#3

Delta Stewardship Council
REQUEST TO ADDRESS THE COUNCIL
Sacramento, CA

2:23 p.m

end 2:52 p.m.

DATE: 1/11/13

AGENDA ITEM NO.: 3

NAME (Please print): Bob Wright

BUSINESS/AGENCY NAME: Environmental Water Caucus, Friends of the River + Restore the Delta

ADDRESS: 1418 20th St Ste

CITY, STATE, ZIP: Sacramento, CA 95811 PHONE: (916) 442-3155 x 217

IF THIS IS A NON-AGENDA ITEM, PLEASE STATE THE SUBJECT MATTER TO BE PRESENTED:
Comments on Delta Plan, Regulatory Draft, EIR, Delta Plan, + proposed regulations

COMMENTS:

(PLEASE COMPLETE FORM AND SUBMIT TO STAFF)

Delta Stewardship Council
REQUEST TO ADDRESS THE COUNCIL
Sacramento, CA

DATE: 1.11.13

AGENDA ITEM NO.:

NAME (Please print): Friends of the River

BUSINESS/AGENCY NAME:

ADDRESS:

CITY, STATE, ZIP: PHONE: ( )

IF THIS IS A NON-AGENDA ITEM, PLEASE STATE THE SUBJECT MATTER TO BE PRESENTED:

COMMENTS:

(PLEASE COMPLETE FORM AND SUBMIT TO STAFF)

To protect and restore California Rivers by influencing public policy and inspiring citizen action.

FRIENDS OF THE RIVER

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January 11, 2012

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

Re: Exhibits referred to in Comments on Recirculated Draft Programmatic Environmental Impact Report (RDPEIR)

Dear Ms. Messer and Council Members:

Please include the attached three documents in the Administrative Record in your CEQA proceedings on the Final Draft Delta Plan and RDPEIR. These three documents have been or are being referred to in the written comments of the Environmental Water Caucus and/or Friends of the River and are as follows:

***Release and Report in Brief,* National Academy of Sciences, A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan (May 5, 2011);**

***Eberhardt School of Business Forecasting Center,* Benefit-Cost Analysis of Delta Water Conveyance Tunnels (July 12, 2012);**

***California Natural Resources Agency,* Gov. Brown and Obama Administration Outline Path Forward for Bay Delta Conservation Plan, "The elements of a preferred proposal include the construction of water intake facilities with a**

total capacity of 9000 cubic feet per second. . . and a conveyance designed to use gravity flow. . ." (July 25, 2012).

Sincerely,

E. Robert Wright

Senior Counsel

Friends of the River

NEWS FROM THE NATIONAL ACADEMIES

NATIONAL ACADEMY OF SCIENCES
NATIONAL ACADEMY OF ENGINEERING
INSTITUTE OF MEDICINE
NATIONAL RESEARCH COUNCIL

Date: May 5, 2011

FOR IMMEDIATE RELEASE

CALIFORNIA'S DRAFT BAY DELTA CONSERVATION PLAN INCOMPLETE; NEEDS BETTER INTEGRATION TO BE MORE SCIENTIFICALLY CREDIBLE

WASHINGTON — A draft plan to conserve habitat for endangered and threatened fishes in the California Bay-Delta while continuing to divert water for agricultural and personal use in central and southern California has critical missing components, including clearly defined goals and a scientific analysis of the proposed project's potential impacts on delta species, says a new report from the National Research Council. In addition, the scientific information in the plan is fragmented and presented in an unconnected manner, making its meaning difficult to understand.

The delta region receives fresh water from the Sacramento and San Joaquin rivers and their tributaries, and water from the delta ultimately flows into the San Francisco Bay and the Pacific Ocean. Pumping stations divert water from the delta, primarily to supply Central Valley agriculture and southern California metropolitan areas. The effects of an increasing population and the operation of the engineered water-control system have substantially altered the delta ecosystem, including its fish species.

The November 2010 draft of the Bay Delta Conservation Plan (BDCP) aims to gain authorization under the federal Endangered Species Act and companion California legislation for a proposed water diversion project, such as a canal or tunnel that would take water from the northern part of the delta directly to the south while protecting the region's ecosystems. To date approximately $150 million has been spent in developing the BDCP, which is being prepared by a steering committee of federal, state, and local agencies, environmental organizations, and other interest groups. The plan is slated for completion by 2013 and would be implemented over the next 50 years.

