From: Michael Brodsky <michael@brodskylaw.net>
Sent: Friday, October 30, 2015 4:26 PM
To: BDCPcomments
Subject: resending comments Save the California Delta Alliance 205 RDEIR Cal Water Fix/BDCP
Attachments: Fix comments final.pdf

Please find attached the comments from Save the California Delta Alliance on the 2015 BDCP/Fix RDERIR. These comments were sent earlier today but were returned. We have reduced the file size and are resending

SCDA-40

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COMMENTS OF SAVE THE CALIFORNIA DELTA ALLLIANCE ON THE BAY DELTA CONSERVATION PLAN / CALIFORNIA WATERFIX 2015 RECIRCULATED DRAFT ENVIRONMENTAL IMPACT REPORT / ENVIRONMENTAL IMPACT STATEMENT

October 30, 2015

Lead Agencies
BDCP/California Water Fix
BDCPComments@icfi.com

The following comments are submitted on behalf of Save the California Delta Alliance. We wish to thank the Lead Agencies for this opportunity to submit comments and for considering our views.

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I. These Comments Focus Directly On The RDEIR/S; References To The 2013 Draft EIR/S Are Required By The Way The Lead Agencies Have Structured These Documents And Substantive Responses To Comments Herein Reliant On The 2013 Draft EIR/S Are Required By NEPA and CEQA.

These comments focus directly on the analysis in the RDEIR/S and must necessarily address the 2013 Draft EIR/S because the 2015 RDEIR/s fails to include a reasonable range of alternatives that stems directly from and relies upon the 2013 Draft EIR/S. In order to understand and respond to new alternatives 4A, 2D, and 5A, and asses whether these new alternatives fill out a "reasonable range of alternatives," it is necessary to understand the screening and development of alternatives presented in the 2013 Draft EIR/S. Where that process was flawed or incomprehensible, references to it and requests for corrections are appropriate at this point. Portions of these comments that describe and analyze portions of the 2013 Draft EIR/S are necessary, and must be allowed, in order to make meaningful comments on the RDEIR/S. Further, the public must be able to *understand* the 2013 Draft EIR/S in order to understand the RDEIR/S. Comments directed to failure of the 2013 Draft EIR/S as an informational document are indispensible to a lawful CEQA/NEPA process.

Many commenters called for changes in the 2013 Draft EIR/S and for repairs to its informational presentation. The 2015 DEIR should have responded to these calls, but largely did not. These failures of the 2015 DEIR can only be meaningfully addressed by references to the 2013 Draft EIR/S.

Further, the 2015 RDEIR/S re-issues, revises, and incorporates the 2013 Draft EIR/S in 2015 Appendix A. The 2013 Draft EIR/S is an integral, current, component of the 2015 RDEIR/S. References to the original pagination/section numbering in the 2013 Draft EIR/S, rather than the same information as it is re-presented in Appendix A, are necessary to a clear and comprehensible presentation and to allow a meaningful response to these comments. This is particularly so in light of the condition of informational chaos present in BDCP/Fix environmental review documents.

Failure to respond to any of the criticisms presented in these comments on grounds that the comment period on the 2013 Draft EIR/S would violate the duty of the Lead Agencies to respond to comments as required by NEPA and CEQA.

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II. The 2013 Draft EIR/S And 2015 RDEIR/S Fail As Informational Documents.

A. The EIR/S-RDEIR/S Fails To Meet Minimal Requirements For Fostering Informed Agency Decision-Making And Informed Public Participation.

"[T]he touchstone for our inquiry is whether an EIS's selection and discussion of alternatives fosters informed decision-making and informed public participation. *State of Cal. v. Block*, 690 F.2d 753, 766-67 (9th Cir. 1982). The BDCP/Fix EIR/S does not. "The Current Draft lacks key information, analyses, summaries, and comparisons. The missing content is needed for evaluation of the science that underpins the proposed project. Accordingly, the Current Draft fails to adequately inform weighty decisions about public policy." 2015 ISB DEIR Review 4 (Attachment 21).

"Judicial review of the range of alternatives considered by an agency is governed by a 'rule of reason' that requires an agency to set forth only those alternatives necessary to permit a "reasoned choice." *State of Cal. v. Block*, 690 F.2d at 766–67. "These reasonable expectations go largely unmet in the Bay Delta Conservation Plan/California WaterFix Partially Recirculated Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement Draft. We do not attempt to determine whether this report fulfills the letter of the law. But we find the Current Draft sufficiently incomplete and opaque to deter its evaluation and use by decision-makers, resource managers, scientist, and the broader public." 2015 ISB DEIR Review 1.

It is perhaps unnecessary to add to the ISB's comments to make the point that the EIR/S-RDEIR/S fails as an informational document within the meaning of 42 U.S.C. § 4332, the large body of case law requiring that environmental impact statements be informative and comprehensible, and applicable Council on Environmental Quality implementing regulations. If a panel of eminent scientists, charged by the California Legislature with being the preeminent science advisors to Delta decision-makers, and who have followed and participated in the BDCP/Fix process from the beginning, find the documents "incomplete and opaque," it would seem a tautology to argue that less specialized participants, such as lawyers representing stakeholders, let alone members of the public, could not be reasonably informed by the documents.

The comments of the Delta ISB reflect the frustration of almost all stakeholders with the obdurate obduracy[1] of those responsible for preparing BDCP/Fix documents in refusing to heed repeated and longstanding calls for documents that meet the basic requirements of informed decision-making:

> For over three years, the Delta ISB has been specifically requesting summaries and comparisons: first in June 2012, then in June 2013, and again in a review of the Previous Draft in May 2014. Appallingly, such summaries and comparisons remain absent in the current draft.

2015 ISB DEIR Review 9 (footnotes omitted).

[1] For a discussion of obduracy in a legal context, *see Fink v. Gomez*, 293 F.3d 989, 992 (9th Cir. 2001).

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For example, a reviewer attempting to understand alternative 9A would be confronted with the following tortured journey through project documents.

Alternative 9A (discussed substantively in section ______) was apparently intended to comply with the requirement of the California Legislature that the Lead Agencies consider a scientific report issued by the California State Water Resources Control Board explicitly for the use of the Lead Agencies in developing the BDCP. "For the purposes of informing planning decisions for the Delta Plan and the Bay Development and Conservation Plan, the board shall, pursuant to its public trust obligations, develop new flow criteria for the Delta ecosystem necessary to protect public trust resources." Cal. Water Code § 85086(c)(1) ("Flow Criteria Report").

The SWRCB issued the Flow Criteria Report on August 3, 2010. It calls, in brief, for restoration of Delta flows to 75% of unimpaired flow. The report stresses that it takes account only of "the flows that would be needed in the Delta ecosystem if fishery protection was the sole purpose for which its waters were put to beneficial use." Flow Criteria Report cover page. It does not (and was not commissioned to) perform the extensive detailed analysis needed to balance fishery protection with other beneficial uses, including water supply, nor does it examine how to implement a restoration of 75% of unimpaired flow. It does conclude that restoration of 75% of unimpaired flow is necessary to protect public trust resources in the Delta at certain times of the year and that other standards for Delta outflow also are necessary to protect public trust resources. Flow Criteria Report 96.

It was incumbent upon the Lead Agencies to consider alternatives that examined the flow criteria goal in the context of meeting water supply and other beneficial use needs. However, the EIR/S-RDEIR/S's treatment of Alternative 9A is frustratingly obscure, opaque, and contradictory and it is nowhere apparent that appropriate consideration to the relevant factors was given.

First, Alternative 9A is treated within 2013 Draft EIR/S Chapter 3 (in the body of the EIR/S) and subsequently in Appendix 3A. Chapter 3 is titled "Description of Alternatives" and is 212 pages long. Chapter 3 repeatedly refers the reader to Appendix 3A for an explanation of the screening process and those alternatives that were summarily dismissed without detailed examination. The reader is advised to refer to Appendix 3A "for description of alternatives that were eliminated." 2013 Draft EIR/S 3-7. Appendix 3A contains ninety-four pages of text and an additional sixty-three pages of tables. Although pdf bookmarks appear *after* downloading Appendix 3A, there is no table of contents for Appendix 3A, tables or text. No bookmarks at all appear for the sixty-three pages of tables. The main table of contents for the entire EIR/S lists Appendix 3A only as "Identification of Water Conveyance Alternatives, Conservation Measure CM1." 2013 Draft EIR/S lxxiv. Many of the crucial tables in Appendix 3A are printed in text that appears to be five or six-point. *See, e.g.,* 3A-146 (left hand column) (Attachment 1). Appendix 3A also has seven attachments, consuming 104.47 megabytes of disk space. The table of contents does not list the titles of the attachments and there are no bookmarks for the separate attachments.[2]

[2] It occurred to the present reviewer that the omission of tables of contents for the critical documents could not have passed unnoticed. However, no erratum providing the tables of contents was found. There is a link at the bottom of the 2013 Public Review Draft BDCP EIR/EIS document page entitled "Errata to the Draft EIR/EIS." None of the omitted tables of contents were found at this link.

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It is within this informational setting, then, that the interested reader must pursue Alternative 9A—the only alternatives response to the express call of the California Legislature and subject of a scientific report issued at the direction of the California Legislature expressly for the use of the Lead Agencies in formulating the BDCP/Fix project. 2013 Draft EIR/S section 3.2.2 states that screening alternatives (including 9A) "were evaluated to narrow them to a more manageable field by eliminating similar or duplicative features (i.e., based on conveyance facilities or operations), or because the alternative would fail to meet the purpose and need for the BDCP or would likely violate federal and state statutes or regulations."

Accordingly, "the following conveyance alternatives were dismissed from further evaluation as detailed in Appendix 3A." 2013 Draft EIR/S 3-12. Six screening alternatives, including screening Alternative 9A, are then listed as being dismissed. *Id*. No reference to page numbers in Appendix 3A is provided as to where the reader will find details on what these alternatives contained or why they were dismissed. No explanation or notation as to which of the proffered reasons (duplicative Features, fail to meet purpose and need, or violate statutes or regulations) applies to which alternative.

Turning to Appendix 3A, the alternatives are inconsistently and incrementally described. *Compare* 3A-11 and 3A-43–50, and renumbered, *see* 3A-53, and renumbered again, *see* 3A-72–73, and renumbered again, *see* 3A-79 ("the conveyance alternatives have been renumbered to be consistent with information presented in the BDCP process"). There is no concordance table or straightforward, comprehensible explanation or chart showing the progress of alternatives identification and transformation.

Alternative 9A first appears in Appendix 3A with a one sentence description at 3A-72. Alternative 9A next appears at table 3A-12 with a one-sentence description in what appears to be five or six-point font. 2013 Draft EIR/S 3A-145, and again at table 3A-13 with the same one-sentence description, and again at table 3A-14 with an additional one-sentence description indicating that it would likely require "reducing deliveries to upstream water rights holders." 2013 Draft EIR/S 3A-148.

Alternative 9A is apparently eliminated from consideration in the EIR/S by table 3A-17, which answers the question as to whether the range of alternatives would result in the impairment of "existing senior water rights" as follows: "No for the range of conveyance alternatives that have been consistent with the three levels of screening criteria" although some alternatives may require a "change in legal ownership due to sale of property." 2013 Draft EIR/S 3A-150. Alternative 9A was included in the chart applying third-level screening criteria and is a second-screening alternative. **Cite.** The table text continues, in what appears to be eight-point font, "However, the answer would be likely for Second Screening Dual Conveyance Alternative 8A, which includes operations alternatives based on Scenario 7a, and Second Screening Dual Conveyance Alternative 9A, which includes the State Water Resources Control Board 2010 flow recommendations for Delta Ecosystem." However, Alternative 9A was carried forward to Table 3A-21, the last of the Appendix 3A tables, and the closest thing (along with preceding Table 3A-20) to a coherent summary of alternatives. This table reports that Alternative 9A was eliminated because it "probably would violate federal or state statutes or regulations." 2013 App. A 3A-157. This must be a reference to Table 3A-14 Column 6, which indicates that Alternative 9A would likely violate statutes or regulations because

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"Delta outflow criteria could not be accomplished even with reducing deliveries to upstream water rights holders." 2013 App. A 3A-148.

Section 3A.9.3 is entitled, "State Water Resources Control Board Enhanced Spring Delta Outflow Alternative." 2013 Draft EIR/S 3A-62. This alternative is discussed in the context of the SWRCB Flow Criteria Report. The "alternative includes a requirement of 55% of unimpaired flow, as estimated for the Sacramento River at Freeport, to become Delta outflow." 2013 Draft EIR/S 3A-64. Section 3A.9.3 does not disclose under which numbered alternative, if any, this alternative is analyzed as in the EIR/S. A separate perusal of Appendix 3A reveals, as best as can be determined, that it wound up as Alternative 8. Section 3A.9.3 appears to be the closest approximation, untitled and unreferenced as such, that analyzes or explains why the 2010 Flow Criteria Report recommendation of 75% of unimpaired flow was not carried forward as an alternative in the EIR/S or what became of it.

This garble of information for Alternative 9A is repeated for the 15 conveyance alternatives identified in scoping (*see* Appendix 3A at 3A-11), the 21 alternatives listed at section 3.2.1.5 (*see* 2013 Draft EIR/S 3-10), and various other "proposals" that were never given a number and are treated at section 3A.11 (which repeatedly refers the reader back to numerous components of other alternatives treated elsewhere) of Appendix 3A. *See* 2013 Draft EIR/S Appendix 3A 3A-80–94.

To follow the disposition of Alternative 9A, the doggedly determined reader is left to print out a dozen sub-sections of the EIR/S, lay them on a table, shuttle back and forth between them, and create his or her own concordance table and table of contents, and ultimately construct his or her own comparison.

It is unreasonable to expect members of the public and even specialized commenters–let alone decision-makers–to follow that same procedure for all of the alternatives (importantly including those eliminated in scoping and those referred to as "proposals"), much less construct his or her own comparison of all these alternatives:

> According to guidance for project proponents, "Environmental impact statements shall be written in plain language and may use appropriate graphics so that decision-makers and the public can readily understand them" (Code of Federal Regulations, 40 CFR 1502.8). Far-reaching decisions should not hinge on environmental documents that few can grasp.
>
> This guidance applies all the more to an EIR/S of the scope, complexity, and importance of the Current Draft. It demands excellent comparative descriptions of alternatives that are supported by readable tables and high-quality graphics, enumeration of major points, well-organized appendices, and integration of main figures with text. For policy deliberations, the presentation of alternatives should include explicit comparisons of water supply deliveries and reliabilities as well as economic performance. For decision-makers, scientists, and the public, summaries of impacts should state underlying assumptions clearly and highlight major uncertainties. The current draft is inadequate in these regards.

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2015 ISB DEIR Review 9.

Promises that these deficiencies will be corrected in the final project documents do not fulfill the purposes of NEPA and CEQA, which are to provide decision-makers with comprehensible information upon which to base their decisions early in the process, when changes of course are practicable. Depriving the public of comprehensible information until after final decisions have been made further frustrates informed public participation and constitutes actionable informational injury as well as depriving decision-makers of informed comments to guide their deliberations.

B. The 2015 RDEIR/S Compounds The Informational Injury Inflicted By BDCP/Fix Environmental Review Documents Because It Adds Further Confusion And Is Misleading.

The 2015 RDEIR contains several features that may have been intended to address the informational chaos created by the 2015 Draft EIRS. For example, the 2015 RDEIR/S provides an Appendix A, which is a redline version of the 2013 Draft EIR/S. This could be a useful feature. However, the Lead Agencies have chosen to renumber all the sections, without providing a concordance table or a table of contents.[3] Some new text is indicated in redline insertion text. Some new text is not so indicated. The pagination has been radically altered. For example, 2013 page 8-420 has become 2015 Appendix A page 8-217. These pages describe significant unmitigated impacts on water quality. They are crucial. The section under which this critical text appears has yet again been renumbered, from 8.4.3.9 to 8.3.3.9. *Compare* 2015 RDEIR/S Appendix A 8-204 with 2013 Draft EIR/S 8-407. The numbering change does not appear in strikeout or underline. Absent a concordance table and/or table of contents/concordance of table of headings (new and original), Appendix A is a source of frustration that will drive away informed comments. The present reviewer can imagine no rational basis for the failure to use well-established techniques, such as keeping all original heading numbering the same and inserting new headings as .0001, .0002, etc.

As it stands, the most expedient way to find out what changes were made to a specific passage from the 2013 Draft EIR/S is to select unique phrases from the 2013 text of interest and run a word search in Acrobat on the 2015 Appendix A in hopes of landing at the correct text.

A line has to be drawn somewhere as to how confusing, poorly organized, and poorly presented NEPA/CEQA documents may be. Here, the line has been crossed and the only remedy is to re-draft the 2015 RDEIR/S and reopen the comment period, if for no other reason than to address the basic requirement of informing the public as to what is being proposed and evaluated, and to allow for informed public comment at stages early enough to allow their meaningful use by decision-makers.

More troubling yet is the misleading presentation several critical portions of the 2015 RDEIR/S. For example, table ES-9 purports to summarize the impacts of the three new alternatives (2D, 4A, and 5A) (Attachment 2). However, it lacks a key feature: a further column that would direct the reader to the text of the DEIR that supports the table's conclusory presentations. This leads to a misstatement of impacts.

Two of the significant unmitigated adverse impacts/effects of preferred Alternative 4A disclosed by the 2013 Draft EIR/S were GW-8 and GW-9, which are statewide impacts to groundwater. Table ES-9 lists GW-8 and GW-9 as having no impact for new alternatives 2D,

[3] Like 2013 Appendix 3A, there are only pdf bookmarks available after download.

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4A, and 5A. 2015 RDEIR ES-43. However, a tiny footnote cue, appearing only on the column "Impact Conclusion Before Mitigation," directs the reader to footnotes stating that the preferred alternative, Alternative 4A, "could have" significant/adverse unmitigated impacts on groundwater. The right-hand column, "Impact After Mitigation," lists Alternative 4A as LTS and B (less than significant or Beneficial). This is false. The actual finding purporting to be summarized is that the "overall impact for Alternative 4A [on groundwater supplies and recharge is] considered significant and unavoidable." REDIER/S 4.3.3-8. Most readers of this table will skim the right-hand columns, which list as "S" or "SU" or "A" those impacts that are significant and unmitigated. On this method, Alternative 4A appears benign, which it is not. An executive summary table constructed with the aim of *alerting* readers to significant impacts that are worthy of further perusal in the body of the document would not have presented information in this manner.

In addition to noncompliance with CEQA and NEPA, and relevant federal government contracting requirements, it may further be argued that the deterrent effect of these documents is so great as to deprive the public of its right to petition the government for a redress of grievances within the meaning of the First Amendment to The United States Constitution. Physical exclusion of dissenting citizens from a hearing room would have no more pernicious effect than the organization of these documents, especially if deceptive intent is found.

III. The 2015 RDEIR/S Fails To Consider A Reasonable Range Of Alternatives.

The current range of Alternatives (including new Alternatives 2D and 5A) and the preferred project (Alternative 4A) do not represent a reasonable range of alternatives as required by CEQA and NEPA. For the following reasons, a second revised RDEIR/S should be issued for public comment that includes some or all of the alternatives discussed below.

A. The Extent Of The Lead Agencies' Duty To Rigorously Explore And Objectively Evaluate All Reasonable Alternatives Is At Its Zenith In This Matter.

An agency must "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative use of available resources." 42 U.S.C.A. § 4332(2)(E). "Judicial review of the range of alternatives considered by an agency is governed by a 'rule of reason' that requires an agency to set forth only those alternatives necessary to permit a 'reasoned choice.'" *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982). The "touchstone for our inquiry is whether an EIS's selection and discussion of alternatives fosters informed decision-making and informed public participation." *Id*.

As acknowledged in the RDEIR/S, federal agencies are required to take a "hard look" at the environmental consequences of their actions, including a hard look at potential alternatives to recommended courses of action that might lessen environmental impacts. *See* RDEIR/S 4.1-3. "The purpose of NEPA is to require disclosure of relevant environmental considerations that were given a 'hard look' by the agency, and thereby

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permit informed public comment on proposed actions and any choices or alternatives that might be pursued with less environmental harm." *Te-Moak Tribe of Western Shoshone of Nevada v. United States Dep't of the Interior*, 608 F.3d 592, 601 (9th Cir. 2010) (citation omitted). "The existence of a viable but unexamined alternative renders an environmental impact statement inadequate." *Id.* (citation omitted).

It would be hard to overstate the conflicts surrounding alternative competing uses of Delta water resources, including but not limited to the conflicts between environmental needs and water supply needs; and the conflicts between in-basin consumptive users, upstream diverters, and export consumptive users. It would also be hard to overstate the cost of a wrong decision. The ecosystem of the largest and most important estuary on the west coast of North and South America is on the brink of collapse. The wrong decision could push numerous species to extinction and take a horrific toll on communities and the economies that rely on Delta water. Indeed, near final drafts of the BDCP, as operated in and in conjunction with expected climate-changed conditions, and vetted by the Action Lead Action Agencies, would have driven important fish species, including winter-run and spring-run Chinook salmon, to extinction. *See NMFS Progress Assessment and Remaining Issues Regarding the Administrative Draft BDCP Document* 1 ("Red Flag Comments") (Attachment 22).

The responsibility of the Lead Agencies in this matter to "describe appropriate alternatives," 42 U.S.C. § 4332(2)(E), that are "necessary to permit a 'reasoned choice,'" *California v. Block*, 690 F.2d at 767, after a "hard look" at environmental consequences in the context of lessening them by considering alternative courses of action, *Te-Moak*, 608 F.3d at 601, is commensurate with the gravity and far-reaching consequences of the ultimate decision in this matter. In short, the Lead Agencies' public duty to "rigorously explore and objectively evaluate all reasonable alternatives," 40 C.F.R. § 1502.14(a), is here at its zenith. The federal Lead Agencies would perhaps not dispute this characterization of their duty. What we ask, upon review of these and all other comments on the RDEIR, is for the Federal Lead Agencies to earnestly re-examine whether they have lived up to it.

B. The BDCP/Fix Statements Of Purpose And Need May Not Be Drawn Or Interpreted In Terms So Narrow As To Unreasonably Limit The Range Of Alternatives Considered.

On February 13, 2009, the Lead Agencies issued a Notice of Intent to Prepare an Environmental Impact Statement/Environmental Impact Report and Notice of Public Scoping Meetings pursuant to NEPA, 74 FR 7257 ("2009 NOI"), and a Revised Notice of Preparation OF Environmental Impact Report and Environmental Impact Statement for the Bay Delta Conservation Plan, State Clearinghouse Number 2008032062, pursuant to CEQA ("2009 NOP"). These statements remained in effect until they were revised on through July 10, 2015, as part of the RDEIR/S.

These documents contain the statement of purpose and need and the statements of objectives and fundamental underlying purpose pursuant to NEPA and CEQA respectively. Because the framing and interpretation of these statements are closely related to the duty to discuss alternatives, they are being increasingly used by lead

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agencies to limit the range of alternatives they wish to consider. As explained by leading practice guides on NEPA and CEQA:

> [An EIS] must briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action … . The courts have recognized these requirements are closely related to the duty to discuss alternatives, because the purpose of an action determines the universe of alternatives an agency must consider.

Daniel R. Mandelker, *NEPA Law and Litigation* § 9:23 (Thomson Reuters 2015) (citations and quotation marks omitted) ("*NEPA Law and Litigation*").

> Lead agencies have considerable discretion to select the project objectives they wish to achieve. Although a lead agency may not give a project's purpose an artificially narrow definition, a lead agency may structure its EIR alternatives analysis around a reasonable definition of underlying purpose and need not study alternatives that cannot achieve that basic goal.

Stephen I. Kostka and Michael H. Zischke, *Practice Under the California Environmental Quality Act* (CEB 2d ed. 2015) ("*Practice Under CEQA*").

