund, but not carry out, the covered action, then it must "include a certification . . . 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." These additional certifications are not authorized in the Delta Reform Act, and they are unnecessary and duplicative of existing laws. If these additional certifications are required by regulation, then, in addition to any potential liability for an alleged failure to comply with the *substantive* mandates of those other applicable laws, project opponents could also bring an appeal before the Council, and potentially file litigation in state court challenging the *certification* of compliance with other substantive laws, *and* the Council's determination of consistency on any appeal, in addition to litigation in state or federal court challenging the alleged failure to comply with the *substantive* mandates of the law.

Consequently, this requirement should be removed because it would increase regulatory burdens on agencies, including the Council, and it would increase the potential for litigation and the attendant costs and delays without providing any benefits in terms of compliance with the law, consistency with the Delta Plan, or furthering achievement of the coequal goals.

Section 5005: The proposed "regulatory policy" WR P1 unlawfully asserts regulatory power to undertake the enforcement of a new policy of the State 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." (Wat. Code, § 85021.) In the Notice of Proposed Rulemaking, the Council claims that requiring reduced reliance on the Delta is "consistent with the Delta Reform Act contained in Water Code §85021 (Notice of Proposed Rulemaking at 3), but this assertion of authority reaches far beyond the substantive and geographic scope of its authorities as explicitly delineated by the Legislature. Furthermore, because the Delta Reform Act does not expressly give the Council a duty or the power to enforce or regulate the general state policy of seeking to "reduce reliance on the Delta in meeting future water supply needs," there is no implied authority to promulgate regulations pertaining to that policy. The only specific language articulated in the Act arguably related to such potential authority merely directs the Council to "promote" conservation and other water management activities that would contribute to furthering the state policy expressed in Section 85021 and elsewhere in the Act and other bills that were part of the comprehensive water package of which the Act was only a part.

The Language of the Statute Does Not Support the Council's Asserted Authority to Require a Significant Reduction in Water Use. Nowhere in the Act's sections providing explicit direction to the Council regarding content of the Delta Plan (see Wat. Code, §§ 85300-85308) is the reduced reliance policy mentioned or cited as a focus of the Delta Plan. The reduced reliance policy in Section 85021 of

No comments

- n/a -

the Act is simply a statement of policy, not a delegation to the Council of power to expand or enforce the policy. The Council is not even mentioned in section 85021, let alone authorized to enforce the policy through forced reductions in current or historic supplies pumped from the southern Delta. It is telling that while the Act did not include any standards or criteria in the Section 85021 policy statement, other bills included as part of the comprehensive water package did specifically target establishing statewide standards and criteria related to increasing water conservation throughout California.[6]

In fact, Section 85021 does not require a "reduction" in current supplies from the Delta at all, let alone a "significant reduction." Instead, it states a policy to take positive actions to increase local supplies and water efficiency through investment as a means to reduce reliance on the Delta "in meeting California's future water supply needs." The Council's proposed Section 5005 attempts to turn that positive, statewide investment policy into a prescriptive rule prohibiting entities that need to export, transfer through, or use water in the Delta or in the entire Delta watershed from doing so unless they have demonstrated "a significant reduction in the amount of water used, or in the percentage of water used, from the Delta watershed." The Council's attempt to add this requirement where the Legislature did not would "alter or amend [the] statute or enlarge or impair its scope" and therefore "is void and must be struck down by a court." (OAL Handbook at p. 19.)

Moreover, the Council ignores the Legislature's focus on reducing reliance in meeting California's *future* water supply needs and instead attempts to require a reduction from current use. But on its face, section 85021, through the express use of the term "future," applies solely to water supply needs that do not currently exist as opposed to current water supply needs. In *Tenet/Centinela Hospital Medical Center v. Workers' Compensation Appeals Board* (2000), the court, in interpreting a statute, was required to distinguish between "continuing" or "further" medical treatment and "future" treatment. (80 Cal.App.4th 1041, 1046.) Looking to the Webster Dictionary, a common reference for statutory interpretation, the Court concluded that whereas "continuing" means "constant" and "further" means "going or extending beyond what exists", the term "future" means "existing or occurring at a later time." (*Id.*) The court went on to find that "future" medical care suggested medical attention that would be required at a later date but is not ongoing. (*Id.*) Using this definition of the term "future," Section 85021 applies to water supply needs that do not currently exist but would arise in the future due to population an economic growth absent the statewide investment strategy called for in Water Code section 85021.

The principles of statutory interpretation require that each word in a statute be given significance. (*Dyna-Med, Inc. v. Fair Employment and Housing Comm'n* (1987) 43 Cal.3d 1379, 1386-87.) The Council's interpretation that Section 85021 calls for a reduction in the use of Delta water from current water supply levels renders the term "future" as surplusage. Under that interpretation, Section

[6] See generally 2009 Water Bills SBx7-7 and SBx7-8, which specifically discuss and seek to reduce per capita use of water in the context of statewide strategies related to conservation, diversification of water supply portfolios, and funding to further achieve those policy goals.

No comments

- n/a -

85021 would have stated a policy to reduce reliance on the Delta in meeting California's water supply needs, generally, which the Legislature explicitly chose not to do[7].

Moreover, two other significant sections of the Delta Reform Act are inconsistent with the Council's position. In Section 85020, the section immediately preceding Section 85021, the Legislature spelled out in specific detail the objectives "inherent in the coequal goals for management of the Delta." Rather than requiring, as the Council would, the "significant reduction" in use of water from the Delta watershed, the Legislature stated the objective is to "promote" statewide water conservation, water use efficiency and sustainable water use. This Legislative objective demonstrates that the Legislature did not choose to confer regulatory authority on the Council but instead provided discretion to "promote" activities related to "sustainable water use." The Legislature's use of "promote" cannot legitimately be interpreted to mean "mandate."