The draft BDCP states that the principal component of a habitat conservation plan is an "effects analysis," which the plan defines as "a systematic, scientific look at the potential impacts of a proposed project on those species and how those species would benefit from conservation actions." However, the effects analysis is still being prepared and was not included in the BDCP, resulting in a critical gap in the science. Without this analysis, it is hard to evaluate alternative mitigation and conservation actions.

The BDCP lacks clarity in its purpose, which makes it difficult to properly understand, interpret, and review the science that underlies the plan, stated the panel that wrote the report. Specifically, it is unclear whether the BDCP is exclusively a habitat conservation plan to be used as an application to "take" -- meaning to injure, harass, or kill -- listed species incidentally or whether it is intended to be a plan that achieves the co-equal goals of providing reliable water supply and protecting and enhancing the delta ecosystem. If it is the latter, a more logical sequence would be to select alternative projects or operation regimes only after the effects analysis is completed.

Furthermore, the draft BDCP combines a catalog of overwhelming detail with qualitative analyses of many separate actions that often appear disconnected and poorly integrated, the panel said. There are many scientific elements, but the science is not drawn together in an integrated fashion to support the restoration activities. The panel noted that a systematic and comprehensive restoration plan needs a clearly stated strategic view of what each scientific component is intended to accomplish and how this will be done.

"There is a strong body of solid science to support some of the actions discussed in the BDCP, but because the science is not well-integrated, we are getting less from the science than we could," said panel chair Henry Vaux, professor emeritus of resource economics at the University of California in Berkeley and Riverside. "As our report concludes, a stronger and more complete BDCP -- and the panel identified several areas for improvement -- could contribute importantly to solving the problems that beset the delta."

The study was sponsored by the U.S. departments of the Interior and Commerce. The National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council make up the National Academies. They are independent, nonprofit institutions that provide science, technology, and health policy advice under an 1863 congressional charter. Panel members, who serve pro bono as volunteers, are chosen by the Academies for each study based on their expertise and experience and must satisfy the Academies' conflict-of-interest standards. The resulting consensus reports undergo external peer review before completion. For more information, visit http://national-academies.org/studycommitteeprocess.pdf. A panel roster follows.

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Shaquanna Shields, Media Relations Assistant

Office of News and Public Information
202-334-2138; e-mail news@nas.edu

Additional Resource:
Report in Brief

Pre-publication copies of *A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan* are available from the National Academies Press; tel. 202-334-3313 or 1-800-624-6242 or on the Internet at http://www.nap.edu. Reporters may obtain a copy from the Office of News and Public Information (contacts listed above).

# # #

NATIONAL RESEARCH COUNCIL
Division on Earth and Life Studies
Water Science and Technology Board
Ocean Studies Board

Panel to Review California's Draft Bay-Delta Conservation Plan

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NATIONAL ACADEMY OF ENGINEERING
INSTITUTE OF MEDICINE
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REPORT IN BRIEF

A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan

California's draft Bay Delta Conservation Plan—a draft plan to conserve habitat for endangered and threatened species, while continuing to divert water to agriculture and domestic water users in central and southern California—is incomplete and contains critical scientific gaps. The Bay Delta is a large, complex ecosystem that supplies water from the state's wetter northern regions to the drier southern regions, and also serves as habitat for many species. The Bay Delta Conservation Plan describes a proposal to construct a tunnel or canal to divert water from the northern Delta to the south, thus reducing the need to convey water through the Delta. This report reviews the use of science and adaptive management in the draft Bay Delta Conservation Plan and identifies opportunities to develop a more successful plan.

Encompassing the deltas of the Sacramento and San Joaquin Rivers, and the eastern margins of the San Francisco Bay, the San Francisco Bay Delta Estuary was once a great tidal freshwater marsh. But over the last century and a half, the land has been drained, cleared, and used for agricultural and residential purposes. Today, the Delta is a maze of canals and waterways flowing around more than 60 islands of farmland and occupying an area of 1,150 square miles.

Credit: California Department of Water Resources

The modified Delta plays an integral role in the water delivery system of California. Water flows into the Delta from the watersheds of the Sacramento and San Joaquin rivers, and is transported through a network of engineered canals to supply water to the drier southern regions of the state. This water helps irrigate millions of acres of arid and semi-arid farmlands, and supplies municipal water to approximately 25 million Californians.