However, courts are increasingly recognizing that lead agencies may abuse the statement of purpose and need to evade the requirement to earnestly evaluate a reasonable range of alternatives. *See, e.g., National Parks & Conservation Ass'n v. Bureau of Land Mgmt.*, 606 F.3d 1058, 1072 (9th Cir. 2009) (summarizing 9th Circuit precedent to "forbid the [lead agency] to define its objectives in unreasonably narrow terms") (striking down lead agency's EIS because "[a]s a result of this unreasonably narrow purpose and need statement, the [lead agency] necessarily considered an unreasonably narrow range of alternatives"); *see also id*. at 1071 (stating that the court will "determine whether the [lead agency's] purpose and need statement properly states the [lead agency's] purpose and need … in a manner broad enough to allow consideration of a reasonable range of alternatives").

Courts also scrutinize unreasonably narrow interpretations of purpose and need statements by lead agencies where the statement of purpose and need, fairly read, would allow for consideration of alternatives that the lead agency rejected as outside the project's purpose and need statement. *See, e.g., Center for Biological Diversity v. National Highway Traffic Safety Admin.*, 538 F.3d 1172, 1219 (9th Cir. 2008) (holding that "[w]e also disagree with [the lead agency] that Petitioners' suggested alternatives would not be reasonably related to the project's purpose").

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C. The Project's Range Of Alternatives Described In The 2015 DEIR Is Unreasonably Limited By Excluding All Storage, Groundwater, Integrated Water Management, And Conservation Elements From Consideration And Failing To Give Meaningful Consideration To Conveyance Options.

1. At The Very Outset Of The Process, The Lead Agencies Unreasonably Eliminated Any Portfolio Approach By Drafting And/Or Interpreting The 2009 Statement Of Purpose And Need In Unreasonably Narrow Terms And Drafted The Revised 2015 Statement In Unreasonably Narrow Terms.

Virtually all stakeholders agree a "portfolio" approach is required if we are to make meaningful progress in solving California's water problems. A portfolio approach simply combines elements of conveyance with one or more elements of storage, groundwater management/recharge, and conservation. However, the Lead Agencies unreasonably eliminated any possibility of a portfolio approach at the outset of the process.

"Scoping" is the process undertaken at the outset of environmental review to determine the scope of issues that the EIS will include. As part of the scoping process the lead agency shall "[d]etermine the scope and the significant issues to be analyzed in depth in the environmental impact statement." 40 C.F.R. § 1501.7(a)(2).

The 2009 NOI, which contained the statement of purpose and need, also announced the commencement of 10 public scoping meetings. However, through their drafting/interpretation of the statement of purpose and need announced in the 2009 NOI, the Lead Agencies had already effectively eliminated from meaningful consideration any water infrastructure other than conveyance within the statutory Delta:

> The 2009 NOP and NOI stated that the new points of diversion could be located along the Sacramento River between South Sacramento and Walnut Grove. The new conveyance facility could extend from the new points of diversion to the existing SWP and CVP pumping facilities in the South Delta and be located either to the west or east of the Sacramento River.

2013 Draft EIR/S, App. 3A 3A-11.

The Lead Agencies interpretation of the 2009 NOI/NOP had also absolutely eliminated from consideration any conservation element; had eliminated from consideration any groundwater component; and had eliminated from consideration any storage component. The 2015 revised statement of purpose in need is narrowed and also excludes storage. This is a failure to respond to changed circumstances because the need for storage has become all the more acute as recognition of the severe diminishment of the snowpack as a storage element has become much better understood and more pronounced in the last six years. It was out of bounds from this point forward for the

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Lead Agencies to meaningfully consider any portfolio approach or any surface storage, groundwater recharge and storage, or demand reduction/management measures.

The 2015 Revision to the statement of purpose and need only further unreasonably narrows the purpose and need.

The now six-year-old environmental review process, while producing tens of thousands of pages of reports, convening dozens of public meetings, drawing thousands of comment letters, and proclaiming itself one of the most thorough ever undertaken, had eliminated the most promising alternatives at the outset. The 2015 DEIR revision to the statement of purpose and need should have corrected course by including a reasonable range of alternatives, but it did not. All of the hundreds of thousands of hours of study and hundreds of millions of dollars in consultant's fees were focused on assessing a badly defined project with a self-imposed constraint that forbids or refuses consideration of better alternatives.

As explained to the public:

> While water storage is a critically important tool for managing California's water resources, developing new water supplies and including new storage is not part of the BDCP purpose and need.

2013-4 Your Questions Answered, *available at http://baydeltaconservationplan.com/Library/BDCPLibrary/YourQuestionsAnswered.aspx* (last visited October 23, 2015) (Attachment 3).

"New water supplies" or "new water" as used in the BDCP/Fix documents, and in California water discussions generally, includes storage and conservation measures. Increasing storage capacity makes "new water" because it allows the capture and storage of water supplies that would not otherwise be available; it increases the total amount of water available for management. Likewise, conservation measures are considered to provide "new water" because "using water more efficiently reduces demand, which has the same effect as adding water to the system." Delta Plan 91, n.1.

The Lead Agencies, therefore, dismissed the basic reaction to initial scoping by concerned stakeholders whose comments "described methods to reduce reliance upon Delta water supplies, including water conservation, recycling, and use of other water supplies such as conjunctive use programs to ensure adequate groundwater recharge operations." 2013 Draft EIR/S App A 3A-11.

Where this process has ended up, stand-alone (single focus) new conveyance infrastructure, is one of the few choices that were available to the Lead Agencies that *does not* increase water supplies:

> The benefits of new Delta conveyance infrastructure should be maximized by integrating with new and expanded storage projects, implementing projects that increase water-use efficiency and conservation, improving groundwater management, and restoring the structure and function of some key Delta ecosystems. New Delta conveyance infrastructure by itself does not create any new supplies of water.

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Delta Stewardship Council, *18 Principles for Water Conveyance in the Delta, Storage Systems, and for the Operation of Both to Achieve the Coequal Goals* ¶ 4, (Attachment ___), *available at http://www.deltacouncil.ca.gov/docs/delta-stewardship-council-october-22-23-2015-meeting-agenda-item-10-attachment-1-draft*) (Attachment 20).

The Lead Agencies' narrow drafting/and or narrow interpretation of the purpose and need of the project as excluding "developing new water supplies" also excludes groundwater storage from meaningful consideration. Groundwater storage is considered a source of "new water" and has the potential to provide up to two million acre-feet of new water annually. *See, e.g.* Delta Plan 92 (Attachment 4).[4] But because it is considered a source of "new water" it has been excluded by the lead agencies, through use of the purpose and need statement, from meaningful consideration.

The 2009 NOI stated that "improvements to the conveyance system are needed" and that the project would include "three major elements," one of which was "potential capital improvements to the water conveyance system." 74 FR 7259. However, the description of potential alternatives in the 2009 NOI stated that:

> Three general alternatives are being considered as they relate to the potential changes in the water conveyance system and CVP/SWP operations. These include (1) A through-Delta alternative; (2) a dual conveyance alternative; and (3) an isolated facility alternative.

Each of these alternatives was limited to conveying water from a point on the Sacramento River between South Sacramento and Walnut Grove to the existing CVP and SWP pumping plants near Tracy, about forty miles away. 2013 Draft EIR/S App. 3A 3A-11.[5]

The elimination of serious consideration of *any* portfolio alternatives was unreasonable on its face. *See, e.g.*, *National Highway Traffic Safety Administration*, 538 F.3d 1172, 1219 (9th Cir. 2008) (striking down impact statement and rejecting lead agency's argument that "Petitioners' suggested alternatives would not be reasonably related to the project's purpose").

Groundwater recharge, surface storage, and conservation are all reasonably related to the project's purpose. Project documents repeatedly state that the underlying goal of the project is to improve deliveries of water to consumptive users while at the same time improving ecological conditions in the Delta:

"As described in Chapter 1, *Introduction*, the BDCP is intended to provide for the ecological needs of a number of at-risk species adversely affected by a range of human activities while also ensuring adequate and reliable water supplies from the Sacramento-San Joaquin River Delta (Delta) and its stream tributaries, for people, communities, agriculture, and industry." Draft EIR/S App. 3G-2 (2013). "As stated in Section 1,

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[4] The 2013 Delta Plan has long been available to the lead agencies and was made a part of the administrative record in its entirety as a part of comments in July 2014. Several excerpts are attached here for the convenience of the reader.

[5] Two conveyance components outside the statutory Delta, one conveying water from a point on the Sacramento River near the confluence of the Feather River, and the other from a point near Fremont Weir, were summarily eliminated without evaluation as project alternatives in the EIR/S.

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Introduction, the RDEIR/SDEIS considers additional sub-alternatives that meet the goals of restoring the ecological functions of the Delta and improving water supply reliability." RDEIR/S 4.1-1 (2015). "The current and projected future inability of the SWP and CVP to deliver water to meet the demands of certain south of Delta CVP and SWP water contractors is a very real concern. More specifically, there is an overall declining ability to meet defined water supply delivery volumes and water quality criteria to support water users' needs for human consumption, manufacturing uses, recreation, and crop irrigation." 2013 Draft EIR/S 2-6. *See also* our July 29, 2014, comments for further explication of the project purpose and nee.

Federal regulators, who are not project proponents, also understand that the project has a broad fundamental purpose. "EPA fully supports the stated purpose of the BDCP effort: to produce a broad, long-term planning strategy that would meet the dual goals of water reliability and species recovery in this valuable ecosystem ... ." Letter from Jared Blumenfeld, Regional Administrator, Region 9 United States Environmental Protection Agency to Will Stelle, Regional Administrator, West Coast Region National Marine Fisheries Service 1, August 26, 2014 ("August 26, 2014, EPA Comments") (Attachment 23). Federal regulators understand that portfolio approach alternatives are well within the BDCP/Fix project's purpose and need. "Other reasonable alternatives could be developed by incorporating a suite of measures, including Integrated Water Management, water conservation, levee maintenance, and decreased reliance on the Delta. Such alternatives would be consistent with the purpose and need for the project, as well as with the California Bay Delta Memorandum of Understanding among federal agencies and the Delta Reform Act of 2009." *Id.* at 3.

Not only is a portfolio approach consistent with the Statement of Purpose and Need, the Lead Agencies' own science advisors deem it indispensible. In 2014, the Action Lead Agencies commissioned four eminent Delta scientists to author a report addressing the challenges facing the Sacramento-San Joaquin Delta in the context of solving the vexing problems of water supply and ecological degradation. *See* Louma, et. al, *Challenges Facing the Sacramento-San Joaquin Delta* (Delta Science Program 2015) ("*Delta Challenges"*) (Attachment Five). *Delta Challenges* concludes that Delta problems are too complex to be addressed by single-focus solutions, such as lone conveyance projects. "Single-focus problem solving can create unanticipated outcomes." *Delta Challenges* 9. Instead:

> Simultaneous attention to a portfolio that includes actions like addressing overuse and mis-use of water, and improving ground water management and storage, *should accompany any necessary water infrastructure adjustments*.

Delta Challenges 4 (emphasis added).

The rejection of portfolio elements on purpose-and-need rationale was unreasonable.

2. A Portfolio Approach With Additional Conveyance Options Is Reasonable, Feasible, Proven, And Necessary And Should Have Been Included In The 2015 RDEIR/S.

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The self-imposed limitation of considering conveyance options located only within the statutory Delta excludes many types of viable conveyance improvements. For example, the SWP and CVP canal system, along with interconnected regional canals, stretches from the Delta south to the Mexican border, west to the coastline at Santa Barbara, and east to Arizona. Many critically over-drafted groundwater basins lie adjacent to this extensive canal network, which forms the largest and most complex piece of water supply infrastructure in the United States (if not the world). Attachment 6 (Delta Plan 70) is a map of the canal network. Attachment 7 (Delta Plan 98) is a map showing the location of critically over-drafted ground water basins.

Smaller regional conveyance improvements, in the form of branch lines connecting to ground water recharge facilities, or improvements to existing branch lines, along much of the route already traversed by existing canals could create new water by recharging badly over-drafted aquifers.

As discussed in our comments of July 29, 2014 ("Delta Alliance July 29, 2014 Comments"), Reclamation has found feasible and approved exactly these types of projects. *See* U.S. Dept. Of the Interior, *Record of Decision: Madera Irrigation District Water Supply Enhancement Project* 1 (approving "Alternative B which includes the banking of MID CVP water outside MID's service area in the proposed WSEP, modification of Reclamation's 24.2 canal and potential federal funding"). *See also Measure J94 Goleta Water District* (local self-imposed ordinance requiring that portions of SWP water supply be devoted to groundwater recharge) (Attachment 8).

There is scientific consensus that recharge of depleted groundwater basins is *feasible* and *necessary* to California's water future. A dozen or so scientific reports emphasizing this fact were attached to our July 29, 2014, comments. In addition to the reports, Lead Agency DWR's California Water Plan, emphasizing the feasibility and necessity of groundwater recharge, was also attached.

The recently released *Delta Challenges* underscores that creating new water to take pressure off the Delta is essential to recovering the Delta ecosystem. "Water scarcity has defined and will continue to define the future of the Delta and all that is linked to it." *Delta Challenges* 28. However:

> Many approaches used in water-scarce environments elsewhere are under-utilized in the Delta. While adjustments to the infrastructure as it ages are essential, opportunities exist to *simultaneously* redefine bold action as we pursue ***proven*** (although not always initially popular) ways to work more effectively with what we have. Examples include the following:
>
> > Groundwater recharge and conjunctive use offer storage potential beyond that available for surface waters.

Delta Challenges 26 (emphasis added) (citations omitted).

We have previously provided detailed comments on the feasibility of portfolio alternatives that include surface storage, either within, north, or south of the Delta. *See* Delta Alliance July 29, 2014, Comments. Our comments included a discussion of Sites Reservoir, also known as North of Delta Offline Storage

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("NODOS") as an integral component of a BDCP/Fix portfolio alternative. A "Sensitivity Analysis of Operations with the BDCP" was and is referenced by the NODOS website. http://www.water.ca.gov/storage/northdelta/index.cfm#NODOSDocs, last visited October 27, 2015. The document is still not available to the public. The Lead Agencies should consider it, and if it has not been produced, should produce it and an analysis of integral operation of BDCP/Fix conveyance with NODOS as an alternative to the preferred project. The NODOS Draft EIR was previously provided. A NODOS Investigation Highlights booklet is attached hereto (Attachment 9).[6]

The currently preferred Fix twin tunnels (Alternative 4A) and the identical previously preferred BDCP twin tunnels (Alternative 4) both have the ability to take from the Delta more water more often than the existing infrastructure system. That ability could make sense in the context of restoring the Delta ecosystem and restoring the ability of the "SWP and CVP to deliver up to full contract amounts" while doing less damage to the Delta ecosystem. 2009 NOI, 74 FR 7258. The ability to take more water at times of abundance makes sense when the project also has the ability to convey and store it for use at times of scarcity.

Conveying "surplus" Delta water to groundwater banking facilities so it could be drawn upon when Delta flows are low and exports are most harmful would provide a more reliable water supply and ease the damage of exports to the Delta ecosystem. Alternatives 4 and 4A do not have that ability. The BDCP "does not significantly reduce pressure on the Delta during drier periods." Saracino and Mount, et al., *Panel Review of the Draft Bay Delta Conservation Plan* 30 (September 2013) ("Mount Report") (reviewing Alternative 4 in the 2013 administrative draft BDCP) (attached to our July 29, 2014 comments). "Expanding potential storage, particularly groundwater storage, would have created considerably more flexibility in exports" allowing more water to be harvested in wet years and conserving environmental flows during periods of scarcity. Mount Report 22. Alternative 4A has not meaningfully changed this dynamic. This was the original rationale for new high-capacity conveyance, referred to in BDCP promotional materials as "Big gulp, little sip," that the BDCP/Fix has failed to fulfill.

There is no logic whatsoever in the tunnels' initial intake capacity being set at 9,000 cfs absent integral storage components. There is only the danger, and perhaps probability, that the high-capacity tunnels will be used to meet the project's expressed goal of providing full contract amounts while wreaking further havoc on the Delta ecosystem. This looming disaster is only made more frightening by considering that the tunnels themselves have a capacity to divert 15,000 cfs (a scenario previously given serious consideration by the Lead Agencies) and could be so employed by adding two additional intakes (that have already been designed) and related diversion components (that have also already been designed).

Increased water use efficiency/conservation, in both urban and agricultural settings, has the potential to produce up to 4.1 million acre-feet of new water annually. Delta Plan 92. In the context of recovering the Delta ecosystem, "Making water

[6] We are aware that the Sacramento Valley Water Management Agreement eyes the NODOS project as a source of new water for local interests. However, the project has been languishing at a snail's pace and integration with the DCP/Fix could benefit all interested parties.

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conservation a continual, long-term, statewide investment is a necessary part of accepting water scarcity." *Delta Challenges* 26 (citations omitted). Although much of California depends on Delta water for *some* portion of its water supply, the relative contribution of Delta water compared to regional sources is small. *See* Delta Plan 78 (Attachment 19).

Conservation and groundwater recharge are necessary to restore the capacity to deliver up to full contract amounts while at the same time reducing harm to the Delta ecosystem and restoring its health. These elements are reasonably related to the project's purpose and were unreasonably excluded from any meaningful consideration.

The Mount Report, reviewing then preferred Alternative 4 in September 2013, was commissioned by ex officio BDCP Steering Committee members American Rivers and The Nature Conservancy. In their July 29, 2014, comments on Alternative 4 ("American Rivers 2014 Comments") these organizations summarized the Mount Report's findings:

> While finding that Conservation Measure 1, including the new north Delta diversion, may improve conditions for Delta smelt, the overall conclusion is that the plan will not significantly improve the ecosystem as a whole or assure reliable water supply.
>
> We regretfully conclude that the plan, in its current draft form, will not make a sufficient contribution to the attainment of the co-equal goals as required by applicable laws.

American Rivers 2014 Comments 2. As all are aware, the "coequal goals" are "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem." These were also the originally proffered twin promises of BDCP/Fix that thus far have not been fulfilled.

As discussed below at section ___, 2015 RDEIR/S further narrows the description of purpose and need. It also eliminates the 90,000 or more acres of habitat restoration and breaks the promise to meet the "gold standard" of a Habitat Conservation Plan and Natural Communities Conservation Plan proffered from the earliest days of the BDCP to assure its environmental benefits.

Left are single-focus giant diversion facilities and conveyance tunnels.[7]

3. The Lead Agency Arguments Against A Portfolio Alternative Lack Merit.

The arguments against *even considering one* portfolio alternative with even *one* portfolio element are found at 2013 Draft EIR/S Appendix 3A § 3A.11.1.1 at 3A-82–83.

[7] EcoRestore, a recently announced separate program to restore Delta habitat, is little more than a branding effort. Much of the habitat restoration proffered by EcoRestore is merely the implementation of measures already required by federal regulators as a condition of continued operation of the SWP and CVP. These orders are long-standing and EcoRestore does not represent any new, increased, or significant effort to restore Delta habitats or repair the Delta ecosystem.

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This section rejects a call from the Natural Resources Defense Council to consider a portfolio alternative and generally eliminates *any* portfolio approach as well. The principal argument is that portfolio elements are "beyond the scope of an HCP/NCCP focused on the Delta." 2013 Draft EIR/S 3A-81. The first part of this answer, that an HCP/NCCP cannot accommodate portfolio elements, is gone because preferred Alternative 4A is not an HCP/NCCP and the idea of BDCP/Fix qualifying as an HCP/NCCP is, for all practical purposes, dead. The second part, that Fix is focused on the Delta, begs the question and ignores the overwhelming consensus that single-focus in-Delta projects cannot solve the problems of water supply and in-stream ecological needs, which are two sides of the same coin.

The arguments further conflate the call for portfolio-based alternatives with a demand to instantaneously implement the entire California Water Plan. Considering an alternative that includes *some* significant storage is not the same as a demand to solve all of the state's water problems in one fell swoop.

The arguments that "DWR has no control over" local programs, *id.*, and that generally portfolio elements are beyond DWR's reach is also without merit. First, the document and project are joint products of the Lead Action Agencies, DWR *and* Reclamation. The resources of the federal government are available for this project. Second, the elements are within DWR's reach:

a. DWR has no control of *local* water supply and recycling. The water contractors are integral partners, along with the federal and state governments, in the BDCP/Fix process. They have been voting members of the BDCP steering committee from the beginning—unlike environmental groups that were ex-officio members. *See Planning Agreement regarding the Bay Delta Conservation Plan*, October 6, 2006 (Attachment 10); *see also First Amendment to the Memorandum of Agreement Regarding Collaboration on the Bay Development and Conservation Plan* 7 (2011) (Attachment 11) (parties to support contractors as applicants and permittees along with DWR). Indeed, the contractors are paying hundreds of millions of dollars to fund the BDCP/Fix planning effort. *Id.* at 10. And they *do* have control over local water supply and recycling as well as the money and expertise to implement these programs. The BDCP/Fix federal/state/local partnership is one of extraordinary capacity and opportunity. What better opportunity is DWR waiting for?

b. DWRs support for such supply augmentation cannot transform the BDCP from an incidental take permit focused on the Delta into a broader focus. The BDCP/Fix is no longer pursuing a section 10 incidental take permit. As we pointed out in our November 16, 2011, comments on the First Amendment to the Memorandum of Agreement, description of the project as "issuance of ESA permits" has never been a legally adequate or factually accurate description of the "major federal action" in any event.

c. Many of the aspects of a portfolio approach can only be accomplished through Integrated Water Management. "Other reasonable alternatives could be developed by incorporating a suite of measures, including Integrated Water Management." August 26, 2014, EPA Comments 3. *See also* subparagraph a above. What better opportunity to integrate water management on a project-specific basis is DWR waiting for?

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D. Including A Portfolio Alternative In The 2015 RDEIR/S Would Avoid The Significant Adverse Environmental Effects/Unmitigated Environmental Impacts Identified In The 2015 RDEIR/S.

1. The Preferred Project And Present Alternatives Have Numerous Adverse Effects That Could Be Eliminated By A Portfolio Alternative.

Among the many adverse effects/unmitigated impacts of the project are the following:

a. Unmitigated Significant Adverse Impact/Effect GW-8: Statewide Long-Term Depletion Of Groundwater Supplies And Interference With Groundwater Recharge / Recharge Opportunities.

Under Alternative 4A surface water deliveries "may decrease by approximately 179 TAF per year depending on the range of spring Delta outflow requirements compared to Existing Conditions. A decrease in surface water deliveries could result in an increase in groundwater pumping and a decrease in groundwater levels, depending on the total water portfolio of the site-specific areas. Therefore, decreases in surface water deliveries would result in significant impacts on groundwater resources under Alternative 4A." 2015 RDEIR/S 4.3.3-8. The "overall impact for Alternative 4A [on groundwater supplies and recharge is] considered significant and unavoidable." *Id.* 4.3.3-8.

b. Significant Unmitigated Adverse Impact/Effect GW-9 Degradation Of Statewide Groundwater Quality.

"If groundwater pumping is increased, there could be resulting changes in regional patterns of groundwater flow and a change in groundwater quality. Due to the uncertainty associated with these effects, this effect is considered adverse. For the same reasons discussed earlier in connection with the possibility of increased groundwater pumping in Southern California, there is no feasible mitigation available to mitigate any changes in regional groundwater quality." 2015 RDEIR/S 4.3.3-8. Implementation "of Alternative 4A at ELT and LLT could degrade groundwater quality in portions of the Southern California SWP Export Service Areas; this impact is considered significant due to the possibility of increased groundwater pumping and the resulting effects on regional groundwater flow patterns. As discussed above, there is no feasible mitigation to address this significant impact. The impact would be considered significant and unavoidable in these areas." *Id*. 4.3.3-8–9. The "overall impact for Impact Gw-9 Alternative 4A is considered significant and unavoidable." *Id*. 4.3.3-9.

c. Significant Adverse Impact/Effect WQ 11: Increased EC.

"The increase in EC in the Sacramento River at Emmaton, particularly during summer months of dry and critical water years, and the additional exceedances of water

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quality objectives in the San Joaquin River at Prisoners Point constitute an adverse effect on Water Quality. Mitigation Measure WQ-11 would be available to reduce these effects." 2015 RDEIR/S 4.3.4-28.