Part 4, Chapter 1 of the Delta Reform Act (Wat. Code, §§ 85300-85309) also demonstrates that Section 85021, while a general policy statement that is certainly relevant when considering actions affecting the Delta, does not delegate any enforcement authority to the Council or even to any of the agencies that do have regulatory authority in the Delta. In particular, while the Legislature devoted these several sections to specifying in detail the elements to be required in the Delta Plan, it did not include or refer to the general Section 85021 policy. What it did do was require that the Delta Plan "shall promote statewide water conservation, water use efficiency, and sustainable use of water." (Wat. Code, § 85303.) This is yet another demonstration that the Legislature did not empower the Council to regulate water use but instead directed it to "promote" good water management in line with section 85021. (See also Wat. Code, § 85302(d)(1), (2) [directing the inclusion of measures to "promote" a more reliable water supply that "[m]eet[s] the needs for reasonable and beneficial uses of water" and "[s]ustain[s] the economic vitality of the state"].)

In addition, the Delta Reform Act limits the Council's consistency review authority to "covered actions," which are limited to projects that "[w]ill occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh." (Wat. Code, § 85057.5.) Thus, the Council's assertion of authority to mandate reductions in the use of water anywhere in the State is clearly beyond the geographic scope of the Council's authority.

Moreover, the Council's assertion of authority over water use is inconsistent with several savings clauses in the Delta Reform Act. The statute provides that:

> Unless otherwise expressly provided, nothing in this division supersedes, reduces, or otherwise affects existing legal protections, both procedural and substantive, relating to the [State Water Resources Control Board's] regulation of diversion and use of water, including, but not limited to, water rights priorities, the protection provided to

[7] This is clearly revealed by the legislative history described below, which also illuminates the significance of the Legislature's use of the phrase "reduce reliance" on the Delta, in contrast to "reduce dependence." The legislative history confirms that the Legislature did not intend the Delta Plan to be an *enforcement* mechanism for the newly established policy of reducing reliance on the Delta to meet future water supply needs, or for the Council to be its enforcer.

No comments

- n/a -

> municipal interests by Sections 106 and 106.5, and changes in water rights. Nothing in this division expands or otherwise alters the board's existing authority to regulate the diversion and use of water or the court's existing concurrent jurisdiction over California water rights.

(Wat. Code, § 85031(d).)

The Council's assertion of authority to mandate reductions in water diversions and water use throughout the State is inconsistent with these important savings provisions in the statute, and would intrude upon the exclusive concurrent jurisdiction of the State Water Resources Control Board and the courts to adjudicate and regulate water diversions and water rights.

The courts have held that general statements of legislative intent do not create an affirmative duty or authority on the part of the agency to impose a mandate in furtherance of the policy. (E.g., *City of Arcadia v. State Water Resources Control Bd.* (2011) 191 Cal.App.4th 156, 175-176; *Shamsian v. Dept. of Conservation* (2006) 136 Cal.App.4th 621, 633.) Therefore, the Council's assertion of authority to regulate water use is inconsistent with the express statutory language and an enlargement of the Council's authorities beyond those provided in the Delta Reform Act.

Ultimately, while it is consistent with the statutory scheme for the Council to "promote" activities that could contribute to reducing reliance on the Delta in meeting future water supply needs, the proposed section 5005 mandate is not "reasonably necessary to effectuate the purpose" of the Delta Reform Act, and it is therefore beyond the Council's authority and should be removed from the Proposed Regulations. (Gov't Code §§ 11342.2, 11349(a)(1) & (2).)

Thus, this provision should be removed from the Proposed Regulations.

Section 5005(c): The prohibition of exports from the Delta proposed in subsection (c) is also not authorized by the Delta Reform Act for the reasons explained above; and it is also inconsistent with the Delta Reform Act's exclusion of routine project operations from the definition of covered actions and with its several savings clauses.

The Delta Reform Act specifically excludes from the definition of "covered action" "[r]outine maintenance and operation of the State Water Project or the federal Central Valley Project." (Wat. Code, § 85057.5(b)(2).) In addition, as demonstrated, the Delta Reform Act provides that "[n]othing in the application of this section shall be interpreted to authorize the abrogation of any vested right whether created by statute or common law" (*id.*, § 85057.5(c)), and "[n]othing in this division expands or otherwise alters the [State Water Resources Control Board's] existing authority to regulate the diversion and use of water or the courts' existing concurrent jurisdiction over California water rights" (*id.*, § 85031(d)).

Thus, the Council lacks the authority to require a reduction in exports of water via the routine operation of the State Water Project ("SWP") or the federal Central Valley Project ("CVP"), and this provision should be removed from the Proposed Regulations.

No comments

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The Legislative History Directly Contradicts the Council's Assertion of Regulatory Authority to Prohibit or Mandate the Actions Required in Section 5005: While it is clear from the face of the statute that the Council does not have the authority to promulgate the mandates in Section 5005, the legislative history provides additional evidence of the Legislature's intent that the reduced reliance policy promote general water management activities and programs to meet future water supply needs, rather than delegating authority to the Council to mandate a requirement that water use be "significantly reduced."