Several other forces of change, including land subsidence, sea level rise, and increased urbanization, have also shaped the Delta, making it one of the most modified deltaic systems in the world—and this transformation has come at a cost. The Delta has supported a diverse array of fish, birds, other animals, and plants, but now, some of these species are listed as threatened or endangered. Restrictions on water exports to protect those species during some periods, together with the effects of several dry years, have exacerbated tensions over water allocation, spurring the development of a variety of plans to provide reliable water supplies and protect the ecosystem.

One of those plans is the Bay Delta Conservation Plan, currently under development by a consortium of federal, state, and local agencies; water supply entities; environmental organizations; and other parties. The plan is intended to support authorization, under both state and federal endangered species statutes, for a proposed "isolated conveyance facility," a mechanism to take water from the northern part of the Delta to the south, thus reducing the need to convey water through the Delta. At the request of the U.S. Secretaries of the Interior and Commerce, the National Research Council

The Bay Delta Conservation Plan is a Habitat Conservation Plan—a plan that developers must submit to the U.S. Fish and Wildlife Service before undertaking an activity or project that could incidentally take* species listed as threatened or endangered under the federal Endangered Species Act. These plans must outline actions that will be taken to protect the habitat of threatened or endangered species in order to compensate for incidental take. Similarly, the Bay Delta Conservation Plan is a Natural Community Conservation Plan under California's Natural Community Conservation Planning Act. These plans aim, among other things, to help the recovery of the species.

* "Take" includes actions that "harm" wildlife, including habitat modification that actually kills or injures wildlife by impairing breeding, feeding, or sheltering behaviors. For further clarification, please see the full report.

convened a panel of experts to review the use of science and adaptive management in a working draft of the Bay Delta Conservation Plan.

The draft Bay Delta Conservation Plan is incomplete in a number of important areas. For example, at the outset of its review, the panel found that although the Bay Delta Conservation Plan aims to address management and restoration of the San Francisco Bay Delta estuary, it omits any analyses of the potential impacts of the plan's efforts on the San Francisco Bay itself (aside from Suisun Bay). Furthermore, the report identifies other key scientific and structural gaps in the draft plan that, if addressed, could lead to a more successful and comprehensive final Bay Delta Conservation Plan.

The Lack of an Effects Analysis

The Bay Delta Conservation Plan describes an effects analysis as a systematic, scientific look at the potential impacts of a proposed project on the species that the project will potentially affect, and at how those species would benefit from various conservation actions. Clearly, such an effects analysis is intended to be the basis for the choice and details of those conservation actions. However, the effects analysis for the Bay Delta Conservation Plan is still in preparation, and was therefore absent from this draft of the plan, representing a critical gap in the science underlying the plan and the corresponding conservation actions.

The panel noted that a successful effects analysis should include an integrated description of the components of the system and how they relate to each other, a synthesis of the available science, and a representation of the dynamic response of the system.