"Based on these findings, this impact in the Plan Area is considered to be significant. Implementation of Mitigation Measure WQ-11 would be expected to reduce these effects to a less-than-significant level." *Id*. 4.3.4-30.

Mitigation measure WQ-11, however, would not be applied when it is needed most: in critical water years. "These actions [comprising WQ-11] would not be required in critical water years, when the objective does not apply." 2015 RDEIR/S. This constitutes a significant unmitigated negative impact/adverse effect because it exacerbates an already critical salinity problem when it is at its worst. The "objectives" that do not apply in critical years are SWRCB water quality objectives for salinity. However, regardless of the suspension of these regulatory requirements in critical years because current infrastructure cannot meet both these environmental needs and minimal export needs for the protection of human health and safety, the project *does* have a significant unmitigated effect on the environment. It increases salinity at Prisoners Point, Jersey Point, and Emmaton where it has adverse impacts on Stripped Bass and other species.

This is negative impact is an inherent part of the project. Changing the points of diversion to the north Delta means that water that would, under existing conditions, flow through the Delta and contribute to dilution of salinity will be diverted before it reaches Delta streams and sloughs and diverted through the tunnels directly to the export pumps. Shifting exports to existing south-Delta diversion points will not reasonably be expected to avoid this impact because south Delta pump operations themselves draw salt water upstream from the bay and contribute to the problem and self-limit the ability to pump form the south Delta location. *See* Attachment 13 hereto.

Further, Mitigation Measure WQ-11 impermissibly defers formulation of the content of the mitigation measure to some future date. "Generally CEQA requires mitigation measures to be formulated in an EIR and not deferred to the development of future plans or measures" that are promised to mitigate impacts. *Center for Biological Diversity v. Dept. of Fish and Wildlife*, 183 Cal. Rptr. 3d 736, 754 (2015). The only exception is where the deferred mitigation measure provides a performance standard that will be met *and demonstrates that the impact can be mitigated in the manner described. Id.* (emphasis added). The deferred measures must "satisfy specific performance criteria *articulated at the time of project approval." Sacramento Old city Ass'n v. City Council*, 229 Cal. App. 3d 1011, 1028–1029 (1991) (emphasis added). WQ-11 relies on commitments to "Adaptively Manage Diversions at the North and South Delta Intakes to Reduce or Eliminate Water Quality Degradation in Western Delta" as well as adaptively managing the head of Old River barrier and north and south Delta intakes to eliminate exceedances at Prisoners Point. 2015 DEIR 4.3.4-30. These measures depend on an impermissibly deferred adaptive management plan. The project proponents have steadfastly refused to articulate how the adaptive management plan will work and have not demonstrated it can be effective. *See* § IV.B below.

d. Significant Adverse Impact/Effect WQ 7: Chloride Concentrations

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"All of the Alternative 4H1-H4 Scenarios would result in increased water quality degradation ... and could contribute measurable water quality degradation relative to the 303[d] impairment in Suisun Marsh ... ." 2015 RDEIR/S 8-226. "Substantial long-term degradation may occur at Antioch under all of the H1-H4 Scenarios ... ." *Id*. 8-227.

However, the NEPA Effects and CEQA Conclusion sections at 2015 RDEIR 4.3.4-18 conclude that there would be no adverse effect or significant adverse impact. These conclusions appear to be based on re-visiting the results of the original modeling and making additional assumptions, providing explanations, and re-visiting metrics. Questionable conclusions include the following:

1) The increase in long-term average chloride concentration at Staten Island would be 25%. 2015 DEIR 4.3.4-13. But this is dismissed as insignificant because it is "extremely small in absolute terms" relative to "applicable water quality objectives." *Id.* However, as discussed at section IV.A.2, existing applicable water quality objectives are recognized as inadequate. Water quality for fish, municipal, and industrial uses suffers harm from excessive chloride concentrations under existing conditions. A 25% increase over existing conditions is an adverse effect and significant impact under these circumstances.

2) "In the Sacramento River at Emmaton, there would be an increase in chloride objective exceedance during the drought period modeled, from 55% to 57% under operations scenario H3, although these changes are within the uncertainty of the modeling approach; there would be no increase in objective exceedances under operations scenario H4." 2015 RDEIR/S 4.3.4-14.

3) Changing assumptions about operations of the Montezuma Slough Salinity Gates. Original modeling assumed the gates would not be operated and showed adverse effects of Alternative 4A on chloride concentrations. When the model was changed to include operation of the gates, the adverse effect was diminished. However, operation of these Gates has its own negative effects and the wisdom of the operating the gates at all has been questioned. The gates "did have a negative effect on salmon passage" and attempts at modifying the gates "did not improve salmon passage at the SMSCG." *Suisun Marsh Salinity Control Gates Salmon Passage Evaluation Report* 1 (DWR and DFG 2003) (Attachment 12). Because of the opaque nature of the environmental documents, it is unknown if the gates were not included in original modeling in anticipation that they would not be operated because of their negative impact on salmon populations in view of recent crashes in salmon abundance. In any event, reliance on gate operation to find no adverse effect was an unreasonable assumption. There is a fair argument that locking gate operation in place to avoid salinity impacts of Alternative 4A itself may have a negative impact on Salmon populations that must be analyzed.

Overall, the fining that there is no adverse effect/significant impact of WQ-11 is not supported.

e. Significant Adverse Effect/Unmitigated Impact WQ-14 degradation Of Water Quality By Increased Mercury Concentrations.

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The Lead Agencies propose wetland creation as mitigation for the loss of wetlands due to project facilities replacing existing wetlands. First, there is no good evidence that "wetland creation" can ever be an adequate replacement for existing wetlands. This is especially true here. Wetland projects that enhance existing wetlands elsewhere create no new wetland areas. Therefore they do not mitigate the destruction of other wetlands for project construction because the wetlands that were destroyed are not replaced and there is a decrease in total wetland area equal to the amount of wetlands destroyed by the project. *See 2015 ISB DEIR* Review 6–7. The idea that wetlands can be created from farmland, other land that is not already a wetland or emergent wetland, or from uplands is highly speculative and unproven. These attempts often end up as mud holes that may look in some respects like a wetland but have little ecological function. This type of wetland creation cannot serve as mitigation for the destruction of wetlands because the outcome is too speculative and theoretical to serve as a concrete mitigation measure. While there may be an offset in the amount of acres of "wetland," there is no evidence that these created wetlands will replace the biological functions of the destroyed wetlands. In fact, evidence is to the contrary. At the very minimum, the ration of "created" wetlands to destroyed wetlands would have to be very high.

This mercury pollution is an unlawful violation of water quality standards and must be removed from the project because it cannot be justified on the basis that it is a mitigation measure. It is pollution without any justification.

f. Unmitigated Destruction Of Wetlands.

For the reasons discussed in subparagraph e immediately above, the destruction of wetlands for the construction and operation of project facilities remains an adverse effect/significant unmitigated impact.

g. Significant Adverse Effect/Impact WQ32 Microsystis.

The NEPA and CEQA conclusions that Alternative 4A would not have adverse effects is unsupported. "Modeling that adequately accounted for the effects of water conveyance facilities operations and maintenance and the hydrodynamic impacts of the environmental commitments on long-term average residence times in the six Delta sub-areas was not available for Alternative 4A, so the hydrodynamic effects of this alternative on *Microcystis* were determined qualitatively." This amounts to unjustified speculation driven by a rush to push Alternative 4A to approval. The Lead Agencies have the capacity to do exactly the modeling that was foregone. They have done it for other alternatives, and it showed significant adverse effects. Such modeling is the basis for all the impacts analysis on water quality. Abrupt departure here is suspect.

The lead agencies have failed to take the requisite "hard look" at this impact. Taking that look is indisputably within their capacity and it is required to comply with NEPA and CEQA. In its absence, this impact must be considered adverse and significant.

h. Significant Adverse Effect/Impact AQUA-22 Longfin Smelt.

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Project operations of Alternative 4A will have an adverse effect on spawning, egg incubation, and rearing habitat for longfin smelt. ES-50. The proposed mitigation measure is “adjustment via adaptive management, which is intended to allow for further evaluation of spring outflow.” This is an unlawful deferral of mitigation based on non-existent adaptive management as described at subparagraph c. above and section IV.B below. The impacts on longfin smelt, therefore, must be considered adverse and significant.

i. Significant Adverse Effect/Impact AQUA-78 Chinook salmon migration.

This impact is significant. ES-54. The proposed mitigation measure, AGUA-78D, states that “Whenever possible during real-time operations, project proponents will slightly adjust Shasta, Folsom and/or Oroville Reservoir operations to ensure that instream flows are sufficient to minimize or avoid migration-related effects to fall-run Chinook salmon.” 2015 RDEIR/S 4.3.7-193. This is an unlawful deferred mitigation as described at subparagraph c. above and section IV.B below. There is no “real-time operations” monitoring or adaptive management mechanism, and all indications are that project proponents either cannot or will not develop one. The preface of “[w]herever possible” is not quantified or analyzed as to when and under what conditions it will be possible.

The impacts on Chinook salmon migration, therefore, must be considered adverse and significant.

j. Significant Unmitigated Impact/Adverse Effect AQUA-201 Stripped Bass and American Shad.

This impact is significant and unmitigated for CEQA purposes. ES-59. Entrainment at the new north Delta intakes of early life stage stripped bass and American shad would significant under CEQA and entrainment of early life state American shad would be adverse under NEPA. 2015 RDEIR/S 4.4.7-213–214.

k. Significant Impacts/Effects On Aesthetics And Delta-As-Place.

Construction and operation of the north Delta intakes and associated infrastructure would existentially transform one of the most scenic and iconic sections of the Delta as viewed from both land and water. The industrial character of the facilities and restrictions on boating and land access are incompatible with the Act’s requirements to preserve Delta as place and respect existing land uses. Under these circumstances these impacts are significant and adverse for purposes of NEPA and CEQA.

l. Adverse Environmental Impacts On Recreational Navigation Of The Head Of Old River Barrier And Violation Of Federal Statutory Navigability Requirements.

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Making the head of Old River barrier a permanent engineering structure is a significant change in the physical environment and makes a temporary seasonal (although longstanding) impairment to recreational boating permanent.

The severe negative impact on boaters of barriers to recreational navigation is documented in the comments we submitted to Lead Agency DWR on March 18, 2015, with regard to their proposed Emergency Drought Barriers Project (Attachment 13). Our Drought Barrier Comments also point out that barriers to recreational navigation violate the act of Congress admitting California to the union, which requires keeping "all navigable waters within the said State shall be common highways, and forever free." This barrier and the cumulative impact of the many barriers proposed at various locations by the Lead Agencies and others violate this act of Congress. *See* 9 Stat. 453 (1850).

Those comments are incorporated here and apply equally to this barrier. The many letters from boaters objecting to barriers to recreational navigation attached to our Drought Barrier Comments are worth perusal.

This is a significant impact/adverse effect that must be analyzed, avoided, or mitigated.

2. Alternatives Containing One Or More Portfolio Element Would Avoid/Eliminate/Mitigate To A Level Of Insignificance The Adverse Effects.

Enhancing in-Delta flows by providing new water while at the same time taking pressure off of groundwater supplies and providing new water could eliminate the adverse water quality and groundwater impacts described above. By providing new water, the portfolio approach would also allow reduction or elimination of massive new infrastructure in the most scenic part of the Delta that damages the Delta as place and impairs recreational boating and other recreation. This could eliminate impacts k and l described above. New water also allows more flexibility in diversions that could eliminate impacts

Providing more flow in the Delta is the key to restoring the Delta ecosystem. Providing new water allows more flow to remain in the Delta because it provides a substitute for drawing down Delta flows as a source of supply.

The impacts listed in sections 1a–d above could be eliminated by including one or more of the portfolio elements listed at section II.C. Providing additional groundwater recharge capacity through modest new infrastructure in the Southern California, which could use water available at times of surplus (perhaps in conjunction with new north of Delta surface storage), would eliminate adverse effects GW-8 and GW-9. The Water Replenishment District of Southern California engages in groundwater recharge. *See generally Water Replenishment District of Southern California Engineering and Survey Report,* March 5, 2015 (Attachment 14). Agencies like WRPDSC provide partners for eliminating the adverse effects of GW-8 and GW-9 through increased recharge. Providing surface storage by itself would also eliminate adverse effects GW-8 and GW-9 because it would provide water supplies alternative to further drawing down already depleted aquifers.

Surface storage and groundwater recharge would also eliminate adverse effects WQ-7 and WQ-11 because "new water'" available from groundwater recharge and/or

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surface storage would replace water drawn from Delta flows, leaving more water available for in-stream flow. It is the reduction in freshwater flows that causes increases in EC and chloride concentrations. For example, installation of the Suisun Marsh Salinity Gates was mitigation for impacts of the SWP and CVP diminishing freshwater flows in the first place. *See, e.g.,* Chris Enright, DWR, *Suisun Marsh Salinity Control Gate: Purpose, Operation, and Hydrodynamics/Salinity Transport Effect* 3 (Attachment 15).

Conservation creates new water to replace water inappropriately drawn from Delta flows at times when there is inadequate flow to support both exports and in-stream needs.

Integrated Water Management allows the coordination of local, regional, and statewide supplies. It allows water to go where it is needed most when it is needed most from the least environmentally harmful means of supply. The CVP and SWP systems, along with interconnected regional canals, link the water management districts of concern in almost all of California in a "water internet." Many of the water management districts of concern are already BDCP/Fix partners. Why not use this partnership to implement Integrative Water Management *for this project*?

A multi-focus solution alternative can have a new point of diversion as its major (or a major) element. The new point of diversion could be located exactly where the Alternative 4A point of diversion is located. The alternative could retain the current design of the twin tunnels. *Addition* of *some* complimentary component that would alleviate the adverse impacts by working *in conjunction with the tunnels* would satisfy the legal requirements of NEPA and CEQA. We are not asking the Lead Agencies to give up their project or pursue a radically different alternative. We are asking them to take a hard look at an alternative that fills the critical gaps in all of the currently proposed alternatives and preferred project, and makes the project work.

Development and consideration of such an alternative is all the more imperative in light of the failure of BDCPs habitat restoration component.

It was thought by BDCP proponents that massive amounts of new shallow-water habitat would provide enough ecological benefit to allow for diversion of more water without net damage to the ecosystem. The entire BDCP was premised on the assumption that habitat could be substituted for flow. In essence, BDCP visionaries theorized that habitat restoration would be a source of "new water." The intensive investigation and modeling of this assumption, at a cost of tens of millions of dollars over six years, proved that it doesn't work. It was worth a try but it doesn't work. Now what?

The answer is to refine the project by including sources of new water that are already *proven* to work. The law and common sense demand that the Lead Agencies at least develop and consider such an alternative before making a decision to either abandon the whole effort through adoption of the no-action alternative or adopt a project that has severe negative environmental consequences *and* falls far short of the aspirations of project proponents.

Integration of a portfolio approach could well resuscitate the dream-come-true of an HCP and the attendant fifty-year take permit that the Action Lead Agencies and contractors desire.

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E. Screening Alternative 9A Was Unreasonably Eliminated And The 2015 RDEIR/S Should Include A Detailed Analysis Of Alternative 9A.

The 2010 SWRCB Flow Criteria Report, commissioned by the California Legislature for use in making BDCP planning decisions, concluded that restoration of 75% of unimpaired Delta flow was the minimum needed to protect public trust resources. This finding deserves serious consideration. However, the Lead Agencies have dismissed attaining 75% of unimpaired flow and further dismissed *any* percentage of unimpaired flow as a metric for the preferred Alternative.

Summarily dismissed screening Alternative 9A was the only alternative addressing attainment of 75% of unimpaired flow.

Although the confused presentation of materials makes it difficult to discern with any certainty the Lead Agencies' reason or reasons for eliminating alternatives from detailed consideration, it appears that Alternative 9A was eliminated because 1) "based upon preliminary model analysis, both of these alternatives [Alternatives 8A and 9A] would result in reductions in water deliveries to [upstream] Sacramento River water rights holders in order to achieve the flow and water quality objectives in these operations alternatives," 2013 Draft EIR/S App. 3A table 3A-17 at 3A-150; and 2) "preliminary modeling analysis indicates that Delta outflow criteria could not be accomplished even with reducing deliveries to upstream water rights holders." *Id*. App. 3A table 3A-14 at 3A-148. The Lead Agencies further argue that "[r]educed water diversions from these water rights holders cannot be feasibly accomplished through approval of the BDCP [because] these water rights holders are not applicants for the BDCP." *Id*. 2013 App. 3A 3A-68.

First, DWR has, in important past agreements, paid upper Sacramento Valley water rights holders for forgoing use of their rights on a per acre-foot basis so DWR could meet its environmental in-stream flow obligations and water supply goals. Phase 8 Settlement Agreement 14–15 (Attachment 16). DWR has also agreed to share costs with upstream rights holders to help them develop new local projects to provide new water and allow more in-stream flow—available downstream to DWR for meeting environmental obligations and water supply goals. *See* Phase 8 Settlement Agreement *passim.* The Phase 8 settlement is closely related to the *Sacramento Valley Water Management Agreement* (Attachment 17), a partnership between DWR, Reclamation, upstream Sacramento River water rights holder, the water contractors, and others.

Indeed, Alternative 4A itself depends upon "spring outflow criteria, which are intended to be provided through the acquisition of water from willing sellers." 2015 RDEIR/S 4.1-6. A significant restoration of Delta flows, including a successful BDCP/Fix, may involve similar agreements and acquisitions in the future. Dealing appropriately and lawfully with upper Sacramento River water rights holders and other upstream diverters is feasible and may be part of a reasonable alternative that is based on achieving a percentage of unimpaired flow. The impairment-of-upstream-rights reason provided for summarily dismissing Alternative 9A was not reasonable.

Second, the flow objectives could be met in a phased approach over time. Achievement of 75% of unimpaired flow might take 20 years or more as a BDCP/Fix portfolio alternative is implemented. In considering the environmental effects of its

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proposed actions, Congress directed all federal agencies to consider "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity." 42 U.S.C. § 4332(C)(iv). The Lead Agencies have summarily dismissed screening Alternative 9A based on local short-term uses of upper Sacramento Valley water rights holders and failed to consider resolving short-term considerations in light of the need for long-term ecological productivity of the Delta ecosystem. Achievement of 75% of unimpaired flow (or any percentage of unimpaired flow) does not have to happen on project ribbon-cutting day. Project milestones could include, for example, 60% within five years of project operation, 65% within ten years, 70% within 20 years, 75% within 25 years; or any other phased implementation of some ultimate percentage of unimpaired flow *as determined through detailed analysis as part of a portfolio alternative.* The BDCP was conceived as a fifty-year plan. These time horizons are reasonable in light of the project description, purpose, and need.

Unimpaired flow as a metric of achieving restoration of restored Delta flows deserves further consideration in light of the findings of the Flow Criteria Report:

> In order to preserve the attributes of a natural variable system to which native fish species are adapted, many of the criteria developed by the State Water Board are crafted as percentages of natural or unimpaired flows. These criteria include:
>
> - 75% of unimpaired Delta outflow from January through June;
> - 75% of unimpaired Sacramento River inflow from November through June; and
> - 60% of unimpaired San Joaquin River inflow from February through June.

Flow Criteria Report 5.

The current Fix approach of Alternative 4A to Delta flows, measuring bypass flows at the new point of diversion, is not consistent with the Flow Criteria Report or the California Legislature's directive to restore Delta flows (discussed at section ___ below). Bypass flows were not the metric developed to protect public trust resources and do not address restoring natural Delta flows.

We do not suggest, and have never suggested, that the Lead Agencies are required to adopt the Flow Criteria Report as the flow requirements for BDCP/Fix. It is an informational document and was prepared for the SWRCB by an independent panel of eminent Delta scientist. We do suggest that it is due considerable regard rising to the level of further consideration as part of an alternative that starts out by including the elements, in addition to conveyance, that will be required to implement it and not disrupt water supply or other environmental needs. Such elements might include any of the portfolio elements as discussed herein and/or modifications, such as an unimpaired flow+ alternative, just as Alternative 4A depends upon an H3+ operational scenario.

In this light, Alternative 9A (or its derivative(s)) should be given full consideration in a further revised RDEIR/S.

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IV. Preferred Alternative 4A Does Not Comply With The Delta Reform Act.

A. On The Whole, Alternative 4A Does Not Advance The Coequal Goals And, In The Long Term, Hinders Achievement Of The Coequal Goals.

1. The Coequal Goals And Inherent Sub-goals Apply To BDCP/Fix.

The Delta Reform Act ("Act") requires that all state agencies conform their actions to the Act's coequal goals, which are the pole star of Delta policy. The coequal goals are "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem." Cal. Water Code § 85054. Inherent in the coequal goals are the subgoals of "[r]estor[ing] Delta flows and channels to support a healthy estuary and other ecosystems," Cal. Water Code § 85302(e)(4), and "[i]mproving water quality to meet drinking water, agriculture, and ecosystem long-term goals." Cal. Water Code § 85302(e)(5). That these requirements apply to the BDCP/Fix is not in dispute.

2. Alternative 4A Does Not Restore Delta Flows Or Protect Public Trust Resources Within the Meaning Of The Act.

The Act provides that "the public trust doctrine shall be the foundation of state water management policy and [is] particularly important and applicable to the Delta." Cal. Water Code § 85023. Restoring and maintaining adequate Delta flows is the cornerstone of meeting public trust obligations with respect to Delta water management policy.

Alternative 4A relies, in large measure, on extant standards in the SWRCB 2006 Bay-Delta Water Quality Control Plan as implemented through Water Rights Decision No. 1641 ("D-1641"). *See, e.g.*, 2015 RDEIR/S 4.1-9 n.17 ("an alternative operation for spring outflow would be to follow flow constraints established under D-1641"); *see also id.* at 4.1-10–12. However, it has been established that D-1641 standards are inadequate to protect public trust resources. The Flow Criteria Report, commissioned explicitly to guide the Lead Agencies in this regard, concludes that "[r]ecent Delta flows [as controlled by] ... existing regulatory requirements included in the 2006 Bay-Delta Plan are insufficient to support native fishes for today's habitats." Flow Criteria Report 5 & n.3. *See also* Delta Plan 148 ("The best available science suggests that currently required flow objectives within and out of the Delta [D-1641] are insufficient to protect the Delta ecosystem.").

In many respects, the NEPA and CEQA conclusions of no adverse effect/significant impact are based on the project not violating applicable laws and regulations with respect to water quality, even though the project admittedly causes some water quality degradation.

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Of the thirty-five water quality impacts listed for Alternative 4A in Table ES-9, none is listed as "beneficial" although the table key provides for a beneficial listing. 2015 RDEIR/S ES–45. One is listed as adverse/significant. We believe many more water quality impacts are actually adverse, including, but not limited to impacts WQ-11 and WQ-7, discussed above. Even on the project proponents reckoning, the project has net negative effect on water quality.

Water quality is a function of flow. The project's failure to restore Delta flows causes its failure to improve water quality.

3. The Benefits, If Any, To OMR Reverse Flows And Delta Smelt Entrainment, Are Outweighed By The Project's Negative Effects.

The impetus for new points of diversion in the north Delta is to move the diversion points away from Delta smelt habitat areas so operations can continue when smelt are in the area of the south Delta intakes. Further impetus is to avoid the limiting effect of reverse OMR flows on the ability to pump. Regulatory restrictions and the self-limiting factor of drawing salt water upstream limit operations of the south Delta pumps.

There are incidental environmental effects of these water supply goals. However, the many negative impacts of the project far outweigh any incidental positive effects. Further, according to the most recent analysis of Alternative 4A, it does not significantly contribute to water supply reliability if operated as promised.

The project, on the whole, does not contribute to the coequal goals and has many attributes that will interfere, over the long term, with attaining the coequal goals.