Statements by legislators who were key in the sponsorship, drafting and adoption of the Act explicitly sought to clarify the reach of Section 85021 as it was being considered. They agreed it was a "broad statement of a policy goal . . . certainly not a mandate." And they agreed that *reducing dependence* on the Delta to meet California's water supply needs *was not* an appropriate policy objective. These conclusions were articulated at a September 3, 2009, joint Senate and Assembly conference committee hearing discussing the various bills that would result in the Delta Reform Act, including SBx7-1, which established the Council and outlined in detail the contents and purposes of the Delta Plan:

Senator Aanestad: "To say that we are going to be able to decrease dependency on the Delta is an impossible goal . . . . The solution is the second part of this paragraph [revised 85021 referring to statewide strategy of investment] and that is to improve efficiency, conservation, etc. . . . , it's foolishness to say we are going to become less dependent on the Delta. I think it's imperative to say we're going to be more responsible with the water that goes through the Delta . . . ."

Colloquy between Senator Steinberg (Senate Majority Leader and coauthor of SBx7-1) and Assemblyman Huffman (Chairman of the Assembly Water, Parks and Wildlife Committee and author of Preprint Assembly Bill No. 1, the Assembly's version of SBx7-1):

> ***Senator Steinberg***: "[O]ne question for consideration is whether or not the proponents of this language [section 85021] intended it to have legal import or is it a statement of intent."
>
> ***Assemblyman Huffman***: "I think, Mr. Chair, ***we know how to write mandates when we want to, that's not how this reads, it reads as a broad statement of policy of a goal that will guide things going forward*** . . . . You reduce dependence by following some of the ***conservation measures that we are asking folks to do in separate legislation*** . . . . So, I think it reflects a prudent policy guidance for the state going forward but ***certainly not a mandate***." [Emphasis added.]
>
> ***Senator Cogdill*** (Lead sponsor of the companion Water Bond): "[I]t ought to be more about how we make the Delta a more reliable source of water rather than to say we are going to do everything we can to limit exports from that very important source."

The Legislators' agreement reflected in these exchanges is supported by the Legislative drafting history of section 85021 and related sections. As originally drafted Water Code Section 85021 read:

No comments

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> The policy of the State of California is to ***reduce dependence on water from the Delta watershed, over the long-term***, for statewide water supply reliability. Each region that depends on water from the Delta shall improve its regional self-reliance for water through investment 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. (Preprint SB 1 (Aug. 4, 2009).) [Emphasis added.]

That language was amended on September 9, 2009,[8] after the September 3 discussions quoted above, to the language adopted ultimately and now codified in section 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 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. [Emphasis added.]

The significant changes to the first sentence of the section are italicized and bolded to emphasize the differences between the earlier draft version, and the ultimately adopted version of section 85021. The first revision changes "reduce dependence" on water from the Delta watershed "over the long-term" to "reduce reliance" on the Delta "in meeting California's future water needs." Similar to the discussion above of *Tenet/Centinela Hospital Medical Center v. Workers' Compensation Appeals Board*, the adopted term "future" (as opposed to "continuing" or "existing") means "existing or occurring at a later time." In other words, the Section 85021 policy envisions reduced reliance on use of Delta water over use that would exist or occur *in the future* if the policy were not implemented. It does not mean reduce "continuing" or "existing" reliance on Delta water "beyond what exists" currently or historically.

The second significant change is the addition of the language regarding a "statewide strategy of investment." This is an important reflection of legislative intent that meeting the policy directive set forth in Section 85021 is to be achieved on a "statewide" basis that would include local initiatives and investments, statewide bond initiatives, or other funding mechanisms. Notably, nowhere does this language expressly or impliedly authorize the Council to impose an obligation to "significantly reduce" the current use of water from the Delta watershed, or an authorization to the Council to "enforce" its particular interpretation of Section 85021 through the Delta Plan.

<u>The Proposed "Significant Reduction" Requirement Is Inconsistent with the Legislature's Deletion from the Bill of a Similar Requirement</u>: Another indication the Legislature did not intend to require (or authorize the Council to regulate) a reduction of current use of water is its consideration and rejection of a proposed section 85219. That section would have prohibited construction of a

[8] Conference Rept. No. 1, SB 12 (Sept. 9, 2009).

No comments

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conveyance facility within or around the Delta until the Council made a determination that agencies relying on the facility for water deliveries had submitted "long-term plan[s] for reducing reliance on those exports." (Preprint SB 1 (Aug. 4, 2009).) That language, which could have been interpreted to support the "significant reduction" requirement the Council is attempting to impose, was deleted at the same time Section 85021 was amended to add "future water supply needs" and the "statewide strategy of investment" language.

The substantive mandate in proposed Section 5005 is inconsistent with both the plain language of the Delta Reform Act and its legislative history, and should be removed from the Proposed Regulations.

Section 5005(e)(1): The language of the statute does not support the Council's asserted authority to require (e)(1)(A), (B), and (C), as a prerequisite for using, exporting, or transferring water through the Delta. For example, subdivision (A) mandates that every water supplier that might receive water from the "covered action" has an urban and agricultural management plan. This is a current requirement under law for certain water suppliers, and is therefore duplicative and unnecessary. (Wat. Code, § 10620 [urban water suppliers]; *id.*, §10820 [agricultural water suppliers].)

Of more concern, as currently proposed Subsections 5005(c) – (e) appear to create a new consequence for water supplies that fail to meet novel requirements that the Council has proposed for inclusion in urban and agricultural water management plans in subsections (e)(1)(B) and (C); namely, a potential denial of the ability to use or export water from, or transfer water through, the Delta. Current law, however, has very limited specific repercussions for a failure to adopt these plans in compliance with the specific requirements set forth in the Water Code. (Wat. Code, §§10608.56(a), (c), (e), (f); 10631.5 [terms of and eligibility for certain water management grants or loans for urban water suppliers]; *id.*, §§ 10608.56(b), (e), (f); 10852 [agricultural water suppliers].) Nothing in the Delta Reform Act provides authority for the novel requirements for urban and agricultural water management plans proposed in subsections (e)(1)(B) and (C) of Section 5005. In addition, insofar as these subsections duplicate existing law, they are unnecessary and create confusion in the regulated community.