The Lack of Clarity as to the Bay Delta Conservation Plan's Purpose

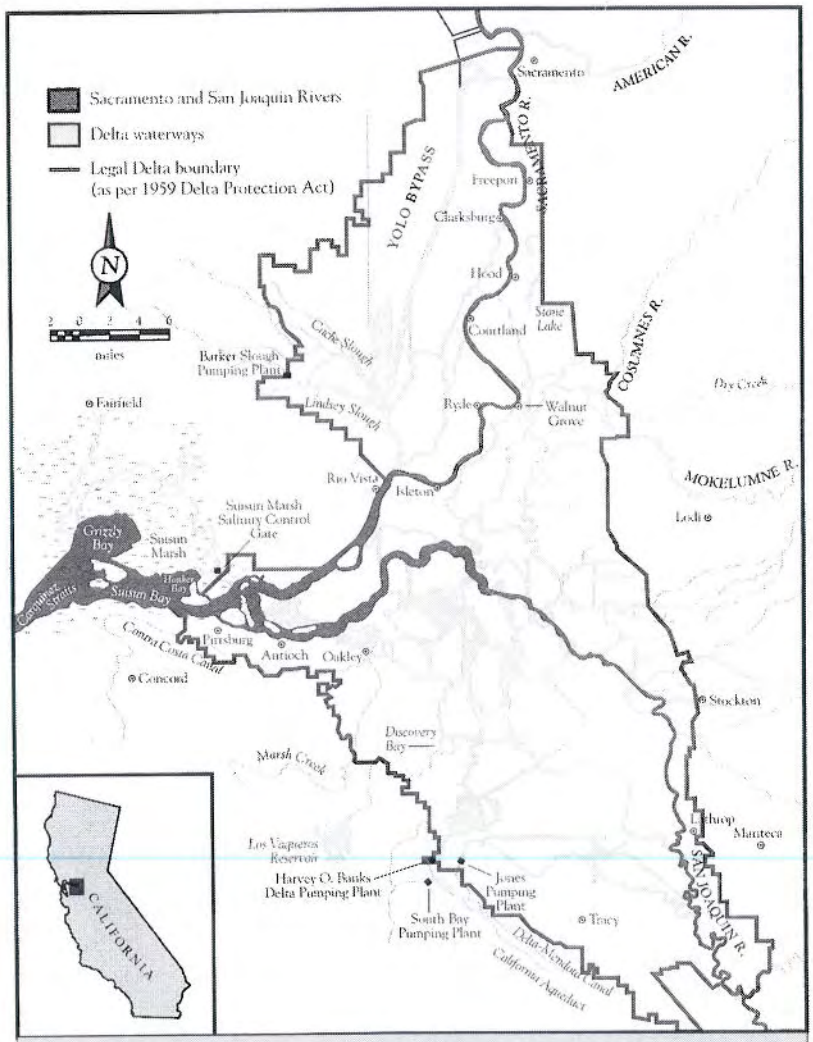
The legal framework surrounding the Bay Delta Conservation Plan is complex. In attempting to comply with all the relevant laws and regulations, the authors of the Bay Delta Conservation Plan have undertaken to develop a conservation plan of great importance, scope, and difficulty. The panel recognized these challenges, and also acknowledged that the Bay Delta Conservation Plan it reviewed is a work in progress. However, the panel found that the purpose of the Bay Delta Conservation Plan is not clear, making it difficult to properly understand, interpret, and review the science that underlies the plan.

The central issue is that although the plan states it is an application for the incidental take of listed species as a result of the proposed water diversion project, it also sets out the goals of providing a more reliable water supply for the state of California and protecting the Delta ecosystem. Because different processes would be used to fulfill these different purposes, the panel concluded that it would be difficult to evaluate the Bay Delta Conservation Plan without clarification of the plan's goals.

To obtain an incidental take permit, developers would design conservation methods to minimize and mitigate the adverse effects of a specific project or operation. However, if the Bay Delta Conservation Plan were a broader conservation plan that aims to protect the ecosystem and provide a reliable water supply, then it would be more logical to carry out an effects analysis, and then identify several alternative projects to reach the two goals. Under the latter scenario, choosing the alternative project before evaluating alternative ways to reach a preferred outcome would be post hoc rationalization—in other words, putting the cart before the horse. Scientific reasons for not considering alternative actions are not presented in the plan.

The Use of Science and Synthesis in the Bay Delta Conservation Plan

Many scientific studies have sought to understand the hydrologic, geologic, and ecological interactions in the Delta, efforts that constitute the



The San Francisco Bay/Sacramento–San Joaquin Delta in California.

Credit: Lund, et al. (2002)/Public Policy Institute of California

scientific foundation of the Bay Delta Conservation Plan. However, it is not clear how the authors of the Bay Delta Conservation Plan synthesized this material and incorporated it into the decision-making process that led to the plan's conservation actions. For example, it is not clear whether the analyses carried out by the numerous other Delta conservation plans and scientific assessments were used in the draft Bay Delta Conservation Plan.

Quantitative evaluation of the environmental stressors that impact species of interest, ideally using life-cycle models, would strengthen the Bay Delta Conservation Plan. For example, much of the analysis of the decline of smelt and salmonids in the Delta has focused on water operations, in particular the pumping of water at the south of the Delta for export to other regions. However, a variety of other environmental factors have potentially large effects on these fishes; and considerable uncertainties remain about the impact that different aspects of flow management in the Delta, especially management of the salinity of the water, have on their survival.