B. Alternative 4A And All The Alternatives Fail To Comply With The Act Because They Lack Adaptive Management.

California Water Code section 85321 requires that the "BDCP shall include a transparent, real-time operational decisionmaking process in which fishery agencies ensure that applicable biological performance measures are achieved in a timely manner with respect to water system operations." Rebranding the project as California WaterFix and deleting 65,000 or more acres of habitat restoration does not repeal section 85321. Legislative intent was to protect the Delta from a mega-diversion project gone awry. The Lead Agencies have acknowledged, throughout the process, that effective adaptive management is essential to ensuring that high-capacity diversion tunnels do not harm the Delta ecosystem. Revising the project description to delete the goal of achieving HCP status does not change that dynamic. An effective, fully developed and described, adaptive management program is essential to the legal sufficiency of Alternative 4A and to any claim to the scientific legitimacy of the effects analysis, operational criteria, and environmental review documents. Practice in the scientific community (which develops and implements adaptive management programs) has been to interpret the Act's adaptive management requirements to required "science-based adaptive management of all ecosystem and water management programs in the Delta." *Mount Report* 99 (citing Cal. Water Code § 85308(f)).

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Indeed, much of Alternative 4A's commitment to not harming the Delta ecosystem depends on, and is deferred to, adaptive management. The Lead Agencies acknowledge a great deal of scientific uncertainty about Alternative 4A's effects on the Delta ecosystem, and depend upon adaptive management to ensure mitigation of adverse effects. Adaptive management "will be used to consider and address scientific uncertainty regarding the Delta ecosystem and to inform implementation of the operational criteria ... ." 2015 RDEIR/S4.1-6.

At bottom, all of the EIR/S assumptions about environmental impacts depend on effective adaptive management. However, Alternative 4A's (like the BDCP's) adaptive management is largely a repetition of slogans about what adaptive management should be. Despite sustained outcry from the scientific community and the public about the Lead Agencies' chimerical treatment of adaptive management, the documents remain an exercise in specious deflection of calls for a real adaptive management program. As the ISB put it, "We are not looking here for a primer on adaptive management." 2015 ISB DEIR Review 5. The project's "missing content includes: 1. Details about the adaptive-management process, collaborative science, monitoring, and the resources that these efforts will require." *Id*. 1. Further:

> The lack of a substantive treatment of adaptive management in the Current Draft indicates that it is not considered a high priority or the proposers have been unable to develop a substantive idea of how adaptive management would work for the project.

Id. 5.

The current state of vacuity in adaptive management is the progression of a process that sought to *frustrate* the ability of adaptive management to throttle back exports through the high-capacity tunnels no matter how dire or immediate the harm to the Delta ecosystem. From the outset, the regulated entities, including the water contractors whose self-interest is to derive as much water as possible from the Delta, have been given an illegitimate role in adaptive management. *See, e.g.*, *Mount Report* 100 (commenting on 2013 Administrative Draft) (noting that the adaptive management structure "confuses the roles of regulators and regulated entities" and will likely result in "rendering the concept of adaptive management moot"); *see also id.* at 83 (noting that adaptive management "is undermined by provisions in the draft Plan that grant the Authorized Entity Group [water contractors]—rather than regulatory agencies—veto authority over changes to the conservation measures [inlcuding CM1, operation of the tunnels themselves], biological objectives, and adaptive management strategies, as well as over amendments to the BDCP itself").

The water contractors, mentioned in the *Mount Report* as being given veto authority over any change in the initial operating criteria that sets export rates, characterize the "need to restore adequate water supplies to protect the state's environmental resources" as "throwing more water at the problem." Letter from Byron Buck, Executive Director, State and Federal Water Contractors Association to Phillip Isenberg, Chairman, Delta Stewardship Council 1, March 3, 2011 (Attachment 18).

To be legally sufficient, the adaptive management program must be fully formed and circulated for public comment before any decision is made to approve the project. It

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cannot be deferred to some future time after project approval. "If adaptive management and monitoring are central to California WaterFix, then details of how they will be done and resourced should be developed at the outset (now) so they can be better reviewed, improved, and integrated into related Delta activities." 2015 Delta ISB Review 6.

The Act and Delta Plan require that all water management decisions be based on adaptive management and that adaptive management be based on the best available science. "The Delta Reform Act requires that the Delta Plan be based on and implemented using the best available science, and requires the use of science-based, transparent, and formal adaptive management strategies for ongoing ecosystem restoration and water management decisions." Delta Plan 34. The Lead Agencies stated that reliance on adaptive management would be "based on best available science" but have deferred any content of adaptive management to the future. 2013 Draft EIR/S 3-207.

Every scientific peer review that has been conducted of the adaptive management "plan" concludes that it is not an adaptive management plan as that term is used in the scientific community, but rather a vague promise for a future adaptive management plan. These promises, rather than an actual plan, all reviewers have concluded, are not acceptable. There is consensus in the scientific community that the Lead Agencies' deferral of adaptive management violates the principles of best available science.

V. The Change In The Project Is Too Fundamental To Be Accomplished Through An Amended Project Description And Requires Issuance Of A New NOI/NOP.

All of alternatives 1–9 described in the 2013 Draft EIR/S were HCP's. The changed project description is intended to eliminate any HCP from the project. This is a different project, not a permissible change or "lessening" of the project. Those cases that allow a changed project description to "lessen" a project do so on the rationale that the environmental balance is thereby tipped in favor of the environment. A smaller project has fewer and less severe impacts.

Here, the opposite is the case. The conservation "gold standard" of an HCP, promised to the public from the outset, has been abruptly abandoned. This tips the balance sharply against the environment and in favor of outright water diversion without any real environmental benefit. The current project description and alternatives that include mitigations and "environmental commitments" are not of the same basic nature as the original project.

If project proponents want to pursue this entirely different kind of project, they are, of course, at liberty to do so—so long as they comply with CEQA and NEPA by issuing a new NOI/NOP and initiating a NEPA/CEA process for this new and different undertaking.

VI. We Join With And Incorporate The Comments Of Others.

We agree with many of the comments being made, and that have been made, by other parties. We do not repeat them here. Repetition of other comments is not necessary to exhaust remedies for purposes of NEPA and we join and incorporate the comments of others that address CEQA/NEPA inadequacies for the purpose of exhausting NEPA

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administrative remedies. Exhaustion is satisfied because the agencies are on notice of our concerns and they have had a chance to address them in detail by their detailed presentation in the comments of others. Where we use CEQA terminology here, the NEPA equivalent terminology is also intended to be included. We join other commenters criticisms including the inadequacy of mitigations; undisclosed or unanalyzed impacts; the failure to consider a reasonable range of alternatives; the unstable project description; the false, misleading, and inadequate project description; failure to adequately define baseline conditions; failure to analyze secondary effects; failure to describe and evaluate reasonable and feasible mitigation measures that could eliminate or substantially lessen significant environmental impacts of the project; unlawful segmentation and deferral of environmental review (piecemealing).

We also join with and incorporate the comments of others pointing out that the project and environmental documents do not comply with the Delta Reform Act, state and federal endangered species acts, the federal Clean Water Act, and the Porter Cologne Water Quality Control Act.

VII. State Funds May Not Be Used For Anything Associated With The Project.

This is in part a comment on the project and in part a comment on the Draft BDCP and in part on the RDEIR/S.

California Water Code section 85320(b) provides that:

> The BDCP shall not be incorporated into the Delta Plan *and* the public benefits associated with the BDCP shall not be eligible for state funding, unless the BDCP does all of the following:
>
> (1) Complies with Chapter 10 (commencing with Section 2800) of Division 3 of the Fish and Game code.

Chapter 10 provides the specifications required to qualify as an NCCP. Alternative 4A does not qualify as an NCCP. It is therefore ineligible for *any* state funding.

The BDCP provides that much funding comes from the water contractors. 2013 Draft BDCP 8-65. However, state funding is shown for aspects of public benefits associated with the BDCP. *Id*. 8-65–8-69. These funding assumptions were made at a time when it was thought that the BDCP would comply with Chapter 10. They are now void. A revenue bond is a bond secured by specific revenue—here it was thought the revenue would be payments from the water contractors based, at least in part, upon water deliveries. This constitutes state funding within the meaning of Water Code section 85320(b)(1) and is now impermissible.

2013 Draft BDCP section 8.3.3 discusses the issuance by DWR of revenue bonds, to be repaid over time by the water contractors. This is no longer permissible. State funding is prohibited, regardless of whether it is provided with agreements for repayment.

It is unclear how Alternative 4A will be funded, but state funds may not be used. Rebranding the project, revising the project description, and re-circulating the environmental documents does not make it a "new" or "different" project within the

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meaning of Water Code section 85320. Project proponents could adopt the no-project alternative and start a new project with whatever funding sources are appropriate. But they have elected not to do that.

To the extent that mitigations or environmental commitments are premised on state funding, they are inadequate and cannot be relied on for environmental analysis.

VIII. Conclusion.

We thank the Lead Agencies for the opportunity to present these comments and for considering our views.

Sincerely,

/s/Michael A. Brodsky
Michael A. Brodsky

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Table 3A-13. Second Screening: Comparison of Conveyance Alternatives with Second Level Screening Criteria Related to CEQA and NEPA

If the answer to the CEQA Criteria and/or the NEPA Criteria question is "Possibly" or "Unknown," the alternative would be considered in the Third Level Screening. If the answers to both questions are "No" or "Not Likely," the alternative would not be considered under subsequent screening criteria.

Potential Alternative	CEQA Criteria: Would the potential alternative avoid or substantially lessen any of the expected significant environmental effects of the "proposed project"?	NEPA Criteria: Would the potential alternative "address one or more significant issues" related to the proposed action?	Results of Second Level Screening
1. **Second Screening Dual Conveyance Alternative 1A–***Dual Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
2. **Second Screening Dual Conveyance Alternative 1B–***Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
3. **Second Screening Dual Conveyance Alternative 1C–***Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
4. **Second Screening Dual Conveyance Alternative 2A–***Dual Conveyance with a Tunnel–Scenario 6 Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
5. **Second Screening Dual Conveyance Alternative 2B–***Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
6. **Second Screening Dual Conveyance Alternative 2C–***Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
7. **Second Screening Dual Conveyance Alternative 3A–***Dual Conveyance with a Tunnel–January 2010 BDCP Operations–6,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
8. **Second Screening Dual Conveyance Alternative 3B–***Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–6,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
9. **Second Screening Dual Conveyance Alternative 3C–***Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–6,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
10. **Second Screening Dual Conveyance Alternative 4A–***Dual Conveyance with a Tunnel–Scenario 6 Operations–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
11. **Second Screening Dual Conveyance Alternative 4B–***Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
12. **Second Screening Dual Conveyance Alternative 4C–***Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
13. **Second Screening Dual Conveyance Alternative 5A–***Dual Conveyance with a Tunnel–January 2010 BDCP Operations and Fall X2–3,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
14. **Second Screening Dual Conveyance Alternative 6A–***Dual Conveyance with a Tunnel–Enhanced Ecosystem Conveyance Operations Alternative–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
15. **Second Screening Dual Conveyance Alternative 7A–***Dual Conveyance with a Tunnel–Enhanced Spring Delta Outflow Alternative–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
16. **Second Screening Dual Conveyance Alternative 8A–***Dual Conveyance with a Tunnel–Proportional North Delta Inflow Bypass Alternative–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
17. **Second Screening Dual Conveyance Alternative 9A–***Dual Conveyance with a Tunnel–State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
18. **Second Screening Isolated Conveyance Alternative 1A–***Isolated Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
19. **Second Screening Isolated Conveyance Alternative 1B–***Isolated Conveyance with a Lined or Unlined East Canal–January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
20. **Second Screening Isolated Conveyance Alternative 1C–***Isolated Conveyance with a Lined or Unlined West Canal–January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
21. **Second Screening Through Delta Conveyance Alternative–***Separate Corridors Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening

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Table ES-9. Summary of BDCP/California WaterFix RDEIR/SDEIS Impacts and Mitigation Measures

Notes:

1. These conclusions reflect implementation of Environmental Commitments 3, 4, 6–12, 15 and 16 (as described in Section 4.1 of the RDEIR/SDEIS), and Avoidance and Minimization Measures (described in detail in the Appendix 3C of the BDCP and in Appendix D of the RDEIR/SDEIS), which are considered a part of each action alternative. In some cases, mitigation measures proposed under one resource section (e.g., terrestrial biological resources) are also proposed to reduce effects on another resource topic (e.g., recreation). These mitigation measures are cross-referenced wherever they may reduce effects. Additional discussion of each effect and mitigation measure can be found under the referenced resource-specific chapter(s).
2. While many impact headers (see "Potential Impact" column) describe specific effects associated with BDCP action alternatives (e.g., the effects of implementing one or more conservation measures proposed as part of the BDCP), the conclusions provided for No Action Alternative (NAA) represent the anticipated effects on a resource as a result of future conditions in the absence of BDCP implementation. For the EIR/EIS analysis, the No Action Alternative assumptions are described in Appendix 3D, *Defining Existing Conditions, No Action Alternative, No Project Alternative, and Cumulative Impact Conditions*.
3. The names of some of the numbered impacts have been slightly modified in the text to more accurately reflect the impacts resulting from implementing Alternatives 4A, 2D, or 5A. Although names of some of these impacts have been modified, the impact number sequence remains accurate as are the findings shown in this table. The impact names in the table reflect the same as what was shown in the DEIR/SEIS.
4. Impacts which refer to conservation measures (from the Draft EIR/S) correspond to identically numbered Environmental Commitments for Alternatives 4A, 2D, and 5A in the Recirculated Draft EIR/Supplemental EIS. (For more information, see Section 4.1 in the RDEIR/SDEIS.)

		Impact Conclusions Before Mitigation		Impact After Mitigation	
Potential Impact	**Alternatives**	**CEQA**	**Proposed Mitigation (CEQA and NEPA)**	**CEQA**	**NEPA**
Water Supply					
WS-1: Changes in SWP/CVP water deliveries during construction	NAA, 2D, 4, 4A, 5A	NI		NI	NE
WS-2: Change in SWP and CVP deliveries	NAA, 2D, 4, 4A, 5A	N/A[1]		N/A	N/A
WS-3: Effects of water transfers on water supply	NAA, 2D, 4, 4A, 5A	N/A[2]		N/A	N/A
Surface Water					
SW-1: Changes in SWP or CVP reservoir flood storage capacity	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
SW-2: Changes in Sacramento and San Joaquin River flood flows	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
SW-3: Change in reverse flow conditions in Old and Middle Rivers	NAA, 2D, 4, 4A, 5A	ND		ND	ND
SW-4: Substantially alter the existing drainage pattern or substantially increase the rate or amount of surface runoff in a manner that would result in flooding during construction of conveyance facilities	NAA, 2D, 4, 4A, 5A	S	SW-4: Implement measures to reduce runoff and sedimentation	LTS	NA
SW-5: Substantially alter the existing drainage pattern or substantially increase the rate or amount of surface runoff in a manner that would result in flooding during construction of habitat restoration area facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	SW-4: Implement measures to reduce runoff and sedimentation	LTS	NA

[1] Findings were not made for these due to the approach in this analysis.

[2] Findings were not made for these due to the approach in this analysis.

Level of Significance/Determination of Effects:

CEQA				NEPA		
SU=significant and unavoidable (any mitigation not sufficient to render impact less than significant)	LTS=less than significant S=significant	NI=no impact B=beneficial	ND=no determination N/A=not applicable	A=adverse NA=not adverse	NE=no effect B=beneficial	ND=no determination N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
SW-6: Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	SW-4: Implement measures to reduce runoff and sedimentation	LTS	NA
SW-7: Expose people or structures to a significant risk of loss, injury or death involving flooding due to the construction of new conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	SW-7: Implement Measures to Reduce Flood Damage	LTS	NA
SW-8: Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding due to habitat restoration	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	SW-8: Implement measures to address potential wind fetch issues	LTS	NA
SW-9: Place within a 100-year flood hazard area structures which would impede or redirect flood flows, or be subject to inundation by mudflow	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	SW-4: Implement measures to reduce runoff and sedimentation	LTS	NA
Groundwater					
Changes in Central and South Delta flow	NAA (ELT)	NI		NI	NE
Changes in Delta Groundwater Levels[3]	NAA (ELT)	NI		NI	NE[4]
Changes in Delta Groundwater Quality[1,]	NAA (ELT)	LTS		LTS	NA
Changes in Delta Agricultural Drainage[1]	NAA (ELT)	LTS		NI	NE
San Joaquin Basin Groundwater Levels[5]	NAA (ELT)	S		S	A
Tulare Basin Groundwater Levels[3]	NAA (ELT)	S		S	A
Tulare Basin Groundwater Flow[3]	NAA (ELT)	LTS		LTS	NA
San Joaquin and Tulare Basin Land Subsidence[3]	NAA (ELT)	LTS		LTS	NA
Other Portions of the Export Service Areas–Groundwater supplies, recharge, and local groundwater table levels	NAA (ELT)	S		S	A
Ongoing Plans, Policies, and Programs	NAA (ELT)	LTS		LTS	NA
GW-1: During construction, deplete groundwater supplies or interfere with groundwater recharge, alter local groundwater levels, or reduce the production capacity of preexisting nearby wells	2D, 4, 4A, 5A	S	GW-1: Maintain water supplies in areas affected by construction dewatering	SU	A
GW-2: During operations, deplete groundwater supplies or interfere with groundwater recharge, alter local groundwater levels, or reduce the production capacity of preexisting nearby wells	2D, 4, 4A, 5A	LTS		LTS	NA

[3] Includes effects of climate change and sea level rise at 2060 (2025 for REIR/S)
[4] Increased groundwater level due to sea level rise in San Francisco Bay may result in a beneficial effect on shallow well yields
[5] SWP/CVP Export Service Areas

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	S=significant	B=beneficial	N/A=not applicable

NEPA		
A=adverse	NE=no effect	ND=no determination
NA=not adverse	B=beneficial	N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
GW-3: Degrade groundwater quality during construction and operation of conveyance facilities	2D, 4, 4A, 5A	LTS		LTS	NA
GW-4: During construction of conveyance facilities, interfere with agricultural drainage in the Delta	2D, 4, 4A, 5A	LTS		LTS	NA
GW-5: During operations of new facilities, interfere with agricultural drainage in the Delta	2D, 4, 4A, 5A	S	GW-5: Agricultural lands seepage minimization	SU	A
GW-6: Deplete groundwater supplies or interfere with groundwater recharge, alter local groundwater levels, reduce the production capacity of preexisting nearby wells, or interfere with agricultural drainage as a result of implementing CM2–CM22	2D, 4, 4A, 5A	S	GW-5: Agricultural lands seepage minimization	SU	A
GW-7: Degrade groundwater quality as a result of implementing CM2–CM22	2D, 4, 4A, 5A	S	GW-7: Provide an alternate source of water	SU	A
GW-8: During operations, deplete groundwater supplies or interfere with groundwater recharge, alter groundwater levels, or reduce the production capacity of preexisting nearby wells	2D, 4A, 5A	LTS[6]		LTS	B
	4, 6A, 6B, 6C, 7, 8, 9	S	No feasible mitigation to address this impact	SU	A
GW-9: Degrade groundwater quality	2D, 4, 4A, 5A	LTS[7]		LTS	NA
GW-10: Result in groundwater level-induced land subsidence	2D, 4, 4A, 5A	LTS		LTS	NA
Water Quality					
WQ-1: Effects on ammonia concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-2: Effects on ammonia concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-3: Effects on boron concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-4: Effects on boron concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-5: Effects on bromide concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-6: Effects on bromide concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-7: Effects on chloride concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-8: Effects on chloride concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA

[6] For Alternative 4A, the impact could be significant/adverse in certain areas of Southern California depending on the range of Spring Delta outflows that affect the surface water deliveries and associated groundwater usage.
[7] For Alternative 4A, the impact could be significant/adverse, as related to impact GW-8

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NEPA		
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
WQ-9: Effects on dissolved oxygen resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-10: Effects on dissolved oxygen resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-11: Effects on electrical conductivity concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	S	WQ-11: Avoid or Minimize Reduced Water Quality Conditions WQ-11a: Adaptively Manage Diversions at the North and South Delta Intakes to Reduce or Eliminate Water Quality Degradation in Western Delta. WQ-11b: Adaptively Manage Head of Old River Barrier and Diversions at the North and South Delta Intakes to Reduce or Eliminate Exceedances of the Bay-Delta WQCP Objective at Prisoners Point.	LTS	NA
WQ-12: Effects on electrical conductivity concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-13: Effects on mercury concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-14: Effects on mercury concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	S	No available mitigation to address this impact	SU	A
WQ-15: Effects on nitrate concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-16: Effects on nitrate concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-17: Effects on organic carbon concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-18: Effects on organic carbon concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-19: Effects on pathogens resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-20: Effects on pathogens resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-21: Effects on pesticide concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-22: Effects on pesticide concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-23: Effects on phosphorus concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-24: Effects on phosphorus concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA

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NEPA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
WQ-25: Effects on selenium concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-26: Effects on selenium concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-27: Effects on trace metal concentrations resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-28: Effects on trace metal concentrations resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-29: Effects on TSS and turbidity resulting from facilities operations and maintenance (CM1)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-30: Effects on TSS and turbidity resulting from implementation of CM2–CM22	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-31: Water quality impacts resulting from construction-related activities (CM1–CM22)	2D, 4, 4A, 5A	LTS		LTS	NA
WQ-32: Effects on Microcystis Bloom Formation Resulting from Facilities Operations and Maintenance (CM1).	1A-2C, 3, 4, 5, 6A-9	S	WQ-32a: Design Restoration Sites to Reduce Potential for Increased Microcystis Blooms WQ-32b: Investigate and Implement Operational Measures to Manage Water Residence Time	SU	A
	2D, 4A, 5A	LTS		LTS	NA
WQ-33: Effects on Microcystis Bloom Formation Resulting from Other Conservation Measures (CM2–CM21).	1A-2C, 3, 4, 5, 6A-9	S	No available mitigation to address this impact	SU	A
	2D, 4A, 5A	LTS		LTS	NA
WQ-34: Effects on San Francisco Bay Water Quality Resulting from Facilities Operations and Maintenance (CM1) and Implementation of CM2–CM21	1A-9	LTS		LTS	NA
Geology and Seismicity					
GEO-1: Loss of property, personal injury, or death from structural failure resulting from strong seismic shaking of water conveyance features during construction	NAA	NI		NI	NA
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-2: Loss of property, personal injury, or death from settlement or collapse caused by dewatering during construction of water conveyance features	NAA	NI		NI	NA
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-3: Loss of property, personal injury, or death from ground settlement during construction of water conveyance features	NAA	NI		NI	NE
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-4: Loss of property, personal injury, or death from slope failure during construction of water conveyance features	NAA	B		B	B
	2D, 4, 4A, 5A	LTS		LTS	NA

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NEPA
A=adverse
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
GEO-5: Loss of property, personal injury, or death from structural failure resulting from construction-related ground motions during construction of water conveyance features	NAA	NI		NI	NE
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-6: Loss of property, personal injury, or death from structural failure resulting from rupture of a known earthquake fault during operation of water conveyance features	NAA	NI		NI	NE
	2D, 4, 4A, 5A	NI		NI	NE
GEO-7: Loss of property, personal injury, or death from structural failure resulting from strong seismic shaking during operation of water conveyance features	NAA	NI		NI	NE
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-8: Loss of property, personal injury, or death from structural failure resulting from seismic-related ground failure (including liquefaction) during operation of water conveyance features	NAA	NI		NI	NE
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-9: Loss of property, personal injury, or death from landslides and other slope instability during operation of water conveyance features	NAA	B		B	B
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-10: Loss of property, personal injury, or death from seiche or tsunami during operation of water conveyance features	NAA	B		B	B
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-11: Ground failure caused by increased groundwater surface elevations from unlined canal seepage as a result of operating the water conveyance facilities	NAA	NI		NI	NE
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-12: Loss of property, personal injury, or death resulting from structural failure caused by rupture of a known earthquake fault at Restoration Opportunity Areas	NAA	NI		NI	NE
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-13: Loss of property, personal injury, or death from structural failure resulting from strong seismic shaking at Restoration Opportunity Areas	NAA	NI		NI	NE
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-14: Loss of property, personal injury, or death from structural failure resulting from seismic-related ground failure (including liquefaction) beneath Restoration Opportunity Areas	NAA	NI		NI	NE
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-15: Loss of property, personal injury, or death from landslides and other slope instability at Restoration Opportunity Areas	NAA	B		B	B
	2D, 4, 4A, 5A	LTS		LTS	NA
GEO-16: Loss of property, personal injury, or death from seiche or tsunami at Restoration Opportunity Areas as a result of implementing the conservation actions	NAA	B		B	B
	2D, 4, 4A, 5A	LTS		LTS	NA
Soils					
SOILS-1: Accelerated erosion caused by vegetation removal and other soil disturbances as a result of constructing the proposed water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA

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NEPA
A=adverse
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
SOILS-2: Loss of topsoil from excavation, overcovering, and inundation as a result of constructing the proposed water conveyance facilities	NAA	S		S	A
	2D, 4, 4A, 5A	S	SOILS-2a: Minimize extent of excavation and soil disturbance SOILS-2b: Salvage, stockpile, and replace topsoil and prepare a topsoil storage and handling plan	SU	A
SOILS-3: Property loss, personal injury, or death from instability, failure, and damage from construction on or in soils subject to subsidence as a result of constructing the proposed water conveyance facilities	NAA	S		S	A
	2D, 4, 4A, 5A	LTS		LTS	NA
SOILS-4: Risk to life and property as a result of constructing the proposed water conveyance facilities in areas of expansive, corrosive, and compressible soils	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
SOILS-5: Accelerated bank erosion from increased channel flow rates as a result of operations	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
SOILS-6: Accelerated erosion caused by clearing, grubbing, grading, and other disturbances associated with implementation of proposed Environmental Commitments 3, 4, and 6–11	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
SOILS-7: Loss of topsoil from excavation, overcovering, and inundation associated with restoration activities as a result of implementing the proposed Environmental Commitments 3, 4, and 6–11	NAA	S		S	A
	2D, 4, 4A, 5A	S	SOILS-2a: Minimize extent of excavation and soil disturbance SOILS-2b: Salvage, stockpile, and replace topsoil and prepare a topsoil storage and handling plan	SU	A
SOILS-8: Property loss, personal injury, or death from instability, failure, and damage from construction on soils subject to subsidence as a result of implementing the proposed Environmental Commitments 3, 4, and 6–11	NAA	B		B	B
	2D, 4, 4A, 5A	LTS		LTS	NA
SOILS-9: Risk to life and property from construction in areas of expansive, corrosive, and compressible soils as a result of implementing the proposed Environmental Commitments 3, 4, and 6–11	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
Fish and Aquatic Resources					
AQUA-NAA1: Effects of construction of facilities on covered fish species	NAA	LTS		LTS	NA
AQUA-NAA2: Effects of maintenance of facilities on covered fish species	NAA	LTS		LTS	NA
AQUA-NAA3: Effects of water operations on entrainment of covered fish species	NAA	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation: CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation: CEQA	Impact After Mitigation: NEPA
AQUA-NAA4: Effects of water operations on spawning and egg incubation habitat for covered fish species	NAA	LTS S (winter-run Chinook salmon and green sturgeon)	No feasible mitigation to address this impact on Chinook salmon	SU	A (winter-run Chinook salmon and green sturgeon)
AQUA-NAA5: effects of water operations on rearing habitat for covered fish species	NAA	S		S	NA
AQUA-NAA6: Effects of water operations on migration habitat for covered fish species	NAA	LTS		LTS	NA
AQUA-NAA7: Effects of habitat restoration on covered fish species	NAA	LTS		LTS	NA
AQUA-NAA8: Effects of other Conservation Measures on covered fish species	NAA	LTS		LTS	B
AQUA-NAA9: Effects of construction of facilities on non-covered fish species	NAA	LTS		LTS	NA
AQUA-NAA10: Effects of maintenance of facilities on non-covered fish species	NAA	LTS		LTS	NA
AQUA-NAA11: Effects of water operations on entrainment of non-covered fish species	NAA	LTS		LTS	NA
AQUA-NAA12: Effects of water operations on spawning and egg incubation habitat for non-covered fish species	NAA	LTS		LTS	NA
AQUA-NAA13: Effects of water operations on rearing habitat for non-covered fish species	NAA	LTS		LTS	NA
AQUA-NAA14: Effects of water operations on migration habitat for non-covered fish species	NAA	LTS		LTS	NA
AQUA-NAA15: Effects of habitat restoration on non-covered fish species	NAA	LTS		LTS	NA
AQUA-NAA16: Effects of other Conservation Measures on non-covered fish species	NAA	LTS		LTS	B
AQUA-1: Effects of construction of water conveyance facilities on delta smelt	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-2: Effects of maintenance of water conveyance facilities on delta smelt	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-3: Effects of water operations on entrainment of delta smelt					
	2D, 4, 4A	LTS		LTS	B
	5A	LTS		LTS	NA

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NEPA		
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NA=not adverse	B=beneficial	N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation: CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation: CEQA	Impact After Mitigation: NEPA
AQUA-4: Effects of water operations on spawning and egg incubation habitat for delta smelt	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-5: Effects of water operations on rearing habitat for delta smelt	4, 4A	LTS		LTS	NE
	1A, 1B, 1C, 3	LTS		LTS	A
	2A, 2B, 2C, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 5A	LTS		LTS	NA
AQUA-6: Effects of water operations on migration conditions for delta smelt	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-7: Effects of construction of restoration measures on delta smelt	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-8: Effects of contaminants associated with restoration	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-9: Effects of restored habitat conditions on delta smelt	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-10: Effects of methylmercury management on delta smelt (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-13: Effects of localized reduction of predatory fish on delta smelt (CM15)	2D, 4, 4A, 5A	NI		NI	NE
AQUA-14: Effects of nonphysical fish barriers on delta smelt (CM16)	4, 4A	LTS		LTS	NE
	2D, 5A	LTS		LTS	NA
AQUA-19: Effects of construction of water conveyance facilities on longfin smelt	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-20: Effects of maintenance of water conveyance facilities on longfin smelt	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-21: Effects of water operations on entrainment of longfin smelt	4, 4A, 5A	B		B	NA
	2D	B		B	B

Level of Significance/Determination of Effects:

CEQA

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NEPA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-22: Effects of water operations on spawning, egg incubation, and rearing habitat for longfin smelt	4, 4A	S	AQUA-22D: Ensure January though June Delta outflows do not result in changes in longfin smelt abundance	LTS	NA
	5A	S	AQUA-22a: Following initial operations of water conveyance facilities, conduct additional evaluation and modeling of impacts to longfin smelt to determine feasibility of mitigation to reduce impacts to spawning and rearing habitat AQUA-22b: Conduct additional evaluation and modeling of impacts on longfin smelt rearing habitat following initial operations of water conveyance facilities AQUA-22c: Consult with USFWS and CDFW to identify and implement feasible means to minimize effects on longfin smelt rearing habitat consistent with water conveyance facilities	S	A
	2D	S	AQUA-22a: Following initial operations of water conveyance facilities, conduct additional evaluation and modeling of impacts to longfin smelt to determine feasibility of mitigation to reduce impacts to spawning and rearing habitat AQUA-22b: Conduct additional evaluation and modeling of impacts on longfin smelt rearing habitat following initial operations of water conveyance facilities AQUA-22c: Consult with USFWS and CDFW to identify and implement feasible means to minimize effects on longfin smelt rearing habitat consistent with water conveyance facilities	S	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9	LTS		LTS	NA
AQUA-25: Effects of construction of restoration measures on longfin smelt	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-26: Effects of contaminants associated with restoration measures on longfin smelt	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4A, 5A	LTS		LTS	NA
AQUA-27: Effects of restored habitat conditions on longfin smelt	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-28: Effects of methylmercury management on longfin smelt (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-31: Effects of localized reduction of predatory fish on longfin smelt (CM15)	2D, 4, 4A, 5A	NI		NI	NE
AQUA-32: Effects of nonphysical fish barriers on longfin smelt (CM16)	4, 4A	NI		NI	NE
	2D, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-37: Effects of construction of water conveyance facilities on Chinook salmon (winter-run ESU)	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-38: Effects of maintenance of water conveyance facilities on Chinook salmon (winter-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-39: Effects of water operations on entrainment of Chinook salmon (winter-run ESU)	2D, 4, 4A, 5A	B		B	B
AQUA-40: Effects of water operations on spawning and egg incubation habitat for Chinook salmon (winter-run ESU)	4, 4A, 5A, 7	LTS		LTS	NA
	2D	S	AQUA-40a: Following initial operations of water conveyance facilities, conduct additional evaluation and modeling of impacts to winter-run Chinook salmon to determine feasibility of mitigation to reduce impacts to spawning habitat AQUA-40b: Conduct additional evaluation and modeling of impacts on winter-run Chinook salmon spawning habitat following initial operations of water conveyance facilities AQUA-40c: Consult with NMFS, USFWS, and CDFW to identify and implement potentially feasible means to minimize effects on winter-run Chinook salmon spawning habitat consistent with water conveyance facilities	S	NA
	3	S		S	A
AQUA-41: Effects of water operations on rearing habitat for Chinook salmon (winter-run ESU)	2A, 2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-42: Effects of water operations on migration conditions for Chinook salmon (winter-run ESU)	4, 5, 7, 4A, 5A	LTS		LTS	NA
	2D	S	AQUA-42a: Following initial operations of water conveyance facilities, conduct additional evaluation and modeling of impacts to winter-run Chinook salmon to determine feasibility of mitigation to reduce impacts to migration conditions AQUA-42b: Conduct additional evaluation and modeling of impacts on winter-run Chinook salmon migration conditions following initial operations of water conveyance facilities AQUA-42c: Consult with NMFS and CDFW to identify and implement potentially feasible means to minimize effects on winter-run Chinook salmon migration conditions consistent with water conveyance facilities operations	S	A

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 8, 9	LTS		LTS	NA/B[8]
AQUA-43: Effects of construction of restoration measures on Chinook salmon (winter-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-44: Effects of contaminants associated with restoration measures on Chinook salmon (winter-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-45: Effects of restored habitat conditions on Chinook salmon (winter-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-46: Effects of methylmercury management on Chinook salmon (winter-run ESU) (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-49: Effects of localized reduction of predatory fish on Chinook salmon (winter-run ESU) (CM15)	2D, 4, 4A, 5A	NI		NI	NE
AQUA-50: Effects of nonphysical fish barriers on Chinook salmon (winter-run ESU) (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-55: Effects of construction of water conveyance facilities on Chinook salmon (spring-run ESU)	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-56: Effects of maintenance of water conveyance facilities on Chinook salmon (spring-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-57: Effects of water operations on entrainment of Chinook salmon (spring-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-58: Effects of water operations on spawning and egg incubation habitat for Chinook salmon (spring-run ESU)	2A, 2B, 2C, 4, 5, 7, 2D, 4A, 5A	LTS		LTS	NA
AQUA-59: Effects of water operations on rearing habitat for Chinook salmon (spring-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NE

[8] The effects of short-term restoration construction activities would not be adverse; the overall long-term effects of habitat restoration are expected to be beneficial to winter-run Chinook salmon and other covered species by providing additional or improved habitat.

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-60: Effects of water operations on migration conditions for Chinook salmon (spring-run ESU)	4, 4A, 5A, 3, 5, 7	LTS		LTS	NA
	2D	S	AQUA-60a: Following initial operations of water conveyance facilities, conduct additional evaluation and modeling of impacts to spring-run Chinook salmon to determine feasibility of mitigation to reduce impacts to migration conditions AQUA-60b: Conduct additional evaluation and modeling of impacts on spring-run Chinook salmon migration conditions following initial operations of water conveyance facilities AQUA-60c: Consult with NMFS and CDFW to identify and implement potentially feasible means to minimize effects on spring-run Chinook salmon migration conditions consistent with water conveyance facilities	S	A
AQUA-61: Effects of construction of restoration measures on Chinook salmon (spring-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-62: Effects of contaminants associated with restoration measures on Chinook salmon (spring-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-63: Effects of restored habitat conditions on Chinook salmon (spring-run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-64: Effects of methylmercury management on Chinook salmon (spring-run ESU) (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-67: Effects of localized reduction of predatory fish on Chinook salmon (spring-run ESU) (CM15)	2D, 4, 4A, 5A	NI		NI	NE
AQUA-68: Effects of nonphysical fish barriers on Chinook salmon (spring-run ESU) (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-73: Effects of construction of water conveyance facilities on Chinook salmon (fall- and late fall–run ESU)	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-74: Effects of maintenance of water conveyance facilities on Chinook salmon (fall- and late fall–run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-75: Effects of water operations on entrainment of Chinook salmon (fall-/late fall–run ESU)	4, 4A, 5A	LTS		LTS	NA
	2D	B		B	NA
	5A	B		B	B
AQUA-76: Effects of water operations on spawning and egg incubation habitat for Chinook salmon (fall- and late fall–run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-77: Effects of water operations on rearing habitat for Chinook salmon (fall-/late fall–run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-78: Effects of water operations on migration conditions for Chinook salmon (fall-/late fall–run ESU)	4, 4A	S	AQUA-78D: Slightly adjust the timing and magnitude of Shasta, Folsom, and/or Oroville Reservoir releases, within all existing regulations and requirements, to ameliorate changes in instream, slows that would cause an adverse effect to fall-run Chinook salmon	LTS	NA
	2D, 5A	S	AQUA-78a: Following initial operations of water conveyance facilities, conduct additional evaluation and modeling of impacts to fall-/late fall–run Chinook salmon to determine feasibility of mitigation to reduce impacts to migration conditions AQUA-78b: Conduct additional evaluation and modeling of impacts on fall-/late fall–run Chinook salmon migration conditions following initial operations of water conveyance facilities AQUA-78c: Consult with NMFS and CDFW to identify and implement potentially feasible means to minimize effects on fall-/late fall–run Chinook salmon migration conditions consistent with water conveyance facility operations	S	A
	7	LTS		LTS	NA
AQUA-79: Effects of construction of restoration measures on Chinook salmon (fall-/late fall–run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-80: Effects of contaminants associated with restoration measures on Chinook salmon (fall-/late fall–run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-81: Effects of restored habitat conditions on Chinook salmon (fall-/late fall–run ESU)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-82: Effects of methylmercury management on Chinook salmon (fall-/late fall–run ESU) (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-85: Effects of localized reduction of predatory fish on Chinook salmon (fall-/late fall–run ESU) (CM15)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-86: Effects of nonphysical fish barriers on Chinook salmon (fall-/late fall–run ESU) (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-91: Effects of construction of water conveyance facilities on steelhead	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-92: Effects of maintenance of water conveyance facilities on steelhead	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-93: Effects of water operations on entrainment of steelhead	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-94: Effects of water operations on spawning and egg incubation habitat for steelhead	2D, 4, 4A, 5A	LTS		LTS	NA

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NEPA

A=adverse	NE=no effect	ND=no determination
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-95: Effects of water operations on rearing habitat for steelhead	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-96: Effects of water operations on migration conditions for steelhead	3, 4, 5, 7, 4A, 5A	LTS		LTS	NA
	2D	S	AQUA-96a: Following initial operations of water conveyance facilities, conduct additional evaluation and modeling of impacts to steelhead to determine feasibility of mitigation to reduce impact to migration conditions AQUA-96b: Conduct additional evaluation and modeling of impacts on steelhead migration conditions following initial operations of water conveyance facilities AQUA-96c: Consult with NMFS and CDFW to identify and implement potentially feasible means to minimize effects on steelhead migration conditions consistent with water conveyance facility operations	S	A
AQUA-97: Effects of construction of restoration measures on steelhead	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-98: Effects of contaminants associated with restoration measures on steelhead	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 6A, 6B, 6C, 8, 9, 2D, 4A, 5A	LTS		LTS	NA
AQUA-99: Effects of restored habitat conditions on steelhead	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-100: Effects of methylmercury management on steelhead (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-103: Effects of localized reduction of predatory fish on steelhead (CM15)	2D, 4, 4A, 5A	LTS		LTS	NE
AQUA-104: Effects of nonphysical fish barriers on steelhead (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-109: Effects of construction of water conveyance facilities on Sacramento splittail	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-110: Effects of maintenance of water conveyance facilities on Sacramento splittail	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-111: Effects of water operations on entrainment of Sacramento splittail	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-112: Effects of water operations on spawning and egg incubation habitat for Sacramento splittail	2D, 4, 4A, 5A	B		B	NE
AQUA-113: Effects of water operations on rearing habitat for Sacramento splittail	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-114: Effects of water operations on migration conditions for Sacramento splittail	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-115: Effects of construction of restoration measures on Sacramento splittail	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-116: Effects of contaminants associated with restoration measures on Sacramento splittail	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-117: Effects of restored habitat conditions on Sacramento splittail	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-118: Effects of methylmercury management on Sacramento splittail (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-121: Effects of localized reduction of predatory fish on Sacramento splittail (CM15)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-122: Effects of nonphysical fish barriers on Sacramento splittail (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-127: Effects of construction of water conveyance facilities on green sturgeon	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-128: Effects of maintenance of water conveyance facilities on green sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-129: Effects of water operations on entrainment of green sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-130: Effects of water operations on spawning and egg incubation habitat for green sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-131: Effects of water operation on rearing habitat for green sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-132: Effects of water operations on migration conditions for green sturgeon	4, 5, 6A, 6B, 6C, 7, 9, 2A, 2D, 4A, 5A	LTS		LTS	NA
AQUA-133: Effects of construction of restoration measures on green sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-134: Effects of contaminants associated with restoration measures on green sturgeon	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4A, 5A	LTS		LTS	NA
AQUA-135: Effects of restored habitat conditions on green sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-136: Effects of methylmercury management on green sturgeon (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-139: Effects of localized reduction of predatory fish on green sturgeon (CM15)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-140: Effects of nonphysical fish barriers on green sturgeon (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-145: Effects of construction of water conveyance facilities on white sturgeon	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-146: Effects of maintenance of water conveyance facilities on white sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-147: Effects of water operations on entrainment of white sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-148: Effects of water operations on spawning and egg incubation habitat for white sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-149: Effects of water operations on rearing habitat for white sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-150: Effects of water operations on migration conditions for white sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-151: Effects of construction of restoration measures on white sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-152: Effects of contaminants associated with restoration measures on white sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-153: Effects of restored habitat conditions on white sturgeon	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-154: Effects of methylmercury management on white sturgeon (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-157: Effects of localized reduction of predatory fish on white sturgeon (CM15)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-158: Effects of nonphysical fish barriers on white sturgeon (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-163: Effects of construction of water conveyance facilities on Pacific lamprey	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-164: Effects of maintenance of water conveyance facilities on Pacific lamprey	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-165: Effects of water operations on entrainment of Pacific lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-166: Effects of water operations on spawning and egg incubation habitat for Pacific lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-167: Effects of water operations on rearing habitat for Pacific lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-168: Effects of water operations on migration conditions for Pacific lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-169: Effects of construction of restoration measures on Pacific lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-170: Effects of contaminants associated with restoration measures on Pacific lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-171: Effects of restored habitat conditions on Pacific lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-172: Effects of methylmercury management on Pacific lamprey (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-175: Effects of localized reduction of predatory fish on Pacific lamprey (CM15)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-176: Effects of nonphysical fish barriers on Pacific lamprey (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-181: Effects of construction of water conveyance facilities on river lamprey	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-182: Effects of maintenance of water conveyance facilities on river lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-183: Effects of water operations on entrainment of river lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-184: Effects of water operations on spawning and egg incubation habitat for river lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-185: Effects of water operations on rearing habitat for river lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-186: Effects of water operations-related decline on migration conditions for river lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-187: Effects of construction of restoration measures on river lamprey	2D, 4, 4A, 5A	LTS		LTS	NA

Level of Significance/Determination of Effects:

CEQA				NEPA		
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(any mitigation not sufficient to render impact less than significant)	S=significant	B=beneficial	N/A=not applicable	NA=not adverse	B=beneficial	N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation: CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation: CEQA	Impact After Mitigation: NEPA
AQUA-188: Effects of contaminants associated with restoration measures on river lamprey	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-189: Effects of restored habitat conditions on river lamprey	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-190: Effects of methylmercury management on river lamprey (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-193: Effects of localized reduction of predatory fish on river lamprey (CM15)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-194: Effects of nonphysical fish barriers on river lamprey (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-199: Effects of construction of water conveyance facilities on non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	S (noise associated with pile driving)	AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Monitor underwater noise and if necessary, use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
AQUA-200: Effects of maintenance of water conveyance facilities on non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-201: Effects of water operations on entrainment of non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	S (striped bass, American shad) LTS (threadfin shad, largemouth bass, Sacramento tule perch, Sacramento San-Joaquin roach, hardhead, and California bay shrimp)		S (striped bass, American shad) LTS (threadfin shad, largemouth bass, Sacramento tule perch, Sacramento San-Joaquin roach, hardhead, and California bay shrimp)	NA (striped bass, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento San-Joaquin roach, hardhead, and California bay shrimp) A (American shad)
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8	S (striped bass, American shad)		S (striped bass, American shad)	A
	9	LTS		LTS	NA
AQUA-202: Effects of water operations on spawning and egg incubation habitat for non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	LTS (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)		LTS (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)	NA (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)