Furthermore, Section 5005(e)(1)(B) distorts the purpose of urban and agricultural water management plans. These plans are internal long-range documents that are to be revised over time as conditions and technologies change. Therefore, the implementation schedules set forth in the plans must remain flexible and adaptable. These plans are meant to inform local water management planning, not to create a new forum for regulation by the Council. Similarly, in subsection 5005(e)(1)(C) the Council grants itself the authority to require a new provision in all water management plans starting in 2015. The Delta Reform Act does not give the Council this authority, and there is no such requirement in existing law. (See Wat. Code, § 10631 [elements of an urban water management plan]; *id.*, § 10826 [agricultural water management plan]; *id.*, § 10608 et seq. [requirements for urban and agricultural water management plans related to sustainable water use and demand reduction].)

Thus, Subsections 5005(c) – (e) should be removed from the Proposed Regulations.

No comments

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2. The Definition of "Achieving the Coequal Goal of Providing a More Reliable Water Supply for California" Includes Unlawful Substantive Mandates to Reduce Water Use

Section 5001(e)(1): The Council proposes to include a definition of "achieving the coequal goal of providing a more reliable water supply for California" to include "[b]etter matching the state's demands for reasonable and beneficial uses of water to the available water supply" (§ 5001(e)(1)(A)), and states that "[r]egions that use water from the Delta watershed *will* reduce their reliance on this water for reasonable and beneficial uses, and improve regional self-reliance" (§ 5001(e)(1)(B), emphasis added), and "[w]ater 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" (§ 5001(e)(1)(C), emphasis added). In addition, the proposed definition states: "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." (§ 5001(a)(1)(C), emphasis added.)

The proposed regulatory definition of "achieving the coequal goal of providing a more reliable water supply for California" conflicts with the language and structure of the Delta Reform Act. (Wat. Code, § 85302(d)(1).) Specifically, the statute mandates that "[t]he Delta Plan shall include measures to promote a more reliable water supply that address all of the following," including "[m]eeting the needs for reasonable and beneficial uses of water." (*Ibid.*) Furthermore, the Delta Reform Act's coequal goal for water supply is to provide "a more reliable water supply for California . . . ." (Wat. Code, §§ 85054, 85020(a).) The Legislature has declared that seven specific objectives "are inherent in the coequal goals for management of the Delta[,]" including the objectives to "[i]mprove the water conveyance system and expand statewide water storage." (Wat. Code, § 85020(f).)

First, the proposed definition of achievement of the coequal goal of a more reliable supply of water does not promote or identify actions that will *meet* water needs. Instead, it defines achieving the coequal goal of a more reliable water supply in a manner that *limits* use of water from anywhere in the Delta watershed, and limits water exports from the Delta.

Specifically, the proposed definition purports to impose a substantive requirement on all those who use water that originates anywhere in the Delta watershed to "reduce reliance on this water for reasonable and beneficial uses." This mandate is an unauthorized expansion beyond the *policy* of the State of California articulated in the Delta Reform Act "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." (Wat. Code, § 85021, emphasis added.)

As demonstrated above, the Legislature did not include the statewide policy of reduced reliance on the Delta to meet *future* water supply needs in the policies "inherent" in the coequal goals, or in its specified elements required to be part of the Delta Plan. (Wat. Code, §§ 85020, 85300 et. seq.) Thus, the Legislature has not authorized the Council to adopt a new mandate applicable to all users of water from the Delta watershed regarding *current or historic* water supply needs based on this general

No comments

- n/a -

expression of state policy that depends on a *statewide* strategy to reduce reliance on the Delta to meet *future* water supply needs. (See Wat. Code, §§ 85210 [enumerated powers of the Council notably lacks any authority to convert state policy into new substantive mandates]; 85212 [authorizing Council to "provide timely *advice* to local and regional planning agencies regarding consistency of local and regional planning documents . . . with the Delta Plan," emphasis added]; 85300(a) [requiring the Council to develop a Delta Plan pursuant to the Delta Reform Act "that *furthers* the coequal goals" and includes "subgoals and strategies *to assist in guiding* state and local agency actions related to the Delta," emphasis added].) The precatory and permissive language in the Delta Reform Act cannot be reasonably interpreted as authorizing the Council to mandate reductions in water use or water exports.

Second, the proposed definition purports to require that those who export water from the Delta, i.e., the Department of Water Resources and U.S. Bureau of Reclamation, reduce exports in "dry years, when the limited amount of available water must remain in the Delta . . . ." This provision in the proposed definition implies that consumptive uses will only get what is available after other "in-stream" uses are met. In addition, the statement is ambiguous, suggesting that in undefined "dry years," exports may be reduced to zero because "the limited amount of available water must remain in the Delta . . . ."

The failure to recognize or even reference the "public interest" integral to the reasonable and beneficial use of water and the Public Trust doctrine is a fatal deficiency in the Council's unsubstantiated interpretation of the objective to further the achievement of the coequal goal of a more reliable water supply. Nowhere in the Delta Reform Act did the Legislature authorize the Council to adopt a mandate that state and federal agencies must reduce exports from the Delta. Instead, any limits on exports are governed by other statutory and regulatory requirements administered by other state and federal agencies, including the State Water Resources Control Board, Department of Fish and Wildlife,[9] the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service.