The lack of clarity concerning the volume of water to be diverted through the proposed isolated conveyance facility is another major shortcoming of the Bay Delta Conservation Plan. Without a clear specification of the volume of water deliveries, the expected impacts to the ecosystem cannot be assessed. Overall, the panel concluded that the Bay Delta Conservation Plan is little more than a list of ecosystem restoration tactics and scientific efforts, with no coordinated strategy for reaching the goals of the plan.

Adaptive Management

Numerous attempts have been made to develop and implement adaptive management strategies in environmental management, but many of them have failed for reasons such as a lack of resources, the high cost of implementation, or the inherent variability of natural ecosystems. Despite these challenges, there often is no better option for implementing environmental management regimes, and therefore the panel

Adaptive management is a formal, systematic, and rigorous program of learning from the outcomes of management actions and using this information to inform the next steps of the plan. Predicting the outcomes of management alternatives in natural systems is difficult, due to the many uncertainties involved. Adaptive management, at least in theory, can provide resource managers with iterative strategies to deal with uncertainties and use science, with a heavy emphasis on monitoring, for planning, implementation, and assessment of restoration efforts.

concluded that the use of adaptive management is appropriate for the Bay Delta Conservation Plan, although adaptive management applied to a large-scale problem such as the California Bay Delta will not be easy, quick, or inexpensive. These considerations further emphasize the need for clear goals.

Adaptive management programs cannot be fully described in advance, because the program must evolve as it is implemented. However, some aspects of the program could be laid out more clearly than they were in the draft Bay Delta Conservation Plan, the panel found. The plan developers would benefit from experience with adaptive management efforts in other large-scale ecosystem restoration projects, such as the Comprehensive Everglades Restoration Program.

Management Fragmentation and a Lack of Coherence

The management of any science-based process has a profound impact on the use of science and adaptive management in that process. The absence of scientific synthesis in the draft Bay Delta Conservation Plan draws attention to the fragmented system of management under which the plan was prepared, lacking coordination and accountability. No single public agency, stakeholder group, or individual was made accountable for the coherence, thoroughness, and scientific integrity of the final product. Rather, the Bay Delta Conservation Plan reflects the differing perspectives of the federal, state, and local agencies, and the many stakeholder groups involved. Unless the management structure is made more coherent and unified, the final product may continue to suffer from a lack of integration, in an attempt to satisfy all discrete interests and, as a result, fail to achieve its goals. Development and implementation of large restoration and conservation programs such as the Bay Delta Conservation Plan often require a complex structure to incorporate technical, political, and legal realities and the evolving dynamics of both the physical and organizational environments. The panel suggests the agencies responsible for implementing the plan review other examples of large scale restoration programs that have been developed and implemented. In conclusion, the panel underscores the importance of a credible and a robust Bay Delta Conservation Plan in addressing the various water management problems that beset the Delta.

Read or purchase this report and locate information on related reports at http://dels.nas.edu/wstb

Panel to Review California's Draft Bay Delta Conservation Plan: Henry J. Vaux, Jr. (*Chair*), Professor Emeritus, University of California; **Michael E. Campana**, Oregon State University; **Jerome B. Gilbert**, Private consultant, Orinda, CA; **Albert E. Giorgi**, BioAnalysts, Inc., Redmond, WA; **Robert J. Huggett**, Professor Emeritus, College of William and Mary, Seaford, VA; **Christine A. Klein**, University of Florida College of Law, Gainesville; **Samuel N. Luoma**, U.S. Geological Survey, Emeritus, Menlo Park, CA; **Thomas Miller**, University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, Solomons; **Stephen G. Monismith**, Stanford University; **Jayantha Obeysekera**, South Florida Water Management District, West Palm Beach; **Hans W. Paerl**, University of North Carolina, Chapel Hill; **Max J. Pfeffer**, Cornell University; **Desiree D. Tullos**, Oregon State University; **Laura J. Helsabeck** (Study Director), **David Policansky** (Scholar), **Stephen D. Parker** (Water Science and Technology Board Director), **Susan Roberts** (Ocean Studies Board Director), **Ellen de Guzman** (Research Associate), **Sarah Brennan** (Senior Program Assistant), **National Research Council**.

The National Academies appointed the above committee of experts to address the specific task requested by the U.S. Department of the Interior. The members volunteered their time for this activity; their report is eer-reviewed and the final product signed off by both the committee members and the National Academies. This report brief was prepared by the National Research Council based on the committee's report.