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NEPA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQUA-203: Effects of water operations on rearing habitat for non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	LTS (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)		LTS (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)	NA (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9	LTS (striped bass, American shad, California bay shrimp)		LTS (striped bass, American shad, California bay shrimp)	NA (striped bass, American shad, California bay shrimp)
AQUA-204: Effects of water operations on migration conditions for non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	LTS (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)		LTS (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)	NA (striped bass, American shad, threadfin shad, largemouth bass, Sacramento tule perch, Sacramento-San Joaquin roach, hardhead, California bay shrimp)
AQUA-205: Effects of construction of restoration measures on non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-206: Effects of contaminants associated with restoration measures on non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-207: Effects of restored habitat conditions on non-covered aquatic species of primary management concern	2D, 4, 4A, 5A	B		B	NA
AQUA-208: Effects of methylmercury management on non-covered aquatic species of primary management concern (CM12)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-211: Effects of localized reduction of predatory fish on non-covered aquatic species of primary management concern (CM15)	2D, 4, 4A, 5A	LTS		LTS	NA
AQUA-212: Effects of nonphysical fish barriers on non-covered aquatic species of primary management concern (CM16)	2D, 4, 4A, 5A	LTS		LTS	NA (striped bass, American shad, threadfin shad, largemouth bass) NE (Sacramento-San Joaquin roach, hardhead, California bay shrimp)
AQUA-217: Effects of water operations on reservoir coldwater fish habitat	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
Terrestrial Biological Resources					
BIO-1: Changes in tidal perennial aquatic natural community as a result of implementing BDCP conservation measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	B		B	B
BIO-2: Increased frequency, magnitude and duration of periodic inundation of tidal perennial aquatic natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-3: Modification of tidal perennial aquatic natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		NI	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-4: Changes in tidal brackish emergent wetland natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	B		B	B
BIO-5: Modification of tidal brackish emergent wetland natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-6: Changes in tidal freshwater emergent wetland natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	LTS (short-term)/ B (long-term)		LTS (short-term)/ B (long-term)	NA (short term-term)/ B (long-term)
BIO-7: Increased frequency, magnitude and duration of periodic inundation of tidal freshwater emergent wetland natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-8: Modification of tidal freshwater emergent wetland natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-9: Changes in valley/foothill riparian natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	B		B	B
BIO-10: Increased frequency, magnitude and duration of periodic inundation of valley/foothill riparian natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	B		B	B
BIO-11: Modification of valley/foothill riparian natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-12: Changes in nontidal perennial aquatic natural community as a result of implementing BDCP conservation measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	B		B	B
BIO-13: Increased frequency, magnitude and duration of periodic inundation of nontidal perennial aquatic natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-14: Modification of nontidal perennial aquatic natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-15: Changes in nontidal freshwater perennial emergent wetland natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	B		B	B
BIO-16: Increased frequency, magnitude and duration of periodic inundation of nontidal freshwater perennial emergent wetland natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-17: Modification of nontidal freshwater perennial emergent wetland natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-18: Changes in alkali seasonal wetland complex natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-19: Increased frequency, magnitude and duration of periodic inundation of alkali seasonal wetland complex natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-20: Modification of alkali seasonal wetland complex natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-21: Changes in vernal pool complex natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-22: Increased frequency, magnitude and duration of periodic inundation of vernal pool complex natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-23: Modification of vernal pool complex natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-24: Changes in managed wetland natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-25: Increased frequency, magnitude and duration of periodic inundation of managed wetland natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-26: Modification of managed wetland natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-27: Modification of other natural seasonal wetland natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-28: Modification of other natural seasonal wetland natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-29: Changes in grassland natural community as a result of implementing BDCP Conservation Measures	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-30: Increased frequency, magnitude and duration of periodic inundation of grassland natural community	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-31: Modification of grassland natural community from ongoing operation, maintenance and management activities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-32: Loss or conversion of habitat for and direct mortality of vernal pool crustaceans	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-33: Indirect effects of Plan implementation on vernal pool crustaceans	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-34: Periodic effects of inundation of vernal pool crustacean habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-35: Loss of valley elderberry longhorn beetle habitat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-36: Indirect effects on valley elderberry longhorn beetle and its habitat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-37: Periodic effects of inundation of valley elderberry longhorn beetle habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
BIO-38: Loss or conversion of habitat for and direct mortality of nonlisted vernal pool invertebrates	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-39: Indirect effects of Plan implementation on nonlisted vernal pool invertebrates	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-40: Periodic effects of inundation of nonlisted vernal pool invertebrates' habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-41: Loss or conversion of habitat for and direct mortality of Sacramento and Antioch Dunes anthicid beetles	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-42: Loss or conversion of habitat for and direct mortality of delta green ground beetle	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-42: Avoid impacts on delta green ground beetle and its habitat	LTS	NA
BIO-43: Loss or conversion of habitat for and direct mortality of Callippe silverspot butterfly	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-43: Avoid and minimize loss of Callippe silverspot butterfly habitat	LTS	NA
BIO-44: Loss or conversion of habitat for and direct mortality of California red-legged frog	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-45: Indirect effects of Plan implementation on California red-legged frog	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-46: Loss or conversion of habitat for and direct mortality of California tiger salamander	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-47: Indirect effects of Plan implementation on California tiger salamander	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
BIO-48: Periodic effects of inundation of California tiger salamander habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-49: Loss or conversion of habitat for and direct mortality of giant garter snake	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-50: Indirect effects of Plan implementation on giant garter snake	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-50a: Loss of connectivity among giant garter snakes in the Coldani Marsh/White Slough subpopulation, Stone Lakes National Wildlife Refuge, and the Delta	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-51: Periodic effects of inundation of giant garter snake habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-52: Loss or conversion of habitat for and direct mortality of western pond turtle	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-53: Indirect effects of Plan implementation on western pond turtle	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-54: Periodic effects of inundation of western pond turtle habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-55: Loss or conversion of habitat for and direct mortality of special-status reptiles	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-55: Conduct preconstruction surveys for noncovered special-status reptiles and implement applicable CM22 measures	LTS	NA

Level of Significance/Determination of Effects:

CEQA				NEPA		
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	S=significant	B=beneficial	N/A=not applicable	NA=not adverse	B=beneficial	N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-56: Indirect effects of Plan implementation on special-status reptile species	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-55: Conduct preconstruction surveys for noncovered special-status reptiles and implement applicable CM22 measures	LTS	NA
BIO-57: Loss or conversion of habitat for and direct mortality of California black rail	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-58: Effects on California black rail associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-59: Indirect effects of Plan implementation on California black rail	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-60: Fragmentation of California black rail habitat as a result of conservation component implementation	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-61: Periodic effects of inundation of California black rail habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-62: Loss or conversion of habitat for and direct mortality of California clapper rail	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-63: Indirect effects of Plan implementation on California clapper rail	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-64: Effects on California clapper rail associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-65: Fragmentation of California clapper rail habitat as a result of conservation component implementation	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA

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NEPA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
BIO-66: Loss or conversion of habitat for and direct mortality of California least tern	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-66: California least tern nesting colonies shall be avoided and indirect effects on colonies will be minimized	LTS	NA
BIO-67: Indirect effects of Plan implementation on California least tern	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-66: California least tern nesting colonies shall be avoided and indirect effects on colonies will be minimized	LTS	NA
BIO-68: Effects on California least tern associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-69: Loss or conversion of habitat for and direct mortality of greater sandhill crane	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	S	BIO-69a: Compensate for the loss of Medium to Very High-Value Greater Sandhill Crane Foraging Habitat	LTS	NA
BIO-70: Effects on greater sandhill crane associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-71: Indirect effects of Plan implementation on greater sandhill crane	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-72: Loss or conversion of habitat for and direct mortality of lesser sandhill crane	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	S	BIO-72: Compensate for the loss of medium- to over high-value lesser sandhill crane foraging habitat	LTS	NA
BIO-73: Effects on lesser sandhill crane associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-74: Indirect effects of Plan implementation on lesser sandhill crane	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-75: Loss or conversion of habitat for and direct mortality of least Bell's vireo and yellow warbler	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-76: Fragmentation of least Bell's vireo and yellow warbler habitat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-77: Effects on least Bell's vireo and yellow warbler associated with electrical transmission facilities	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-78: Indirect effects of Plan implementation on least Bell's vireo and yellow warbler	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-79: Periodic effects of inundation of least Bell's vireo and yellow warbler habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	B		B	B
BIO-80: Loss or conversion of habitat for and direct mortality of Suisun song sparrow and saltmarsh common yellowthroat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-81: Indirect effects of Plan implementation on Suisun song sparrow and saltmarsh common yellowthroat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-82: Effects on Suisun song sparrow and saltmarsh common yellowthroat associated with electrical transmission facilities	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-83: Loss or conversion of habitat for and direct mortality of Swainson's hawk	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-84: Effects on Swainson's hawk associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-85: Indirect effects of Plan implementation on Swainson's hawk	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-86: Periodic effects of inundation of Swainson's hawk nesting and foraging habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-87: Loss or conversion of habitat for and direct mortality of tricolored blackbird	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-88: Effects on tricolored blackbird associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-89: Indirect effects of Plan implementation on tricolored blackbird	NAA	v		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-90: Periodic effects of inundation of tricolored blackbird habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-91: Loss or conversion of habitat for and direct mortality of western burrowing owl	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
	4	S	BIO-91: Compensate for near-term loss of high-value western burrowing owl habitat	LTS	NA
BIO-92: Effects on western burrowing owl associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-93: Indirect effects of Plan implementation on western burrowing owl	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-94: Periodic effects of inundation on western burrowing owl habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-95: Loss or conversion of habitat for and direct mortality of western yellow-billed cuckoo	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-96: Fragmentation of western yellow-billed cuckoo habitat as a result of constructing the water conveyance facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-97: Effects on western yellow-billed cuckoo associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-98: Indirect effects of Plan implementation on western yellow-billed cuckoo	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-99: Periodic effects of inundation of western yellow-billed cuckoo habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-100: Loss or conversion of habitat for and direct mortality of white-tailed kite	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-101: Effects on white-tailed kite associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-102: Indirect effects of Plan implementation on white-tailed kite	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-103: Periodic effects of inundation of white-tailed kite habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-104: Loss or conversion of habitat for and direct mortality of yellow-breasted chat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-105: Fragmentation of yellow-breasted chat habitat as a result of constructing the water conveyance facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-106: Effects on yellow-breasted chat associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-107: Indirect effects of Plan implementation on yellow-breasted chat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-108: Periodic effects of inundation of yellow-breasted chat habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	B		B	B
BIO-109: Loss or conversion of habitat for and direct mortality of Cooper's hawk and osprey	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-110: Effects on Cooper's hawk and osprey associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-111: Indirect effects of Plan implementation on Cooper's hawk and osprey	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-112: Periodic effects of inundation of Cooper's hawk and osprey nesting habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
BIO-113: Loss or conversion of habitat for and direct mortality of golden eagle and ferruginous hawk	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	S	BIO-113: Compensate for the near-term loss of golden eagle and ferruginous hawk foraging habitat	LTS	NA
BIO-114: Effects on golden eagle and ferruginous hawk associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-115: Indirect effects of Plan implementation on golden eagle and ferruginous hawk	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-116: Periodic effects of inundation on golden eagle and ferruginous hawk habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-117: Loss or conversion of nesting habitat for and direct mortality of cormorants, herons and egrets	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds BIO-117: Avoid impacts on rookeries	LTS	NA
BIO-118: Effects associated with electrical transmission facilities on cormorants, herons and egrets	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-119: Indirect effects of Plan implementation on cormorants, herons and egrets	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds BIO-117: Avoid impacts on rookeries	LTS	NA
BIO-120: Periodic effects of inundation on cormorants, herons and egrets as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-121: Loss or conversion of habitat for short-eared owl and northern harrier	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-122: Effects on short-eared owl and northern harrier associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-123: Indirect effects of Plan implementation on short-eared owl and northern harrier	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-124: Periodic effects of inundation on short-eared owl and northern harrier as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-125: Loss or conversion of habitat for and direct mortality of mountain plover	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	S	BIO-125: Compensate for the near-term loss of mountain plover wintering habitat	LTS	NA
BIO-126: Effects on mountain plover associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-127: Indirect effects of Plan implementation on mountain plover	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-128: Periodic effects of inundation on mountain plover as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA

Level of Significance/Determination of Effects:

CEQA				NEPA		
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
BIO-129a: Loss or conversion of habitat for and direct mortality of black tern	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds BIO-129a: Compensate for loss of black tern nesting habitat (short-term)	LTS	NA
BIO-129b: Indirect effects of Plan implementation on black tern	NAA	B (short-term)// SS (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-129c: Periodic effects of inundation on black tern nesting habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-130: Loss or conversion of habitat for and direct mortality of California horned lark and grasshopper sparrow	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
	4	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds BIO-130: Compensate for near-term loss of California horned lark and grasshopper sparrow habitat	LTS	NA
BIO-131: Effects on California horned lark and grasshopper sparrow and associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-132: Indirect effects of Plan implementation on grasshopper sparrow and California horned lark	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-133: Periodic effects of inundation on California horned lark and grasshopper sparrow as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
BIO-134: Loss or conversion of habitat for and direct mortality of least bittern and white-faced ibis	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-135: Effects on least bittern and white-faced ibis associated with electrical transmission facilities	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-136: Indirect effects of Plan implementation on least bittern and white-faced ibis	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-137: Periodic effects of inundation on least bittern and white-faced ibis as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-138: Loss or conversion of modeled habitat for and direct mortality of loggerhead shrike	NAA	B (short-term)/ S (long-term)		B (short-term)v/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
	4	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds BIO-138: Compensate for the near-term loss of high-value loggerhead shrike habitat	LTS	NA
BIO-139: Effects on loggerhead shrike associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-140: Indirect effects of Plan implementation on loggerhead shrike	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-141: Periodic effects of inundation on loggerhead shrike as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-142: Loss or conversion of habitat for and direct mortality of Modesto song sparrow	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA

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BIO-143: Effects on Modesto song sparrow associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-144: Indirect effects of Plan implementation on Modesto song sparrow	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-145: Periodic effects of inundation on Modesto song sparrow as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-146: Indirect effects of implementation of conservation components on bank swallow	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-146: Active bank swallow colonies shall be avoided and indirect effects on bank swallow will be minimized	LTS	NA
BIO-147: Effects of upstream reservoir and water conveyance facility operations on bank swallow	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-147: Monitor bank swallow colonies and evaluate winter and spring flows upstream of the study area	LTS	NA
BIO-148: Loss of habitat for and direct mortality of yellow-headed blackbird	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-149: Effects on yellow-headed blackbird associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-150: Indirect effects of Plan implementation on yellow-headed blackbird	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-151: Periodic effects of inundation of yellow-headed blackbird nesting habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-152: Loss or conversion of habitat for and direct mortality of riparian brush rabbit	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-153: Indirect effects of Plan implementation on riparian brush rabbit	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-154: Periodic effects of inundation of riparian brush rabbit habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-155: Loss or conversion of habitat for and direct mortality of riparian woodrat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-156: Indirect effects of Plan implementation on riparian woodrat	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-157: Periodic effects of inundation of riparian woodrat habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-158: Loss or conversion of habitat for and direct mortality of salt marsh harvest mouse	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-159: Indirect effects of Plan implementation on salt marsh harvest mouse	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-160: Loss or conversion of habitat for and direct mortality of Suisun shrew	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-161: Indirect effects of Plan implementation on Suisun shrew	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	LTS		LTS	NA
BIO-162: Loss or conversion of habitat for and direct mortality of San Joaquin kit fox and American badger	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-162: Conduct preconstruction survey for American badger	LTS	NA
BIO-163: Indirect effects of Plan implementation on San Joaquin kit fox and American badger	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-162: Conduct preconstruction survey for American badger	LTS	NA
BIO-164: Loss or conversion of habitat for and direct mortality of San Joaquin pocket mouse	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-165: Indirect effects of Plan implementation on San Joaquin pocket mouse	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-166: Loss or conversion of habitat for and direct mortality of special-status bats	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-166: Conduct preconstruction surveys for roosting bats and implement protective measures	LTS	NA
BIO-167: Indirect effects of Plan implementation on special-status bats	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-166: Conduct preconstruction surveys for roosting bats and implement protective measures	LTS	NA
BIO-168: Periodic effects of inundation of special-status bat habitat as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NE
	4	S	BIO-166: Conduct preconstruction surveys for roosting bats and implement protective measures	LTS	NA
BIO-169: Effects on habitat and populations of vernal pool plants	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-170: Effects on habitat and populations of alkali seasonal wetland plants	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-170: Avoid, minimize, or compensate for impacts on noncovered special-status plant species	LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
BIO-171: Effects on habitat and populations of grassland plant species	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NA
	4	LTS		LTS	NA
BIO-172: Effects on habitat and populations of valley/foothill riparian plants	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	NI		NI	NA
	4	LTS		LTS	NA
BIO-173: Effects on habitat and populations of tidal wetland plants	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	S	BIO-170: Avoid, minimize, or compensate for impacts on noncovered special-status plant species	LTS	NA
BIO-174: Effects on habitat and populations of inland dune plants	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	NI		NI	NE
BIO-175: Effects on habitat and populations of nontidal wetland plants	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-170: Avoid, minimize, or compensate for impacts on noncovered special-status plant species	LTS	NA
BIO-176: Effects of constructing water conveyance facilities (CM1) on wetlands and other waters of the United States	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	4, 2D, 4A, 5A	S	BIO-176: Compensatory Mitigation for Fill of Waters of the U.S.	LTS	NA
BIO-177: Effects of implementing other conservation measures (CM2–CM10) on wetlands and other waters of the United States	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4A, 5A	LTS		LTS	NA
	4	B		B	B
BIO-178: Loss or conversion of habitat for waterfowl and shorebirds as a result of water conveyance facilities construction	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
BIO-179: Loss or conversion of habitat for wintering waterfowl as a result of implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-179a: Conduct food studies and monitoring for wintering waterfowl in Suisun Marsh BIO-179b: Conduct food studies and monitoring to demonstrate food quality of palustrine tidal wetlands in the Yolo and Delta Basins	LTS	NA
BIO-180: Loss or conversion of habitat for breeding waterfowl from implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-180: Conduct food and monitoring studies of breeding waterfowl in Suisun Marsh	LTS	NA
BIO-181: Loss or conversion of habitat for shorebirds from implementation of conservation components	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-182: Effects on shorebirds and waterfowl associated with electrical transmission facilities	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-183: Indirect effects of Plan implementation on shorebirds and waterfowl	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds	LTS	NA
BIO-184: Effects on habitat and populations of common wildlife and plants	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-185: Effect of BDCP Conservation Measures on wildlife corridors	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-186: Effects on natural communities resulting from the introduction and spread of invasive plant species	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	LTS		LTS	NA
BIO-187: Compatibility of the proposed water conveyance facilities and other Conservation Measures with federal, state, or local laws, plans, policies, or executive orders addressing terrestrial biological resources in the study area	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	NI		NI	NE

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		CEQA		CEQA	NEPA
Land Use					
LU-1: Incompatibility with applicable land use designations, goals, and policies as a result of constructing the proposed water conveyance facility (CM1)	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	NI		NI	NE
LU-2: Conflicts with existing land uses as a result of constructing the proposed water conveyance facility (CM1)	NAA, 2D, 4, 4A, 5A	NI		NI	A
LU-3: Create physical structures adjacent to and through a portion of an existing community as a result of constructing the proposed water conveyance facility (CM1)	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	TRANS-1a: Implement site-specific construction traffic management plan TRANS-1b: Limit hours or amount of construction activity on congested roadway segments	SU	A
LU-4: Incompatibility with applicable land use designations, goals and policies as a result of implementing the proposed Conservation Measures 2–21	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	4	NI		NI	NE
	2D, 4A, 5A	LTS		LTS	NA
LU-5: Conflicts with existing land uses as a result of implementing the proposed Conservation Measures 2–21	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	4	NI		NI	A
	2D, 4A, 5A	LTS		LTS	NA
LU-6: Create physical structures adjacent to and through a portion of an existing community as a result of implementing the proposed Conservation Measures 2–21	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
Agricultural Resources					
AG-1: Temporary conversion, short-term conversion, and permanent conversion of Important Farmland or of farmland under Williamson Act contracts or in Farmland Security Zones as a result of constructing the proposed water conveyance facility.	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones	SU	A

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
AG-2: Other effects on agriculture as a result of constructing and operating the proposed water conveyance facility	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones GW-1: Maintain water supplies in areas affected by construction dewatering GW-5: Agricultural lands seepage minimization WQ-11: Avoid, minimize, or offset, as feasible, reduced water quality conditions	SU	A
AG-3: Temporary conversion, short-term conversion, and permanent conversion of Important Farmland or of land subject to Williamson Act contracts or in Farmland Security Zones as a result of implementing the proposed Conservation Measures 2–11, 13, 15, 16, 20, and 21	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones	SU	A
AG-4: Other effects on agriculture as a result of implementing the proposed Conservation Measures 2–11, 13, 15, 16, 20, and 21	NAA	B (short-term)/ S (long-term)		B (short-term)/ S (long-term)	B (short-term)/ A (long-term)
	2D, 4, 4A, 5A	S	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones GW-5: Agricultural lands seepage minimization	SU	A
Recreation					
REC-1: Permanent displacement of existing well-established public use or private commercial recreation facility available for public access as a result of the location of the proposed water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	LTS		LTS	NA
REC-2: Result in long-term reduction of recreation opportunities and experiences as a result of constructing the proposed water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	REC-2: Provide alternative bank fishing access sites BIO-75: Conduct preconstruction nesting bird surveys and avoid disturbance of nesting birds AES-1a: Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new transmission lines and underground transmission lines where feasible	SU/LTS[9]	A/NA[13]

[9] Impacts and effects on recreation from constructing the intakes would be LTS and NA, respectively, following mitigation.

Level of Significance/Determination of Effects:

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NEPA		
A=adverse NA=not adverse	NE=no effect B=beneficial	ND=no determination N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
			AES-1b: Install visual barriers between construction work areas and sensitive receptors AES-1c: Develop and implement a spoil/borrow and reusable tunnel material area management plan AES-1d: Restore barge unloading facility sites once decommissioned AES-1e: Apply aesthetic design treatments to all structures to the extent feasible AES-1f: Locate concrete batch plants and fuel stations away from sensitive visual resources and receptors and restore sites upon removal of facilities AES-1g: Implement best management practices to implement project landscaping plan AES-4a: Limit construction to daylight hours within 0.25 mile of residents AES-4b: Minimize fugitive light from portable sources used for construction AES-4c: Install visual barriers along access routes, where necessary, to prevent light spill from truck headlights toward residences TRANS-1a: Implement site-specific construction traffic management plan TRANS-1b: Limit hours or amount of construction activity on congested roadway segments TRANS-1c: Make good faith efforts to enter into mitigation agreements to enhance capacity of congested roadway segments NOI-1a: Employ noise-reducing construction practices during construction NOI-1b: Prior to construction, initiate a complaint/response tracking program		
REC-3: Result in long-term reduction of recreational navigation opportunities as a result of constructing the proposed water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	TRANS-1a: Implement site-specific construction traffic management plan	SU	A
REC-4: Result in long-term reduction of recreational fishing opportunities as a result of constructing the proposed water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	REC-2: Provide alternative bank fishing access sites AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Use an attenuation device to reduce effects of pile driving and other construction-related underwater noise NOI-1a: Employ noise-reducing construction practices during construction	LTS	NA

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NEPA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
			NOI-1b: Prior to construction, initiate a complaint/response tracking program AES-1a: Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new transmission lines and underground transmission lines where feasible AES-1b: Install visual barriers between construction work areas and sensitive receptors AES-1c: Develop and implement a spoil/borrow and reusable tunnel material area management plan AES-1d: Restore barge unloading facility sites once decommissioned AES-1e: Apply aesthetic design treatments to all structures to the extent feasible AES-1f: Locate concrete batch plants and fuel stations away from sensitive visual resources and receptors and restore sites upon removal of facilities AES-1g: Implement best management practices to implement project landscaping plan		
REC-5: Result in long-term reduction of recreational fishing opportunities as a result of the operation of the proposed water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
REC-6: Cause a change in reservoir or lake elevations resulting in substantial reductions in water-based recreation opportunities and experiences at north- and south-of-Delta reservoirs	NAA	LTS	LTS	NA	
	2D, 4, 4A, 5A	LTS (for north-and south-of-Delta reservoirs for all operational scenarios except for San Luis Reservoir) S (for Scenarios H2 and H4 for San Luis Reservoir)	REC-6: Provide a Temporary Alternative Boat Launch to Ensure Access to San Luis Reservoir	LTS	NA
REC-7: Result in long-term reduction in water-based recreation opportunities as a result of maintenance of the proposed water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
REC-8: Result in long-term reduction in land-based recreation opportunities as a result of maintenance of the proposed water conveyance facilities	NAA, 2D, 4, 4A, 5A	NI		NI	NE

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation: CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation: CEQA	Impact After Mitigation: NEPA
REC-9: Result in long-term reduction in fishing opportunities as a result of implementing Conservation Measures 2–21	NAA	LTS		LTS	NA
	4	LTS	AES-1a: Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new transmission lines and underground transmission lines where feasible AES-1b: Install visual barriers between construction work areas and sensitive receptors AES-1c: Develop and implement a spoil/borrow and reusable tunnel material area management plan AES-1d: Restore barge unloading facility sites once decommissioned AES-1e: Apply aesthetic design treatments to all structures to the extent feasible AES-1f: Locate concrete batch plants and fuel stations away from sensitive visual resources and receptors and restore sites upon removal of facilities AES-1g: Implement best management practices to implement project landscaping plan AES-4b: Minimize fugitive light from portable sources used for construction AES-4c: Install visual barriers along access routes, where necessary, to prevent light spill from truck headlights toward residences TRANS-1a: Implement site-specific construction traffic management plan TRANS-1b: Limit hours or amount of construction activity on congested roadway segments TRANS-1c: Make good faith efforts to enter into mitigation agreements to enhance capacity of congested roadway segments NOI-1a: Employ noise-reducing construction practices during construction NOI-1b: Prior to construction, initiate a complaint/response tracking program AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
	2D, 4A, 5A	LTS		LTS	NA

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NEPA		
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
REC-10: Result in long-term reduction in boating-related recreation opportunities as a result of implementing Conservation Measures 2–21	4	S	AES-1a: Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new transmission lines and underground transmission lines where feasible AES-1b: Install visual barriers between construction work areas and sensitive receptors AES-1c: Develop and implement a spoil/borrow and reusable tunnel material area management plan AES-1d: Restore barge unloading facility sites once decommissioned AES-1e: Apply aesthetic design treatments to all structures to the extent feasible AES-1f: Locate concrete batch plants and fuel stations away from sensitive visual resources and receptors and restore sites upon removal of facilities AES-1g: Implement best management practices to implement project landscaping plan AES-4b: Minimize fugitive light from portable sources used for construction AES-4c: Install visual barriers along access routes, where necessary, to prevent light spill from truck headlights toward residences TRANS-1a: Implement site-specific construction traffic management plan TRANS-1b: Limit hours or amount of construction activity on congested roadway segments TRANS-1c: Make good faith efforts to enter into mitigation agreements to enhance capacity of congested roadway segments NOI-1a: Employ noise-reducing construction practices during construction NOI-1b: Prior to construction, initiate a complaint/response tracking program AQUA-1a: Minimize the use of impact pile driving to address effects of pile driving and other construction-related underwater noise AQUA-1b: Use an attenuation device to reduce effects of pile driving and other construction-related underwater noise	LTS	NA
	NAA, 2D, 4A, 5A	LTS		LTS	NA
REC-11: Result in long-term reduction in upland recreational opportunities as a result of implementing Conservation Measures 2–21	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA

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NEPA		
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NA=not adverse	B=beneficial	N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
REC-12: Compatibility of the proposed water conveyance facilities and other conservation measures with federal, state, or local plans, policies, or regulations addressing recreation resources	NAA, 2D, 4, 4A, 5A	NI		NI	NE
ECON-1: Temporary effects on regional economics and employment in the Delta region during construction of the proposed water conveyance facilities.	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones	NI	A
ECON-2: Effects on population and housing in the Delta region during construction of the proposed water conveyance facilities.	NAA	NI		NI	NA
	4	LTS		LTS	LTS
	2D, 4A, 5A	NI		NI	NA
ECON-3: Changes in community character as a result of constructing the proposed water conveyance facilities.	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI		NI	A/B[10]
ECON-4: Changes in local government fiscal conditions as a result of constructing the proposed water conveyance facilities.	NAA, 2D, 4, 4A, 5A	NI		NI	NA
ECON-5: Effects on recreational economics as a result of constructing the proposed water conveyance facilities.	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	Various mitigation measures introduced in the following chapters: Chapter 12, *Terrestrial Biological Resources;* Chapter 15, *Recreation*; Chapter 17, *Aesthetics and Visual Resources*; Chapter 19, *Transportation*; and Chapter 23, *Noise*.	NI	A
ECON-6: Effects on agricultural economics in the Delta region during construction of the proposed water conveyance facilities	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones	NI	A
ECON-7: Permanent regional economic and employment effects in the Delta region during operation and maintenance of the proposed water conveyance facilities.	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones	NI	A
ECON-8: Permanent effects on population and housing in the Delta region during operation and maintenance of the proposed water conveyance facilities	NAA, 2D, 4, 4A, 5A	NI		NI	NA

[10] While water conveyance construction could result in beneficial effects relating to the economic welfare of a community through additional regional employment and income, adverse social effects could also arise as a result of declining economic stability in communities closest to construction effects and in those most heavily influenced by agricultural and recreational activities.