The proposed definition conflicts with the savings clauses in the Delta Reform Act that expressly acknowledge the authority of other state and federal laws and regulations that affect the management of water resources in the Delta and Delta watershed. (See Wat. Code, §§ 85031 [limitations on division], 85032 [subjects not affected by division]; see also Wat. Code, § 85320(e)-(g) [recognizing that the Department of Water Resources, Department of Fish and Wildlife, and other agencies besides the Council are "charged with BDCP implementation," and that the Council's authority is limited to making recommendations to the BDCP implementing agencies regarding implementation of the BDCP, which is to be incorporated into the Delta Plan].)

3. The Proposed Definition of "Significant Impact" Is Inconsistent with CEQA and Should Be Removed or Substantially Revised

Section 5001(s): The proposed regulatory definition of "significant impact" impermissibly attempts to alter and amend established CEQA principles regarding baseline conditions and assessment of impacts (direct, indirect, and cumulative), and is in direct conflict with controlling law. (Pub. Resources Code, §§ 21065, 21068; Cal. Code Regs., tit. 14, § 15125; *In re Bay-Delta Coordinated*

[9] Formerly named the Department of Fish and Game.

No comments

- n/a -

Proceedings (2008) 43 Cal.4th 1143, 1167-1168; *Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal.4th 310, 315, 320-322; *Citizens for East Shore Parks v. State Lands Commission* (2011) 202 Cal.App.4th 549, 557-566.) The Council has no authority to alter the fundamental framework of environmental review, which is concerned with whether approval of a proposed action may result in a significant *adverse* physical change in the existing environment. (Pub. Resources Code, §§ 21065, 21068; Cal. Code Regs., tit. 14, §§ 15060 (c)(2), 15061, 15064, 15125, 15358, 15360, 15378(a); 15382.)

Of special concern is the Council's inclusion of an overbroad definition of any proposed project that appears to include any contribution, no matter how insignificant, to any existing cumulatively significant impact on achievement of the coequal goals. It is conceivable that a proposed project may have an insignificant contribution to a cumulatively significant impact that has resulted from over a century of development in the Delta and Delta watershed. At a minimum, the definition of "significant impact" should be revised to expressly exclude such projects from the definition.

Section 5003(b)(2)(C): One-year temporary CVP- and SWP-related water transfers occur regularly and are subject to all terms and conditions and other environmental protections imposed on the SWP and CVP. They therefore are "routine operations" of the SWP and CVP and expressly excluded from the definition of "covered action" by Water Code section 85057.5(b)(2). Moreover, one-year transfers approved by State Water Resources Control Board are exempt from the application of CEQA pursuant to Water Code section 1729, and therefore are not a "project" under Public Resources Code section 21065. Although the proposed regulation administratively exempts one-year temporary water transfers, it does so "only through December 31, 2014." This proposed sunsetting of the covered action exclusion is inconsistent with the express language in the Delta Reform Act and will hinder achievement of the coequal goal of improving water supply reliability. Accordingly, this Section should be removed from the Proposed Regulations.

Section 5003(b)(2)(D): The proposed definition of "covered actions" impermissibly attempts to alter and amend established CEQA principles regarding the definition of a "project," as well as the application of statutory and categorical exemptions, and is in direct conflict with controlling law. (Pub. Resources Code, § 21065; Cal. Code Regs., tit. 14, §§ 15300.2 (c), 15378; 15382.) Statutory exemptions under CEQA are absolute; they reflect legislative policy determinations and are not subject to any exceptions for "unusual circumstances." (Cal. Code Regs., tit. 14, § 15061(b)(2); *Sunset Sky Ranch Pilots Association v. County of Sacramento* (2009) 47 Cal.4th 902, 907; *Great Oaks Water Co. v. Santa Clara Water Dist.* (2009) 170 Cal.App.4th 9576, 966, fn. 8; *Communities for a Better Environment v. California Resources Agency* (2002) 103 Cal.App.4th 98, 128-129.) The Proposed Regulations directly conflict with these established principles. Furthermore, "unusual circumstances" as they pertain to categorical CEQA exemptions have been defined and interpreted under CEQA. (Cal. Code Regs., tit. 14, §§ 15300.2(c); *see, e.g., Banker's Hill v. City of San Diego* (2006) 139 Cal.App.4th 249, 261; *Turlock Irrigation District v. Zanker* (2006) 140 Cal.App.4th 1047; *Santa Monica Chamber of Commerce v. City of Santa Monica* (2002) 101 Cal.App.4th 786, 800; *Fairbank v. City of Mill Valley* (1999) 75 Cal.App.4th 1243, 1260-1261.) The Council has no authority to fundamentally alter controlling law.

No comments

- n/a -

4. Section 5006 Includes an Unauthorized Assertion of Regulatory Authority over State and Federal Water Contracting

Section 5006: The Proposed Regulations require "improved transparency in water contracting." The Council does not have the statutory authority to impose that requirement merely because it is based on a Council determination that water contracting is a "covered action." While the Delta Reform Act authorizes the Council to review on appeal whether a covered action is consistent with the Delta Plan, it has no role in the initial determination whether a proposed action is a "covered action." As described above, early language had proposed to give the Counsel a direct role, but the Legislature declined to do so as reflected in the Act. The Council recognizes this at page 54 of the Delta Plan—"The state or local agency . . . determines whether the proposed plan, program or project is a covered action . . ." Nevertheless, Section 5006(b) appears to be an attempt to administratively declare that the Department of Water Resources' and U.S. Bureau of Reclamation's administration of their contracts are covered actions. The Legislature, however, has explicitly provided otherwise by excluding routine operations of the SWP and CVP—which includes routine execution and amendment of a water supply contract—in Water Code Section 85057(b)(2). The Delta Reform Act does not authorize the Council to regulate the contract renewal process, and its attempt to do so is inconsistent with the Delta Reform Act.