EXPERT CONSENSUS REPORT

For more information, contact the Water Science and Technology Board at (202) 334-3422 or visit http://dels.nas.edu/wstb. Copies of *A Review of the Use of Science and Adaptive Management in California's Draft Bay Delta Conservation Plan* are available from the National Academies Press, 500 Fifth Street, NW, Washington, D.C. 20001; (800) 624-6242; www.nap.edu.

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EBERHARDT SCHOOL OF BUSINESS

BusinessForecasting Center

Benefit – Cost Analysis of Delta Water Conveyance Tunnels

July 12, 2012

Summary

This report updates an initial benefit-cost analysis of the water conveyance tunnels at the center of the Bay Delta Conservation Plan (BDCP). We find the tunnels are not economically justified, because the costs of the tunnels are roughly 2.5 times larger than their benefits. The economic benefits of the tunnels include water supply, water quality, and earthquake risk reduction to areas served by export water agencies. The economic costs include capital costs, operating and maintenance costs, and the costs to in-Delta and upstream water users.

Benefit-cost analysis is an essential and normal part of assessment and planning of large infrastructure projects such as the $13 billion water conveyance tunnel proposal, but has not been part of the BDCP. This report fills an important information gap for policy makers and water ratepayers who will ultimately bear the multi-billion dollar costs of the project.

This is a revision of an earlier white paper dated June 14, 2012. This version has been updated to reflect new project and economic information from BDCP, and some minor technical and editorial changes.

The principal author of this report is Dr. Jeffrey Michael, Director of the Business Forecasting Center (BFC) at the University of the Pacific. The BFC is among the most recognized economic research centers in California, and is known for its expertise on the Central Valley economy, growth resource issues facing the region. On water issues, the BFC is known for being the only academic or government entity to accurately assess employment impacts during the 2009 drought, and recently led the development of the Economic Sustainability Plan for the Delta Protection Commission. This report is part of the Center's mission of independent research and analysis of economic issues and trends in the state and region.

No funding was solicited or received to support this report.

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Benefit – Cost Analysis of Delta Water Conveyance Tunnels

A pair of large water conveyance tunnels is being considered as the centerpiece of the Bay Delta Conservation Plan (BDCP). The tunnels would divert water from the Sacramento River and convey it around the Delta to state and federal water projects serving southern California rather than continuing to convey the fresh water through Delta channels. The construction cost of the tunnels is estimated at $13 billion. Essentially, the project is an updated version of the peripheral canal defeated by California voters in 1982.

This report updates an initial comprehensive economic benefit-cost analysis of the proposed tunnel with the latest information from the BDCP. Primarily using the results of the BDCP's own economic benefit and cost studies, we find benefit-cost ratios ranging from 0.3 to 0.5, meaning that there are between $1.90 and $3.36 of costs for every $1 in economic benefits. When these very low benefit-cost ratios are considered alongside the inconsistent and incomplete financial plans, it is clear that the Delta water conveyance tunnels proposed in the draft BDCP are not justified on an economic or financial basis.

The BDCP is considering a variety of sizes and operating criteria for the water conveyance tunnel. This analysis focuses on a scenario that is reported to be the preferred alternative emerging in BDCP negotiations.[1] Two large tunnels will be built to convey water below the Delta along with three intakes on the Sacramento river that can divert 9,000 cfs (cubic feet per second) from the river. The project would result in average annual water exports in a range between 4.3 maf (million acre feet) and 5.5 maf. The level of water exports through the tunnel depends on a 15-year decision-tree process based upon scientific studies of the effectiveness of the BDCP's habitat investments in recovering endangered fish populations. The studies and decision-tree process would be concurrent to the tunnel construction, so the water yield of the tunnels would not be known until after they are built.

This assessment examines a favorable water supply scenario for the water agencies that would finance the tunnels, average water exports of 5.3 maf, near the maximum level. This analysis looks only at the water conveyance proposal in the BDCP, and does not evaluate habitat creation proposals that provide their own benefits and would have several billion dollars in additional construction costs that would be primarily financed by the water bond recently moved to the 2014 ballot. As noted in a later section, this separate analysis of water conveyance infrastructure and habitat is consistent with Department of Water Resources' economic analysis guidelines.