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
ECON-9: Changes in community character during operation and maintenance of the proposed water conveyance facilities	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	Various mitigation measures and environmental commitments related to noise, visual effects, transportation, agriculture and recreation would reduce adverse effects (See Appendix 3B, Environmental Commitments).	NI	A
ECON-10: Changes in local government fiscal conditions during operation and maintenance of the proposed water conveyance facilities.	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI		NI	A/B[11]
ECON-11: Effects on recreational economics during operation and maintenance of the proposed water conveyance facilities	2D, 4, 4A, 5A	NI		NI	NA
ECON-12: Permanent effects on agricultural economics in the Delta region during operation and maintenance of the proposed water conveyance facilities.	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones	NI	A
ECON-13: Effects on the Delta region's economy and employment due to the implementation of the proposed Conservation Measures 2–22	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones MIN-5: Design Conservation Measures 4, 5, and 10 to avoid displacement of active natural gas wells to the extent feasible	NI	A/B[12]
ECON-14: Effects on population and housing in the Delta region as a result of implementing the proposed Conservation Measures 2–22	NAA, 2D, 4, 4A, 5A	NI		NI	NA
ECON-15: Changes in community character as a result of implementing the proposed Conservation Measures 2–22	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	Various mitigation measures and environmental commitments related to transportation, agriculture, and recreation would be anticipated to reduce these adverse effects (See Appendix 3B).	NI	A
ECON-16: Changes in local government fiscal conditions as a result of implementing the proposed Conservation Measures 2–22	NAA, 2D, 4, 4A, 5A	NI		NI	NA

[11] A decrease in revenue as a result property tax and assessment revenue forgone as a result of the proposed water conveyance facilities could result in the loss of a substantial share of some agencies' tax bases, which would be considered an adverse effect. However, the BDCP proponents would make arrangements to compensate local governments for the loss of property tax or assessment revenue for land used for constructing, locating, operating, or mitigating for new Delta water conveyance facilities. Additionally, operation and maintenance of the water conveyance facilities would be anticipated to result in a net increase of income and employment in the Delta region. This would also create an indirect beneficial effect through increased sales tax revenue for local government entities that rely on sales taxes.

[12] Implementation of CMs 2–22 would result in an increase in construction and operation and maintenance-related employment and labor income, which would be considered a beneficial effect. However, there may also be a resulting decrease in agricultural-related and natural gas production-related employment and labor income as a result of implementing these conservation measures, which would be considered an adverse effect.

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
ECON-17: Effects on recreational economics as a result of implementing the proposed Conservation Measures 2–22	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI		NI	A/B[13]
ECON-18: Effects on agricultural economics in the Delta region as a result of implementing the proposed Conservation Measures 2–22	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI	AG-1: Develop an Agricultural Lands Stewardship Plan (ALSP) to maintain agricultural productivity and mitigate for loss of Important Farmland and land subject to Williamson Act contracts or in Farmland Security Zones	NI	A
ECON-19: Socioeconomic effects in the south-of-Delta hydrologic regions	NAA, 2D, 4, 4A, 5A	NI		NI	A/B[14]
Aesthetics and Visual Resources					
AES-1: Substantial alteration in existing visual quality or character during construction of conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	AES-1a: Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new transmission lines and underground transmission lines where feasible AES-1b: Install visual barriers between construction work areas and sensitive receptors AES-1c: Develop and implement a spoil/borrow and reusable tunnel material area management plan AES-1d: Restore barge unloading facility sites once decommissioned AES-1e: Apply aesthetic design treatments to all structures to the extent feasible AES-1f: Locate concrete batch plants and fuel stations away from sensitive visual resources and receptors and restore sites upon removal of facilities AES-1g: Implement best management practices to implement project landscaping plan	SU	A

[13] Adverse effects would be primarily limited to areas close to restoration areas and during site preparation and earthwork phases. These effects could result in a decline in visits to the Delta and reduction in recreation-related spending, creating an adverse economic effect throughout the Delta. Beneficial recreational effects would generally result during later stages of the BDCP permit period as CM2–CM22 are implemented and environmental conditions supporting recreational activities are enhanced. These effects could improve the quality of recreational experiences, leading to increased economic activities related to recreation, particularly in areas where conservation measure implementation would create new recreational opportunities.

[14] If operation of water conveyance facilities under Alternative 6A reduced M&I deliveries to the extent that it would, in the long run, constrain population growth, its implementation could reinforce a socioeconomic status quo or limit potential economic and employment growth in hydrologic regions. Such changes to agricultural production and population growth with its associated economic activity could also lead to shifts in the character of communities in the hydrologic regions with resultant beneficial or adverse effects. Likewise, limited growth associated with reduced deliveries could require lower expenditures for local governments while also leading to reduced revenue.

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(any mitigation not sufficient to render impact less than significant)	S=significant	B=beneficial	N/A=not applicable	NA=not adverse	B=beneficial	N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AES-2: Permanent effects on a scenic vista from presence of conveyance facilities.	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	AES-1a: Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new transmission lines and underground transmission lines where feasible AES-1c: Develop and implement a spoil/borrow and reusable tunnel material area management plan AES-1e: Apply aesthetic design treatments to all structures to the extent feasible	SU	A
AES-3: Permanent damage to scenic resources along a state scenic highway from construction of conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	AES-1a: Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new transmission lines and underground transmission lines where feasible AES-1c: Develop and implement a spoil/borrow and reusable tunnel material area management plan AES-1e: Apply aesthetic design treatments to all structures to the extent feasible	SU	A
AES-4: Creation of a new source of light or glare that would adversely affect views in the area as a result of construction and operation of conveyance facilities.	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	AES-4a: Limit construction to daylight hours within 0.25 mile of residents AES-4b: Minimize fugitive light from portable sources used for construction AES-4c: Install visual barriers along access routes, where necessary, to prevent light spill from truck headlights toward residences	SU	A
AES-5: Substantial alteration in existing visual quality or character during operation.	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	LTS		LTS	NA
AES-6: Substantial alteration in existing visual quality or character during construction of CM2–CM22.	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	AES-1a: Locate new transmission lines and access routes to minimize the removal of trees and shrubs and pruning needed to accommodate new transmission lines and underground transmission lines where feasible AES-1b: Install visual barriers between construction work areas and sensitive receptors AES-1c: Develop and implement a spoil/borrow and reusable tunnel material area management plan AES-1d: Restore barge unloading facility sites once decommissioned AES-1e: Apply aesthetic design treatments to all structures to the extent feasible	SU	A

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
			AES-1f: Locate concrete batch plants and fuel stations away from sensitive visual resources and receptors and restore sites upon removal of facilities AES-1g: Implement best management practices to implement project landscaping plan AES-4a: Limit construction to daylight hours within 0.25 mile of residents AES-4b: Minimize fugitive light from portable sources used for construction AES-4c: Install visual barriers along access routes, where necessary, to prevent light spill from truck headlights toward residences AES-6a: Underground new or relocated utility lines where feasible AES-6b: Develop and implement an afterhours low-intensity and lights off policy AES-6c: Implement a comprehensive visual resources management plan for the Delta and study area		
AES-7: Compatibility of the proposed water conveyance facilities and other conservation measures with federal, state, or local plans, policies, or regulations addressing aesthetics and visual resources	NAA	NI		NI	NA
	2D, 4, 4A, 5A	NI		NI	NE
Cultural Resources					
CUL-1: Effects on identified archaeological sites resulting from construction of conveyance facilities	NAA	S		SU	A
	2D, 4, 4A, 5A	S	CUL-1: Prepare a data recovery plan and perform data recovery excavations on the affected portion of the deposits of identified and significant archaeological sites	SU	A
CUL-2: Effects on archaeological sites to be identified through future inventory efforts	NAA	S		SU	A
	2D, 4, 4A, 5A	S	CUL-2: Conduct inventory, evaluation, and treatment of archaeological resources	SU	A
CUL-3: Effects on archaeological sites that may not be identified through inventory efforts	NAA	S		SU	A
	2D, 4, 4A, 5A	S	CUL-3: Implement an archaeological resources discovery plan, perform training of construction workers, and conduct construction monitoring	SU	A
CUL-4: Effects on buried human remains damaged during construction	NAA	S		SU	A
	2D, 4, 4A, 5A	S	CUL-4: Follow state and federal law governing human remains if such resources are discovered during construction	SU	A
CUL-5: Direct and indirect effects on eligible and potentially eligible historic architectural/built environment-resources resulting from construction activities	NAA	S		SU	A
	2D, 4, 4A, 5A	S	CUL-5: Consult with relevant parties, prepare and implement a built environment treatment plan	SU	A

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NEPA

A=adverse NA=not adverse	NE=no effect B=beneficial	ND=no determination N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
CUL-6: Direct and indirect effects on unidentified and unevaluated historic architectural/built environment resources resulting from construction activities	NAA	S		SU	A
	2D, 4, 4A, 5A	S	CUL-6: Conduct a survey of inaccessible properties to assess eligibility, determine if these properties will be adversely impacted by the project, and develop treatment to resolve or mitigate adverse impacts	SU	A
CUL-7: Effects of other Conservation Measures on cultural resources	NAA	S		SU	A
	2D, 4, 4A, 5A	S	CUL-7: Conduct cultural resource studies and adopt cultural resource mitigation measures for cultural resource impacts associated with implementation of Conservation Measures 2–22	SU	A
CUL-8: Compatibility of the proposed water conveyance facilities and other Conservation Measures with plans and policies	NAA	NI		NI	NE
	2D, 4, 4A, 5A	NI		NI	NE
Transportation					
TRANS-1: Increased construction vehicle trips resulting in unacceptable LOS conditions	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	TRANS-1a: Implement site-specific construction traffic management plan TRANS-1b: Limit hours or amount of construction activity on congested roadway segments TRANS-1c: Make good faith efforts to enter into mitigation agreements to enhance capacity of congested roadway segments	SU[20]	A[21]
TRANS-2: Increased construction vehicle trips exacerbating unacceptable pavement conditions	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	TRANS-2a: Prohibit construction activity on physically deficient roadway segments TRANS-2b: Limit construction activity on physically deficient roadway segments TRANS-2c: Improve physical condition of affected roadway segments as stipulated in mitigation agreements or encroachment permits	SU[21]	A[22]
TRANS-3: Increase in safety hazards, including interference with emergency routes during construction	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	TRANS-1c: Make good faith efforts to enter into mitigation agreements to enhance capacity of congested roadway segments	SU[22]	A[23]
TRANS-4: Disruption of marine traffic during construction	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA

Level of Significance/Determination of Effects:

CEQA

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NEPA

A=adverse
NA=not adverse
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
TRANS-5: Disruption of rail traffic during construction.	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A		TRANS-1a: Implement site-specific construction traffic management plan	LTS	NA
TRANS-6: Disruption of transit service during construction.	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 2D, 4, 4A, 5A	S	TRANS-1a: Implement site-specific construction traffic management plan TRANS-1b: Limit hours or amount of construction activity on congested roadway segments TRANS-1c: Make good faith efforts to enter into mitigation agreements to enhance capacity of congested roadway segments	SU	A
	9	S	TRANS-1a: Implement site-specific construction traffic management plan	LTS	NA
TRANS-7: Interference with bicycle routes during construction.	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	TRANS-1a: Implement site-specific construction traffic management plan	LTS	NA
TRANS-8: Increased traffic volumes and delays during operations and maintenance.	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
TRANS-9: Permanent alteration of transportation patterns during operations and maintenance.	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
TRANS-10: Increased traffic volumes during implementation of CM2–CM22	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	TRANS-1a: Implement site-specific construction traffic management plan TRANS-1b: Limit hours or amount of construction activity on congested roadway segments TRANS-1c: Make good faith efforts to enter into mitigation agreements to enhance capacity of congested roadway segments	SU[23, 24]	A[24, 25]
TRANS-11: Compatibility of the proposed water conveyance facilities and other conservation measures with plans and policies	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	NI		NI	NE
TRANS-12: Potential Effects on Navigation From Changes in Surface Water Elevations Caused by Construction of Water Conveyance Facilities	NAA	NI		NI	NE
	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 4A, 2D, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
TRANS-13: Potential Effects of Navigation from Changes in Surface Elevations Caused by Operation of Intakes	NAA	NI		NI	NE
	4A	LTS	SW-4: Implement Measures to Reduce Runoff and Sedimentation	LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 5A	LTS		LTS	NA
TRANS-14: Potential Effects on Navigation Caused by Sedimentation From Construction of Intakes	NAA	NI		NI	NE
	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 4A, 2D, 5A	LTS	SW-4: Implement Measures to Reduce Runoff and Sedimentation	LTS	NA
TRANS-15: Potential Effects on Navigation Caused by Sedimentation From Construction of Barge Facilities	NAA	NI		NI	NE
	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 4A, 2D, 5A	LTS	SW-4: Implement Measures to Reduce Runoff and Sedimentation	LTS	NA
TRANS-16: Potential Effects on Navigation Caused by Sedimentation From Construction of Clifton Court Forebay	NAA	NI		NI	NE
	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 4A, 2D, 5A	NI		NI	NE
TRANS-17: Potential Effects on Navigation Caused by Sedimentation From Operation of Intakes	NAA	NI		NI	NE
	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9, 4A, 2D, 5A	LTS	SW-4: Implement Measures to Reduce Runoff and Sedimentation	LTS	NA
TRANS-18: Potential Effects on Navigation From Construction and Operations of Head of Old River Barrier	NAA	NI		NI	NE
	4A, 2A, 2B, 2C, 3, 4, 2D	LTS		LTS	NA
	1A, 1B, 1C, 5, 6A, 6B, 6C, 7, 8, 9, 5A	NI		NI	NE
TRANS-19: Potential Cumulative Effects on Navigation From Construction and Operations of Water Conveyance Facilities	NAA	NI		NI	NE
	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 4A, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 5A	LTS		LTS	NA
Public Services and Utilities					
UT-1: Increased demand on law enforcement, fire protection, and emergency response services from new workers in the Plan Area as a result of constructing the proposed water conveyance facilities.	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
UT-2: Displacement of public service facilities as a result of constructing the proposed water conveyance facilities.	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
UT-3: Effects on public schools as a result of constructing the proposed water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
UT-4: Effects on water or wastewater treatment services and facilities as a result of constructing the proposed water conveyance facilities.	NAA. 2D, 4, 4A, 5A	LTS		LTS	NA
UT-5: Effects on landfills as a result of solid waste disposal needs during construction of the proposed water conveyance facilities.	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
UT-6: Effects on regional or local utilities as a result of constructing the proposed water conveyance facilities.	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	UT-6a: Verify locations of utility infrastructure UT-6b: Relocate utility infrastructure in a way that avoids or minimizes any effect on operational reliability UT-6c: Relocate utility infrastructure in a way that avoids or minimizes any effect on worker and public health and safety	SU[15]	A[16]
UT-7: Effects on public services and utilities as a result of operation and maintenance of the proposed water conveyance facilities.	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
UT-8: Effects on public services and utilities as a result of implementing the proposed CM2–CM11	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	UT-6a: Verify locations of utility infrastructure UT-6b: Relocate utility infrastructure in a way that avoids or minimizes any effect on operational reliability UT-6c: Relocate utility infrastructure in a way that avoids or minimizes any effect on worker and public health and safety	SU	NA
Energy					
ENG-1: Wasteful or inefficient energy use for temporary construction activities	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
ENG-2: Wasteful or inefficient energy use for pumping and conveyance	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
ENG-3: Compatibility of the proposed water conveyance facilities and CM2–CM22 with plans and policies	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	NI		NI	

[15] If coordination with all appropriate utility providers and local agencies to integrate with other construction projects and minimize disturbance to communities were successful under Mitigation Measure UT-6b, the impact would be less than significant (CEQA) and there would be no adverse effect (NEPA).

[16] If coordination with all appropriate utility providers and local agencies to integrate with other construction projects and minimize disturbance to communities were successful under Mitigation Measure UT-6b, the impact would be less than significant (CEQA) and there would be no adverse effect (NEPA).

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
Air Quality and Greenhouse Gases					
AQ-1: Generation of criteria pollutants in excess of the SMAQMD regional thresholds during construction of the proposed water conveyance facility (previously AQ-1).	NAA	S		S	A
	1A, 1B, 2A, 2B, 6A, 6B, 2D	S (for ROG, NO_X, and PM10)	AQ-1a: Mitigate and offset construction-generated criteria pollutant emissions within the SFNA to net zero (0) for emissions in excess of general conformity *de minimis* thresholds (where Applicable) and to quantities below applicable CEQA thresholds for other pollutants AQ-1b: Develop an alternative or complementary offsite mitigation program to mitigate and offset construction-generated criteria pollutant emissions within the SFNA to net zero (0) for emissions in excess of general conformity *de minimis* thresholds (where applicable) and to quantities below applicable CEQA thresholds for other pollutants	LTS	NA
	1C, 2C, 6C, 3, 7, 8	S (for ROG, NO_X)		LTS	NA
	4, 4A, 5, 5A	S (for NO_X)		LTS	NA
AQ-2: Generation of criteria pollutants in excess of the YSAQMD regional thresholds during construction of the proposed water conveyance facility (previously AQ-1).	NAA	S		S	A
	1A, 1B, 2A, 2B, 6A, 6B, 7, 8, 9, 2D	S (for ROG, NO_X, and PM10)	AQ-1a: Mitigate and offset construction-generated criteria pollutant emissions within the SFNA to net zero (0) for emissions in excess of general conformity *de minimis* thresholds (where Applicable) and to quantities below applicable CEQA thresholds for other pollutants AQ-1b: Develop an alternative or complementary offsite mitigation program to mitigate and offset construction-generated criteria pollutant emissions within the SFNA to net zero (0) for emissions in excess of general conformity *de minimis* thresholds (where applicable) and to quantities below applicable CEQA thresholds for other pollutants	LTS	NA
	3	S (for PM10)		LTS	NA
	4, 4A, 5, 5A	LTS		LTS	NA
AQ-3: Generation of criteria pollutants in excess of the BAAQMD regional thresholds during construction of the proposed water conveyance facility.	NAA	S		S	A
	1A, 1B, 2A, 2B, 3, 5, 6A, 6B, 7, 8, 9, 2D, 4, 4A, 5A	S (for ROG and NO_X)	AQ-3a: Mitigate and offset construction-generated criteria pollutant emissions within BAAQMD/SFBAAB to net zero (0) for emissions in excess of General Conformity *de minimis* thresholds (where applicable) and to quantities below applicable BAAQMD CEQA thresholds for other pollutants AQ-3b: Develop an alternative or complementary off-site mitigation program to mitigate and offset construction-generated criteria pollutant emissions within the BAAQMD/SFBAAB to net zero (0) for emissions in excess of General Conformity *de minimis* thresholds (where applicable) and to quantities below applicable BAAQMD CEQA thresholds for other pollutants	LTS	NA
	1C, 2C, 6C	S (for ROG and NO_X)		S (for ROG and NO_X)	A (for ROG and NO_X)