In addition, any attempt by the Council to alter or amend those contracting policies would be inconsistent with supremacy principles under federal law, which governs the contracting process for water supplied by the Central Valley Project; the Burns-Porter Act (see, e.g., Wat. Code § 12937), which governs the State Water Project; and the Delta Reform Act savings clause (including the provision that nothing in the Act affects the Burns-Porter Act). (Wat. Code, § 85032(e).)

For the foregoing reasons, Section 5006 should be removed from the Proposed Regulations.

Section 5009: The Proposed Regulation states that "[s]ignificant impacts to the opportunity to restore habitat at the elevations shown in Appendix 4 must be avoided or mitigated." It is unclear what constitutes an "opportunity to restore habitat," and how such an "opportunity" might be the subject of a potentially significant impact (which much be an adverse physical impact under controlling law). (Pub. Resources Code, §§ 21065, 21068; Cal. Code Regs., tit. 14, §§15358, 15382.) These ubiquitous uncertainties violate OAL requirements. Thus, Section 5009 must be removed or revised.

B. Sections of the Proposed Regulations Are Not Necessary or Are Unreasonable

The OAL will review the Proposed Regulations for compliance with the "necessity" standard. Government Code section 11349(a) defines the necessity standard:

> "Necessity" means the record of the rulemaking proceeding demonstrates by substantial evidence the need for a regulation to effectuate the purpose of the statute, court decision, or other provision of law that the regulation implements, interprets, or makes specific, taking into account the totality of the record. For purposes of this standard, evidence includes, but is not limited to, facts, studies, and expert opinion.

No comments

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To satisfy this standard, Council must provide:

> (1) a statement of the specific purpose of each adoption, amendment, or repeal; and
>
> (2) information explaining why each provision of the adopted regulations is required to carry out the described purpose of the provision. Such information shall include, but is not limited to, facts, studies, or expert opinion. When the explanation is based upon policies, conclusions, speculation, or conjecture, the rulemaking record must include, in addition, supporting facts, studies, expert opinion, or other information. An "expert" within the meaning of this section is a person who possesses special skill or knowledge by reason of study or experience which is relevant to the regulation in question.

Numerous sections of the Proposed Regulations do not meet these legal standards. Examples are set forth below.

Section 5001: In the Initial Statement of Reasons, the Council states that the definitions in section 5001 "are necessary to clarify the meaning of terms used in the regulations." (Initial Statement of Reasons at p.2.) However, at least the following five provisions within the proposed definitions are unnecessary.

Subsection 5001(k): The proposed regulatory definition of "feasible" merely repeats the language of Public Resources Code section 21061.1. (See also Cal. Code Regs., tit. 14, § 15364.) As such, the regulation is unnecessary and duplicative.

Subsection 5001(s): The proposed regulatory definition of "significant impact" conflicts with existing statutory and regulatory definitions of the same term used in the same context. (Pub. Resources Code, § 21068; Cal. Code Regs., tit. 14, § 15382.) The Council's proposed regulation is confusing and unnecessary as well as inconsistent with controlling law. (Pub. Resources Code, § 21068; Cal. Code Regs., tit. 14, § 15382; *see also In re Bay-Delta Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1167-1168; *Communities for a Better Environment v. South Coast Air Quality Management District* (2010) 48 Cal.4th 310, 315, 320-322; *Citizens for East Shore Parks v. State Lands Commission* (2011) 202 Cal.App.4th 549, 557-566.)

Section 5005: The Initial Statement of Reasons describes section 5005 as necessary to "ensure[] that urban and agricultural water suppliers are taking appropriate actions to contribute to the achievement of reduced reliance on the Delta . . ." (Initial Statement of Reasons at p. 4.) In addition, the text of section 5005 of the Proposed Regulations requires use of water from the Delta watershed to be "significantly reduced." The Council's proposed implementation of that requirement violates the Savings Clauses of the Delta Reform Act. (Wat. Code, §§ 85031-85032.) Moreover, the legislative purpose of the Act was to further the coequal goals through the establishment of the Council to improve coordination of state agency actions in the Delta, develop a new Science Program to improve water and ecosystem management in the Delta, and ensure activities of the State and local governments in the

No comments

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Delta did not preclude progress toward achievement of the coequal goals. These outcomes were to be achieved through the Delta Plan, under which the Council was given the authority to review appeals of consistency certifications for "covered actions." Regulations seeking to reduce water use statewide and SWP and CVP water deliveries are not necessary for the Council to effectuate these purposes of the Delta Reform Act, which the Legislature directed it to pursue with very limited, rather than expansive, authorities provided in the Act.

Subsection 5005(c): Water Code section 85021 calls for a statewide strategy of investment in regional water supply and management actions as a means to help reduce reliance on the Delta in meeting future water supply needs. However, proposed subsection 5005(c) turns this statutory, forward-looking investment policy into a highly punitive threat to current and future water supplies. In doing so, the Council has proposed a regulation that is unnecessary, unreasonable, and inconsistent with the statute itself and that "does not reasonably effectuate the statute." (Gov. Code, §§ 11342.2, 11346.3, 11349.1(a).)

The Council's proposed section 5005(c) could prevent water supply entities the use of their water rights, or their contract rights to water service, even if those entities meet all statutory requirements, simply because the Council has decided that another entity has not, in the Council's opinion, adequately reduced its reliance on water from the Delta watershed. For example, the Council apparently claims the authority (1) to determine that one entity sharing a supply with others (e.g., several retailers served by the same wholesale supplier) has not implemented "all programs and projects" identified in its water management plan as cost effective and technically feasible; and (2) to prohibit the delivery to other parties sharing that supply and for which water management plan compliance has not been questioned. Under this proposed regulation, if "one or more" water suppliers have not satisfied the Council, it claims the right to consider that factor in deciding whether to halt delivery of any of that water to all of the entities sharing that supply. Not only is this assertion of power untenable and not supported by the language of the statute or its legislative history, it also is invalid and ineffective under Government Code section 11342.2.