This preliminary benefit-cost assessment can be updated with new information as it becomes available. Our intention is to motivate public agencies and others to conduct comprehensive benefit-cost analysis, and to provide appropriate economic justification of the project. Given the poor performance of the tunnel in this initial benefit-cost analysis with several assumptions favorable to tunnel construction, we believe it is highly unlikely that any subsequent benefit-cost analysis will find that the project is economically justified.

[1] For example, see "Gov. Jerry Brown's delta fix is not much of a plan." *San Francisco Chronicle*, July 9, 2012, and presentations at the June 20, 2012 meeting of the Bay Delta Conservation Plan.

Benefit-Cost Analysis

Benefit-cost analysis of large infrastructure projects is common practice, and broadly considered to be an essential part of good public policy analysis of large capital projects. For example, high-speed rail, the other California mega-project in the news, has included multiple benefit-cost assessments as the plan has evolved. The most recent accompanied the revised business plan and found most scenarios had about $2 in expected benefits for every $1 in expected costs.[2] The benefit-cost ratio of high-speed rail is five times higher than the benefit-cost ratio we have calculated for the Delta water conveyance tunnel.

Benefit-cost analysis of the tunnel conveyance has been called for in numerous reports and reviews of the BDCP, but still has not been appropriately conducted by any state agencies or published in any independent academic studies before this report. The Department of Water Resources (DWR) has an Economic Analysis Guidebook that provides a comprehensive description of DWR's approach to benefit-cost analysis.[3]

The DWR Economic Analysis Guidebook states the importance of benefit-cost analysis well,

> Economic analysis is a critical element of the water resources planning processes because it not only evaluates the economic justification of alternative plans but it can assist in plan formulation. (p. 1)
>
> The economic analysis should answer questions such as, Should the project be built at all? Should it be built now?, Should it be built to a different configuration or size? Will the project have a net positive social value for Californians irrespective of to whom the costs and benefits accrue? (p. 5)
>
> Benefit-cost analysis is the procedure where the different benefits and costs of proposed projects are identified and measured (usually in monetary terms) and then compared with each other to determine if the benefits of the project exceed its costs. Benefit-cost analysis is the primary method used to determine if a project is economically justified. A project is justified when:
>
> - estimated total benefits exceed total estimated economic costs;
> - each separable purpose (for example, water supply, hydropower, flood damage reduction, ecosystem restoration, etc.) provides benefits at least equal to its costs;[4]
> - the scale of development provides maximum net benefits; and

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[2] The April 2012 high-speed rail benefit-cost analysis can be downloaded from http://www.cahighspeedrail.ca.gov/assets/0/152/431/6515fa4a-a098-4b88-9f19-19f0e1475e19.pdf. The business plan and benefit-cost analysis of high-speed rail have been criticized for optimistic ridership projections, but this debate has strengthened the policy and planning process for the high-speed rail project. Many of the economic benefits of high-speed rail are health related such as reduced traffic fatalities and air pollution from reduced highway travel and the benefit-cost analysis attached monetary values to health and environmental benefits.

[3] The DWR Economic Analysis Guidebook is on the web at http://www.water.ca.gov/pubs/planning/economic_analysis_guidebook/econguidebook.pdf

[4] This bullet point is critically important to the BDCP which some argue can only be evaluated as a package of water conveyance and habitat improvement projects. The DWR economic analysis guidebook is correct in stating that water supply and habitat projects should be evaluated separately.

- there are no more-economical means of accomplishing the same purpose. (p. 13)

The benefits and costs of an investment occur at different points in time, and can extend for very long time horizons. Benefit-cost analysis examines a full stream of costs and benefits over the expected life of the project. For this analysis, we examined 50 years after the expected completion of the tunnels in 2025.

The long streams of benefits and costs are compared using a present discounted value in current dollars. A discount rate, comparable to an interest rate, is used to account for the time value of money or the opportunity costs of using funds for a public investment. Public investment has opportunity costs, because it competes with and crowds out funding for private consumption, investment or alternative public investments.

Benefit-cost results can be sensitive to the level of the discount rate, and the choice of discount rate is sometimes controversial in benefit cost analysis. Federal government guidelines recommend the use of a 7% discount rate.[5] The DWR Economic Analysis Guidebook endorses a 6% discount rate. Many economists recommend a lower discount rate, such as 3%, when looking at long-lived investments or regulations to combat long-run, global issues such as climate change. This analysis uses scenarios with a 3% and 6% discount rate.