Section 5006: In the Initial Statement of Reasons, the Council asserts that section 5006 is intended to remedy the "lack of accurate, timely, consistent, and transparent information on the management of California's water supplies and beneficial uses" through "improved public involvement and transparency in decision making processes by enforcing . . . existing contracting policies within the [DWR] and the Bureau of Reclamation." (Initial Statement of Reasons at p. 5.) However, the requirement in the Proposed Regulation of "improved transparency in water contracting" is redundant of existing policies, as shown in the Council's own appendices. The specific language merely requires the Department of Water Resources and U.S. Bureau of Reclamation to follow contracting policies that each has developed and is currently utilizing. There is no need for the requirement.

C. Sections of the Proposed Regulations Lack Clarity

The OAL will review the Proposed Regulations to determine whether they comply with the "clarity" standard. (Gov. Code, § 11349.1(a)(3).) "Clarity" as defined by Government Code section

No comments

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11349(c) means "written or displayed so that the meaning of regulations will be easily understood by those persons directly affected by them." "Clarity" is further defined in California Code of Regulations, title 1, section 16(a):

> In examining a regulation for compliance with the "clarity" requirement of Government Code section 11349.1, OAL shall apply the following standards and presumptions:
>
> > (a) A regulation shall be presumed not to comply with the "clarity" standard if any of the following conditions exists:
> >
> > (1) the regulation can, on its face, be reasonably and logically interpreted to have more than one meaning . . . .

Because the Proposed Regulations contain so many vagaries, the regulated community cannot know how they may be required to comply. The Council has an obligation to provide clear and complete regulations for public review and comment such that their requirements are readily apparent. The following examples illustrate where the Proposed Regulations do not satisfy that obligation.

Subsection 5001(s): As noted above, the Initial Statement of Reasons states that the definitions in section 5001 "are necessary to clarify the meaning of terms used in the regulations." (Initial Statement of Reasons at p.2.) However, the proposed definition of "significant impact" is confusing. Subsection 5001(s) does not explain what would constitute a "*substantial* impact on the achievement of one or both of the coequal goals," which is a key component of the proposed definition of "significant impact." (Emphasis added.) Thus, in addition to being unnecessary and inconsistent with controlling law, subsection 5001(s) lacks clarity.

Section 5009: The Proposed Regulation states that "[s]ignificant impacts to the opportunity to restore habitat at the elevations shown in Appendix 4 must be avoided or mitigated." It is unclear what constitutes an "opportunity to restore habitat," and how such an "opportunity" might be the subject of a potentially significant impact (which much be a physical impact under controlling law). (Pub. Resources Code, §§ 21065, 21068; Cal. Code Regs., tit. 14, §§15358, 15382.) Further, it is unclear how the proposed mandatory language requiring that "opportunity" impacts "must be avoided or mitigated" is to be satisfied.

IV. DEFICIENCIES WITH COST ANALYSIS

The Cost Analysis of the DSC proposed regulations contains analytical errors, errors of omission, and simply ignores significant costs.

A. The Cost Analysis Does Not Adequately Explain the Assumption of No Cost to Comply with Existing Regulations

The proposed regulations are based on an apparent assumption that the Proposed Regulations merely duplicate, and do not add to the substantive requirements of existing law, so the costs of the proposed regulations would occur in any case. That assumption is not explicitly stated or supported by

No comments

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citations to law. Thus, the assumption that particular results of the regulations are already defined in law, and thus generate no costs, is unsupported. To the extent that the Proposed Regulations add substantive mandates, as demonstrated above, the assumption is inaccurate.

B. The Cost Analysis Greatly Underestimates the Cost of Complying with the Proposed Regulations

Most simply put, the cost analysis is limited to administrative costs of compliance with the Proposed Regulations; thus, it fails to address the larger direct and indirect economic and social costs associated with application of the regulations as written.

The Proposed Regulations fail to consider:

- Costs (both opportunity and direct costs) due to delays in private projects for consistency determinations;
- Costs due to delays that result in the abandonment of projects;
- Costs due to appeals regarding consistency certifications, and the lack of clear definition of many of the terms of the regulation lend themselves to interminable, hyper-technical legal challenges based on differing interpretations of vague and ambiguous provisions;

Also, the cost analysis ignores the costs associated with the mandatory reductions in the quantity of water conveyed through the Delta, and in reductions in water used from within the Delta watershed set forth in Section 5005 of the Proposed Regulations. The economic and social costs of those reductions are severe. The Public Water Agencies' prior letter regarding the Delta Plan Draft Program Environmental Impact Report, dated February 2, 2012, discusses the work of economists from U.C. Davis and the University of the Pacific, which concluded that in 2009, as a result of a relatively dry hydrology and water supply restrictions imposed on the State Water Project and Central Valley Project, the San Joaquin Valley population lost as many as 7,434 jobs, more than $278 million in income, and more than $368 million in overall economic output. (Michael J., et al. 2009. A Retrospective Estimate of the Economic Impacts of Reduced Water Supplies to the San Joaquin Valley in 2009 (Sep. 28, 2010).) Additional support can be found in several court decisions. (*Delta Smelt Consol. Cases* (E.D. Cal. 2010) 717 F.Supp.2d 1021, 1052; *Consol. Salmonid Cases* (E.D. Cal. 2010) 713 F.Supp.2d 1116, 1148; *San Luis & Delta-Mendota Water Authority v. Salazar (Delta Smelt Consol. Cases)* (E.D. Cal. 2009) 2009 WL 1575169 at *5-6.)