Benefit-cost analysis is not just a pass/fail test to be taken after an investment proposal is finalized. It should be conducted and refined throughout a planning process as it yields valuable insights about a projects strengths, weaknesses, and overall merit. The absence of benefit-cost analysis throughout the BDCP process is a significant weakness that has left policy makers poorly informed to make a decision about a very costly investment with far ranging economic effects.

The objective of this report is to fill an important information void, and to challenge tunnel proponents to make their economic case using an accepted and established benefit-cost framework. Most of the values for benefits and costs in this report are taken directly or clearly derived from BDCP documents or reports sponsored or cited by tunnel proponents. Most assumptions required to derive values are made in ways that favor building the tunnel. The detailed sources and discussion of study assumptions are in the sections that follow.

Benefits of a Delta Water Supply Tunnel

The delta water supply tunnels would provide four types of potential benefits: higher export water supply, improved export water quality, earthquake risk reduction for water exports, and possible environmental benefits for endangered fish species. There is a trade-off between increasing water supply from the tunnels and their potential benefits for fish.

[5] See Office of Management and Budget, Circular No A-94. http://www.whitehouse.gov/omb/circulars_a094#7

The California Department of Water Resources has recently contracted with the Brattle Group to conduct an Economic Benefit Analysis of the BDCP led by Dr. David Sunding.[6] The quantification of economic benefits in this section follows the framework in the scope of work in the "Benefits Analysis," and the values used in this report are taken directly from the preliminary results presented by Dr. Sunding at the BDCP public meeting on June 20, 2012.[7] The benefits in the Brattle presentation are for the period of 2022 to 2050, whereas this analysis assumes the tunnels would open in 2025 and considers benefits from fifty years of operation, 2025 to 2074. To make the adjustment, we calculated the average annual benefit in the 29 years of the Brattle analysis, and assumed it was constant over the fifty year period from 2025 to 2074.[8]

The Brattle analysis is not a comprehensive statewide benefit-cost analysis, but has a more narrow purpose to "assess whether the benefits of BDCP are sufficient to justify the costs to the agencies receiving project water supplies." In addition to providing reliable, current estimates for several components of benefit-cost analysis, the Brattle "Benefits Analysis" raises some additional considerations for financial feasibility that are discussed later in this report.

Export Water Supply:

The Brattle group estimates the present value of water supply benefits from 2022 to 2050 at $1.898 billion for urban users and $1.138 billion for agricultural exporters using a 3% discount rate. This equates to average annual operating benefits of about $361 per acre foot, averaged across both agricultural and urban water exports. The average annual benefit of $136 million for urban agencies and $81 million for agricultural agencies creates a present value of export water supply benefits of $3.916 billion using a 3% discount rate and $1.700 billion using a 6% discount rate when this annual benefit of the tunnels is extended over the 50 year period beginning in 2025.

Export Water Quality Benefits:

Improved export water quality is a significant benefit of the proposed Delta tunnel. The Brattle group estimates the present value of water quality benefits from 2022 to 2050 at $1.802 billion

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[6] The Economic Benefit Scope of Work is available at http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Economics_Benefit_Scope_of_Work.sflb.ashx

[7] Dr. Sunding's presentation from the meeting is available on the BDCP website, http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/June_2012_Public_Meeting_Presentation_6-20-12.sflb.ashx. Some minor adjustments to the Brattle results have been made to reflect two differences in the scenario analyzed in this report. We assume the tunnel begins operation in 2025 as stated in BDCP documents, not the more optimistic 2022 used in the Brattle modeling. Also, we analyze benefits and costs out to 2075, 50 years of operation, rather than the 2050 end date in the Brattle analysis by assuming benefits continue at a constant annual rate beyond 2050. This assumption may understate total benefits somewhat, but by a much smaller amount than cutting the analysis off in 2050.

[8] This simplifying assumption may somewhat understate benefits since the benefits of the tunnel grow slowly over time and are likely to be somewhat higher in the post 2050 period than the pre-2050 period. However, it may also overstate benefits in the early years that are less affected by discounting. Overall, it has little effect on the results. An alternative option to ignore years after 2050 would result in much lower benefit estimates and significantly bias the analysis against the tunnels.