To the extent the proposed regulations assume the reductions in the quantity of water conveyed through the Delta would be "offset" by localized actions, the cost analysis does not identify costs associated with those other actions. For example, if the offset is to occur with increased production of groundwater, the cost analysis does not consider the cost of overdrafting groundwater basins.

No comments

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C. The Cost Analysis Erroneously Interprets Habitat Restoration as No Cost

The cost analysis assumes that all habitat restoration will result from the operation of CEQA. There is no basis for this assumption, as nowhere in the Proposed Regulations are habitat restoration goals tied to those required to fulfill CEQA obligations to implement feasible alternatives or mitigation measures to address significant environmental impacts. As a result, the cost analysis improperly assumes no cost for habitat restoration that may be required as a result of the Proposed Regulations.

Further, the related requirement to protect opportunities to restore habitat imposes additional opportunity and direct costs, as use of private property may be affected by restoration effort mandates. The discussion in the cost analysis focuses on areas that are currently regulated to justify its finding of no additional costs, but fails to examine the costs associated with those areas which are not currently regulated.

D. The Cost Analysis Ignores Potential Costs Associated with Implementing the Requirements to Reduce Reliance on Delta Watershed Water to Meet Future Water Supply Needs

While existing law may require regions to improve water conservation, groundwater management, and multiple other water use changes (see Wat. Code, § 10608 et seq.), Section 5005 of the Proposed Regulations threatens loss of water supply for failing to meet certain reductions in water used from the Delta watershed. The Proposed Regulations state, if a region fails to '"adequately contribute," to water use reductions,[10] those within that region may not receive water from within the Delta, or conveyed through the Delta. If restrictions on water supply are imposed pursuant to Section 5005, such draconian consequences will drive significant expenditures beyond what is currently underway. Conversely, those regions which have already significantly complied with the requirements may have limited ability to further reduce their demand. Those regions may lose opportunities to have sufficient water to meet demands or be forced to spend large sums of money on projects that are not otherwise cost-effective. Thus, the Council has yet to analyze the economic costs associated with the implementation of Section 5005.

[10] "Adequately contribute" is undefined. Thus, the cost of compliance may be unknowable. However, the Council cannot promulgate an unlawfully vague and ambiguous regulation, then use the vagueness and ambiguity as an excuse not to conduct the required economic analysis of the impact of implementing the Proposed Regulations.

No comments

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For all the reasons stated above, the Proposed Regulations including the Cost Analysis are fundamentally flawed and should be revised and recirculated for public comment.

Sincerely,

Daniel G. Nelson
Executive Director
San Luis & Delta-Mendota Water Authority

Terry L. Erlewine
General Manager
State Water Contractors

No comments

- n/a -

ATTACHMENT 1

The State Water Contractors (SWC) represents 27 public agencies that contract with the State of California for water from the State Water Project (SWP). These agencies are each organized under California law and provide water supplies to nearly 25 million Californians and 750,000 acres of prime farmland from Napa County to San Diego and points between.

The San Luis & Delta-Mendota Water Authority (SLDMWA), which was formed in 1992 as a joint powers authority, consists of 29 member agencies, 27 of which contract with the United States Department of the Interior, Bureau of Reclamation (Reclamation), for supply of water from the federal Central Valley Project (CVP). SLDMWA's member agencies hold contracts with Reclamation for the delivery of approximately 3.3 million acre-feet of CVP water. CVP water provided to SLDMWA's member agencies supports approximately 1.2 million acres of agricultural land, as well as more than 100,000 acres of managed wetlands, private and public, in California's Central Valley. SLDMWA's member agencies also use CVP water to serve more than 1 million people in the Silicon Valley and the Central Valley.

SLDMWA Member Agencies:	SWC Member Agencies:
Banta-Carbona Irrigation District	Alameda County Flood Control and Water Conservation District Zone 7
Broadview Water District	Alameda County Water District
Byron Bethany Irrigation District (CVPSA)	Antelope Valley-East Kern Water Agency
Central California Irrigation District	Casitas Municipal Water District
City of Tracy	Castaic Lake Water Agency
Del Puerto Water District	Central Coast Water Authority
Eagle Field Water District	City of Yuba City
Firebaugh Canal Water District	Coachella Valley Water District
Fresno Slough Water District	County of Kings
Grassland Water District	Crestline-Lake Arrowhead Water Agency
Henry Miller Reclamation District #2131	Desert Water Agency
James Irrigation District	Dudley Ridge Water District
Laguna Water District	Empire-West Side Irrigation District
Mercey Springs Water District	Kern County Water Agency
Oro Loma Water District	Littlerock Creek Irrigation District
Pacheco Water District	Metropolitan Water District of Southern California
Pajaro Valley Water Management Agency	Mojave Water Agency
Panoche Water District	Napa County Flood Control and Water Conservation District
Patterson Irrigation District	Oak Flat Water District
Pleasant Valley Water District	Palmdale Water District
Reclamation District 1606	San Bernardino Valley Municipal Water District
San Benito County Water District	San Gabriel Valley Municipal Water District
San Luis Water District	San Gorgonio Pass Water Agency
Santa Clara Valley Water District	San Luis Obispo County Flood Control and Water Conservation District
Tranquility Irrigation District	Santa Clara Valley Water District
Turner Island Water District	Solano County Water Agency
West Side Irrigation District	Tulare Lake Basin Water Storage District
West Stanislaus Irrigation District	
Westlands Water District	

No comments

- n/a -