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQ-4: Generation of criteria pollutants in excess of the SJVAPCD regional thresholds during construction of the proposed water conveyance facility.	NAA	S		S	A
	1A, 1B, 2A, 2B, 2D, 3, 4, 4A, 5, 5A, 7, 8	S (for ROG, NO_X and PM10)	AQ-4a: Mitigate and offset construction-generated criteria pollutant emissions within SJVAPCD/SJVAB to net zero (0) for emissions in excess of General Conformity *de minimis* thresholds (where applicable) and to quantities below applicable SJVAPCD CEQA thresholds for other pollutants AQ-4b: Develop an alternative or complementary off-site mitigation program to mitigate and offset construction-generated criteria pollutant emissions within the SJVAPCD/SJVAB to net zero (0) for emissions in excess of General Conformity *de minimis* thresholds (where applicable) and to quantities below applicable SJVAPCD CEQA thresholds for other pollutants	LTS	NA
	9	S (NO_X and PM10)		LTS	NA
	1C, 2C, 6C	LTS		LTS	NA
AQ-5: Generation of criteria pollutants in excess of the SMAQMD regional thresholds from operation and maintenance of the proposed water conveyance facility (previously AQ-6).	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-6: Generation of criteria pollutants in excess of the YSAQMD regional thresholds from operation and maintenance of the proposed water conveyance facility (previously AQ-5).	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-7: Generation of criteria pollutants in excess of the BAAQMD regional thresholds from operation and maintenance of the proposed water conveyance facility.	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-8: Generation of criteria pollutants in excess of the SJVAPCD regional thresholds from operation and maintenance of the proposed water conveyance facility.	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-9: Exposure of Sensitive Receptors to Health Hazards from Localized Particulate Matter in Excess of SMAQMD's Health-Based Concentration Thresholds (new impact).	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	AQ-9: Implement Measures to Reduce Re-Entrained Road Dust and Receptor Exposure to PM2.5 and PM10	LTS	NA
AQ-10: Exposure of Sensitive Receptors to Health Hazards from Localized Particulate Matter in Excess of YSAQMD's Health-Based Concentration Thresholds (new impact).	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-11: Exposure of Sensitive Receptors to Health Hazards from Localized Particulate Matter in Excess of BAAQMD's Health-Based Concentration Thresholds (new impact)	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-12: Exposure of Sensitive Receptors to Health Hazards from Localized Particulate Matter in Excess of SJVAPCD's Health-Based Concentration Thresholds (new impact)	NAA	LTS		LTS	NA
	1A, 1B, 2A, 2B, 2D, 3, 5, 5A, 6A, 6B, 7, 8, 9	S	AQ-9: Implement Measures to Reduce Re-Entrained Road Dust and Receptor Exposure to PM2.5 and PM10	LTS	NA
	1C, 2C, 6C, 4, 4A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
AQ-13: Exposure of Sensitive Receptors to Health Hazards from Localized Carbon Monoxide (new impact)	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-14: Exposure of Sensitive Receptors to Health Hazards from Diesel Particulate Matter in Excess of SMAQMD's Chronic Non-Cancer and Cancer Risk Thresholds (previously Impact AQ-11)	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 5, 6A, 6B, 6C, 7, 8, 9	LTS		LTS	NA
AQ-15: Exposure of Sensitive Receptors to Health Hazards from Diesel Particulate Matter in Excess of YSAQMD's Chronic Non-Cancer and Cancer Risk Thresholds (previously impact AQ-10)	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-16: Exposure of Sensitive Receptors to Health Hazards from Diesel Particulate Matter in Excess of BAAQMD's Chronic Non-Cancer and Cancer Risk Thresholds (previously impact AQ-13)	1A, 1C, 2A, 2C, 2D, 3, 5, 5A, 6A, 6C, 7, 8	S (cancer risk)	AQ-16: Relocate Sensitive Receptors to Avoid Excess Cancer Risk	SU (cancer risk)[17]	A (cancer risk)[38]
	NAA, 1B, 2B, 4, 4A, 6B, 9	LTS		LTS	NA
AQ-17: Exposure of Sensitive Receptors to Health Hazards from Diesel Particulate Matter in Excess of SJVAPCD's Chronic Non-Cancer and Cancer Risk Thresholds (previously impact AQ-12)	1B, 2B, 6B	S (cancer risk)	AQ-16: Relocate Sensitive Receptors to Avoid Excess Cancer Risk	SU (cancer risk)[18]	A (cancer risk)[39]
	NAA, 1A, 1C, 2A, 2C, 2D, 3, 4, 4A, 5, 5A, 6A, 6C, 7, 8, 9	LTS		LTS	NA
AQ-18: Exposure of Sensitive Receptors to *Coccidioides immitis* (Valley Fever) (new impact)	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-19: Creation of Potential Odors Affecting a Substantial Number of People	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-20: Generation of Criteria Pollutants in the Excess of Federal De Minimis Thresholds from Construction and Operation and Maintenance of the Proposed Water Conveyance Facility	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 2D, 3, 5, 5A, 6A, 6B, 6C, 7, 8, 9	S	AQ-1a: Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within the SFNA to Net Zero (0) for Emissions in Excess of General Conformity De Minimis Thresholds (Where Applicable) and to Quantities below Applicable CEQA Thresholds for Other Pollutants AQ-1b: Develop an Alternative or Complementary Offsite Mitigation Program to Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within the SFNA to Net Zero (0) for Emissions in Excess of General Conformity De Minimis Thresholds (Where Applicable) and to Quantities below Applicable CEQA Thresholds for Other Pollutants	SU	A
	4, 4A	S		LTS	NA

[17] Mitigation Measure AQ-16 would reduce exposure to substantial cancer risk by relocating affected receptors. The BDCP proponents cannot ensure that the affected landowners will accept DWR's offer for relocation assistance. If the landowners choose not to accept DWR's offer of relocation assistance, a significant impact in the form of exposure to substantial excess cancer risk would occur. Therefore, this impact would be significant and unavoidable. If, however, the landowners accept DWR's offer of relocation assistance, the impact would be less than significant.

[18] Mitigation Measure AQ-16 would reduce exposure to substantial cancer risk by relocating affected receptors. The BDCP proponents cannot ensure that the affected landowners will accept DWR's offer for relocation assistance. If the landowners choose not to accept DWR's offer of relocation assistance, a significant impact in the form of exposure to substantial excess cancer risk would occur. Therefore, this impact would be significant and unavoidable. If, however, the landowners accept DWR's offer of relocation assistance, the impact would be less than significant.

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CEQA				NEPA		
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
			AQ-3a: Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within BAAQMD/SFBAAB to Net Zero (0) for Emissions in Excess of General Conformity De Minimis Thresholds (Where Applicable) and to Quantities below Applicable BAAQMD CEQA Thresholds for Other Pollutants AQ-3b: Develop an Alternative or Complementary Offsite Mitigation Program to Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within the BAAQMD/SFBAAB to Net Zero (0) for Emissions in Excess of General Conformity De Minimis Thresholds (Where Applicable) and to Quantities below Applicable BAAQMD CEQA Thresholds for Other Pollutants AQ-4a: Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within SJVAPCD/SJVAB to Net Zero (0) for Emissions in Excess of General Conformity De Minimis Thresholds (Where Applicable) and to Quantities below Applicable SJVAPCD CEQA Thresholds for Other Pollutants AQ-4b: Develop an Alternative or Complementary Offsite Mitigation Program to Mitigate and Offset Construction-Generated Criteria Pollutant Emissions within the SJVAPCD/SJVAB to Net Zero (0) for Emissions in Excess of General Conformity De Minimis Thresholds (Where Applicable) and to Quantities below Applicable SJVAPCD CEQA Thresholds for Other Pollutants		
AQ-21: Generation of cumulative greenhouse gas emissions during construction of the proposed water conveyance facility (previously Impact AQ-15)	NAA	S		S	A
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	AQ-21: Develop and implement a GHG mitigation program to reduce construction related GHG emissions to net zero (0)	LTS	NA
AQ-22: Generation of cumulative greenhouse gas emissions from operation and maintenance of the proposed water conveyance facility and increased pumping (previously Impact AQ-16)	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-23: Generation of cumulative greenhouse gas emissions from increased CVP pumping as a result of implementation of CM1 (previously Impact AQ-17)	1A, 1B, 1C, 2A, 2B, 2C, 3, 4, 4A, 5, 5A	S	No feasible mitigation to address this impact	SU	A
	NAA, 6A, 6B, 6C, 7, 8, 9	LTS		LTS	NA
AQ-24: Generation of regional criteria pollutants from implementation of CM2–CM11 (previously Impact AQ-18)	NAA	S		S	A
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	AQ-24: Develop an Air Quality Mitigation Plan (AQMP) to ensure air district regulations and recommended mitigation are incorporated into future conservation measures and associated project activities.	SU	A

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CEQA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
AQ-25: Exposure of Sensitive Receptors to Health Hazards from Localized Particulate Matter, Carbon Monoxide, and Diesel Particulate Matter from Implementation of CM2–CM11 (new impact)	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	AQ-24: Develop an Air Quality Mitigation Plan (AQMP) to ensure air district regulations and recommended mitigation are incorporated into future conservation measures and associated project activities. AQ-25: Prepare a Project-Level Health Risk Assessment to Reduce Potential Health Risks from Exposure to Localized DPM and PM Concentrations	LTS	NA
AQ-26: Creation of Potential Odors Affecting a Substantial Number of People from Implementation of CM2–CM11	NAA, 1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	LTS		LTS	NA
AQ-27: Generation of cumulative greenhouse gas emissions from implementation of CM2–CM11 (previously Impact AQ-19)	NAA	S		S	A
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	AQ-24: Develop an Air Quality Mitigation Plan (AQMP) to ensure air district regulations and recommended mitigation are incorporated into future conservation measures and associated project activities. AQ-27 Prepare a land use sequestration analysis to quantify and mitigate (as needed) GHG flux associated with conservation measures and associated project activities	SU	A
Noise					
NOI-1: Exposure of noise-sensitive land uses to noise from construction of water conveyance facilities	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	NOI-1a: Employ noise-reducing construction practices during construction. NOI-1b: Prior to construction, initiate a complaint/response tracking program.	SU	A
NOI-2: Exposure of sensitive receptors to vibration or groundborne noise from construction of water conveyance facilities	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 2D, 4, 4A, 5A	S	NOI-2: Employ vibration-reducing construction practices during construction of water conveyance facilities.	SU	A
	NAA, 9	LTS		LTS	NA
NOI-3: Exposure of noise-sensitive land uses to noise from operation of water conveyance facilities	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	NOI-3: Design and construct intake facilities and other pump facilities such that operational noise does not exceed 50 dBA (one-hour L_{eq}) during daytime hours (7:00 a.m. to 10:00 p.m.) or 45 dBA (one-hour L_{eq}) during nighttime hours (10:00 p.m. to 7:00 a.m.) or the applicable local noise standard (whichever is less) at nearby noise sensitive land uses.	LTS	NA

Level of Significance/Determination of Effects:

CEQA
SU=significant and unavoidable (any mitigation not sufficient to render impact less than significant); LTS=less than significant; S=significant; NI=no impact; B=beneficial; ND=no determination; N/A=not applicable

NEPA
A=adverse; NA=not adverse; NE=no effect; B=beneficial; ND=no determination; N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
NOI-4: Exposure of noise-sensitive land uses to noise from implementation of proposed Conservation Measures 2–10	NAA	LTS		LTS	NA
	1A, 1B, 1C, 2A, 2B, 2C, 3, 5, 6A, 6B, 6C, 7, 8, 9, 2D, 4, 4A, 5A	S	NOI-1a: Employ noise-reducing construction practices during construction. NOI-1b: Prior to construction, initiate a complaint/response tracking program.	SU	A
Hazards and Hazardous Materials					
HAZ-1: Create a substantial hazard to the public or the environment through the release of hazardous materials or by other means during construction of the water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S		LTS	NA
HAZ-2: Expose sensitive receptors located within 0.25 miles of a construction site to hazardous materials, substances, or waste during construction of the water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
HAZ-3: Potential to conflict with a known hazardous materials site and, as a result, create a significant hazard to the public or the environment	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	NI		NI	NE
HAZ-4: Result in a safety hazard associated with an airport or private airstrip within 2 miles of the water conveyance facilities footprint for people residing or working in the study area during construction of the water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
HAZ-5: Expose people or structures to a substantial risk of property loss, personal injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands, as a result of construction, and operation and maintenance of the water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
HAZ-6: Create a substantial hazard to the public or the environment through the release of hazardous materials or by other means during operation and maintenance of the water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S		LTS	
HAZ-7: Create a substantial hazard to the public or the environment through the release of hazardous materials or by other means as a result of implementing Conservation Measures CM2–CM11, CM13, CM14, CM16 and CM18	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S		LTS	NA
HAZ-8: Increased risk of bird – aircraft strikes during implementation of conservation components that create or improve wildlife habitat	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S		SU	A

Level of Significance/Determination of Effects:

CEQA				NEPA		
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Potential Impact	Alternatives	Impact Conclusions Before Mitigation	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation	
		CEQA		CEQA	NEPA
Public Health					
PH-1: Increase in vector-borne diseases as a result of construction and operation of the intakes, solids lagoons, and/or sediment basins associated with the water conveyance facilities.	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
PH-2: Exceedances of water quality criteria for constituents of concern such that there is an adverse effect on public health as a result of operation of the water conveyance facilities.	NAA	LTS		LTS	NA
	4	S	WQ-5: Avoid, minimize, or offset, as feasible, adverse water quality conditions.	SU[19]	A[31]
	2D, 4A, 5A	LTS		LTS	NA
PH-3: Substantial mobilization or increase in constituents known to bioaccumulate as a result of construction, operation or maintenance of the water conveyance facilities.	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
PH-4: Expose substantially more people to transmission lines generating new sources of EMFs as a result of the operation of the water conveyance facilities.	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
PH-5: Increase in vector-borne diseases as a result of implementing CM2–CM7, CM10, and CM11	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
PH-6: Substantial increase in recreationists' exposure to pathogens as a result of implementing the restoration conservation measures	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
PH-7: Substantial mobilization of or increase in constituents known to bioaccumulate as a result of implementing CM2, CM4, CM5, and CM10	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
PH-8: Increase in Microcystis Bloom Formation as a Result of Operation of the Water Conveyance Facilities.	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	WQ-32a: Design Restoration Sites to Reduce Potential for Increased Microcystis Blooms. WQ-32b: Investigate and Implement Operational Measures to Manage Water Residence Time.	SU	A
PH-9: Increase in Microcystis Bloom Formation as a Result of Implementing CM2 and CM4.	4	S	WQ-32a: Design Restoration Sites to Reduce Potential for Increased Microcystis Blooms. WQ-32b: Investigate and Implement Operational Measures to Manage Water Residence Time.	SU	A
PH-9: Increase in *Microcystis* Bloom Formation as a Result of Implementing Environmental Commitment 4	NAA, 2D, 4A, 5A	LTS		LTS	NA

[19] This impact/effect would be less than significant/not adverse if all financial contributions, technical contributions, or partnerships required to avoid significant impacts prove feasible and any necessary agreements are completed before the project's contribution to the effect.

Level of Significance/Determination of Effects:

CEQA				NEPA		
SU=significant and unavoidable (any mitigation not sufficient to render impact less than significant)	LTS=less than significant	NI=no impact	ND=no determination	A=adverse	NE=no effect	ND=no determination
	S=significant	B=beneficial	N/A=not applicable	NA=not adverse	B=beneficial	N/A=not applicable

Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
Mineral Resources					
MIN-1: Loss of availability of locally important natural gas wells as a result of constructing the water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	NI		NI	NA
MIN-2: Loss of availability of extraction potential from natural gas fields as a result of constructing the water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
MIN-3: Loss of availability of locally important natural gas wells as a result of operation and maintenance of the water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	NI		NI	NA
MIN-4: Loss of availability of natural gas fields as a result of operation and maintenance of the water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	NI		NI	NA
MIN-5: Loss of availability of locally important natural gas wells as a result of implementing Conservation Measures 2–22	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	MIN-5: Design CM4, CM5, and CM10 to avoid displacement of active natural gas wells to the extent feasible	SU	A
MIN-6: Loss of availability of extraction potential from natural gas fields as a result of implementing Conservation Measures 2–22	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	S	MIN-6: Design CM4, CM5, and CM10 to maintain drilling access to natural gas fields to the extent feasible	SU	A
MIN-7: Loss of availability of locally important aggregate resource sites (mines and MRZs) as a result of constructing the water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	NI		NI	NE
MIN-8: Loss of availability of known aggregate resources as a result of constructing the proposed water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
MIN-9: Loss of availability of locally important aggregate resource sites (mines and MRZs) as a result of operation and maintenance of the water conveyance facilities	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	NI		NI	NE
MIN-10: Loss of availability of known aggregate resources as a result of operation and maintenance of the water conveyance facilities	NAA, 2D, 4, 4A, 5A	LTS		LTS	NA
MIN-11: Loss of availability of locally important aggregate resource sites (mines and MRZs) as a result of implementing Conservation Measures 2–22	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	LTS	MIN-11: Purchase affected aggregate materials for use in BDCP construction	LTS	NA
MIN-12: Loss of availability of known aggregate resources as a result of implementing Conservation Measures 2–22	NAA	LTS		LTS	NA
	2D, 4, 4A, 5A	LTS		LTS	NA

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Potential Impact	Alternatives	Impact Conclusions Before Mitigation CEQA	Proposed Mitigation (CEQA and NEPA)	Impact After Mitigation CEQA	Impact After Mitigation NEPA
Paleontological Resources					
PALEO-1: Destruction of unique or significant paleontological resources as a result of construction of water conveyance facilities.	NAA	S		S	A
	2D, 4, 4A, 5A	S	PALEO-1a: Prepare a monitoring and mitigation plan for paleontological resources PALEO-1b: Review 90% design submittal and develop specific language identifying how the mitigation measures will be implemented along the alignment PALEO-1c: Educate construction personnel in recognizing fossil material PALEO-1d: Collect and preserve substantial potentially unique or significant fossil remains when encountered	SU	A
PALEO-2: Destruction of unique or significant paleontological resources associated with the implementation of other conservation measures.	NAA	S		S	A
	2D, 4, 4A, 5A	S	PALEO-1a: Prepare a monitoring and mitigation plan for paleontological resources PALEO-1b: Review 90% design submittal and develop specific language identifying how the mitigation measures will be implemented along the alignment PALEO-1c: Educate construction personnel in recognizing fossil material PALEO-1d: Collect and preserve substantial potentially unique or significant fossil remains when encountered	LTS	NA

Level of Significance/Determination of Effects:

CEQA

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Attachment 3

2013-2014 Your Questions Answered

Below is a list of common questions from landowners, stakeholders, media, and interested public received on the previously proposed BDCP, between 2013-2014. These questions and answers are available for your information but are not necessarily applicable to the current proposed project.

Benefits of BDCP

Expand all

How many jobs will BDCP create?

How Can a New Water Diversion Help the Delta?

Climate Adaptation

Expand all

How has climate change been incorporated into the BDCP documents?

How will BDCP's dual conveyance operations help California adapt to water supply challenges due to climate change?

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How will the BDCP address the Delta's resiliency and adaptability to the effects of climate change?

How will the BDCP protect water supplies in the event of an earthquake or levee failure?

Construction Impacts

Expand all

What aesthetic and visual impacts are expected from the BDCP and how will they be mitigated?

How will BDCP construction impact the Delta's roadways?

What are the BDCP impacts to agriculture in the Delta and how will they be mitigated?

How will noise impacts associated with the BDCP be mitigated?

What are the BDCP impacts to recreation and how will they be mitigated?

What are the BDCP impacts to public services and utilities and how will they be mitigated?

How will excavated tunnel material be used?

Will the air quality impacts during construction force hundreds of residents to move?

Will access to and maintenance of the Delta levees be maintained during the construction period?

Will BDCP construction require the dewatering of all groundwater along the entire alignment for 10 years?

What is the total amount of agricultural land in the Delta that will be impacted by construction, including disposal of dirt and material?

Will the construction activity be phased?

How long will construction take, and how will construction activities impact residents, farming, fisheries, recreation, and other economic activities? What provisions are being made for negative impacts?

Cost and Financing

Expand all

How does the BDCP cost and water yield compare to ocean desalination and recycling?

What planning efforts have been completed, how much has it cost, and who paid for it?

What do you expect the final cost of water to the contractors will be? What are the current ranges of prices south of the Delta for agricultural water, urban water, and water for oil extraction and/or fracking?

Is there evidence that irrigators in the southern San Joaquin Valley are willing/able to pay for the water they will receive? Will that change if farmers grow annual crops of lower dollar value that are resilient to annual changes in water supplies?

Ecosystem, Habitat, and Species

Expand all

How will the BDCP help fish?

Will the BDCP improve populations of Chinook salmon and steelhead?

Does the BDCP use habitat restoration measures to “offset” adverse effects of the proposed north Delta diversions on Salmon and steelhead?

What is the timetable for restoration? How will you know that the BDCP's habitat conservation plan is moving forward successfully?

How will the fish screens on the North Delta tunnel intakes differ from the ones on the South Delta pumps?

Should the South Delta pumps, which will continue to be operated 51% of the time, including during dry years, have new screens? If not, why?

What happens if voters do not approve bond measures? Could conveyance construction begin before restoration funding is secured?

How would BDCP construction affect sandhill cranes in the Delta?

Would the BDCP Benefit All 56 Species It Would Cover?

Facilities, Operation, and Deliveries

Expand all

Will the BDCP replace the Delta's current pumping system?

Are the tunnel diversions based on established criteria?

Why are the baseline estimates for exports under the EIR/EIS no action alternative different than the baseline estimates for the "No BDCP" export scenario in BDCP Chapter 9?

How will gravity move water through the tunnels without intermediate pumps?

What provisions are proposed for maintaining these tunnels over the life of the project?

What are the anticipated deliveries to State and Federal project contractors in wet, average, and dry years? How many acre-feet are expected to be pumped through the South Delta pumps during those same wet, average, and dry years?

In addition to "anticipated" water deliveries, what will be the maximum delivery possible if the tunnels are built to the maximum size (9,000 cfs capacity)?

Would BDCP require reoperation of upstream dams, especially on the Sacramento River?

Groundwater

Expand all

Will the BDCP impact private wells in the Delta?

Will the BDCP impact groundwater levels in the Delta?

Will water pumped from the Delta be used for fracking in the Central Valley?

Other

Expand all

How many comments have been received?

Will the BDCP's significant and unavoidable impacts be mitigated?

What happens with my comments?

Why isn't correspondence posted to the BDCP website during the public review period?

How many environmental impacts does the BDCP have?

Why are the draft documents so massive?

Project Commitments, Regulations, Requirements

Expand all

Why doesn’t the BDCP include provisions for water users to reduce their reliance on the Delta? Isn’t that a requirement of the 2009 Delta Reform Act?

What is the purpose of the Draft Implementing Agreement?

What does the BDCP Draft Implementing Agreement do?

Can the public comment on the Draft Implementing Agreement?

What has the BDCP done to reach out to environmental justice communities?

What are the legal requirements regarding outreach to environmental justice communities?

In terms of the Draft BDCP and Draft EIR/EIS, what is the difference between mitigation and restoration?

If species are not recovering, at what point will the fisheries agencies suspend the "take" permits, and what is the plan for export water deliveries if that occurs?

Where does authority lie to stop a particular BDCP action in response to an emergency or changed circumstance?

Is a Biological Opinion required prior to the release of the Draft BDCP?

How has the BDCP ensured transparency in its planning?

Project Schedule

Expand all

What happens with public comments received after the July 29 deadline, and what follows the

end of the comment period?

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Will the public review and comment period for the Draft BDCP and EIR/EIS be extended?

Seismic Concerns

Expand all

How many seismic faults will the proposed tunnels cross? At what depth?

Because there's uncertainty about seismic risk, should we do nothing to address it?

Is the Delta an active seismic region?

State Water Management Portfolio

Expand all

Would conservation and improved water use efficiency of existing water supplies replace the need for the BDCP?

Will Delta levees continue to be maintained with or without BDCP?

What is the California Water Action Plan, and how does the BDCP fit into it?

Why can't the BDCP be replaced by desalination?

Surface Water and Storage

Expand all

Why is additional storage not considered as a component of BDCP?

While water storage is a critically important tool for managing California's water resources, developing new water supplies and including new storage is not part of the BDCP purpose and need. Additional water storage was eliminated from consideration in the BDCP EIR/EIS through the alternatives development and screening process.

The BDCP is a stand-alone project that demonstrates independent utility just as future storage projects would demonstrate. However, without improvements to the existing conveyance system, the ability to capture and deliver additional water supplies from north of the Delta to two-thirds of the state will continue to be constrained by pumping restrictions in the south Delta. Public water agencies are investing in the BDCP to secure existing water supply against future risk, including climate change and earthquakes.

The need for storage is being addressed outside of the BDCP planning process. Expanding water storage and capacity and improving groundwater management are among the actions identified in the California Water Action Plan to address California's overall water needs.

Where will the project store the extra water that comes in wet years?

The BDCP does not propose any new south Delta storage facilities as part of project implementation. The BDCP also does not call for any more water diversions than is authorized by state and federal law, but it does propose to make water deliveries when the water is available, depending on variety of operational considerations, including time of year, Delta water levels, and needs for fish.

With existing Delta regulatory constraints, the existing SWP and Central Valley Project (CVP) storage south of the Delta is not used to full capacity every year (e.g. San Luis Reservoir). In addition, there are a number of other ways water can be stored south of delta for use. For example, local projects already exist for storage through groundwater banking programs.

The California Natural Resources Agency, California Environmental Protection Agency and the California Department of Food and Agriculture recently released a draft Water Action Plan to identify actions to implement water policy in California. Aimed at providing the foundation for sustainable water resource management, specific actions include expanding water storage capacity.

Why is no nonstructural alternative for achieving habitat and species restoration being considered?

Will the BDCP affect upstream reservoirs or cause "dead pool" conditions?

Can the BDCP Drain the Sacramento River?

Would BDCP Divert More Water from the Delta?

Water Quality

Expand all

Will BDCP cause a higher concentration of bromide (which contributes to salinity) in the Delta?

Will the BDCP increase salinity in the Delta?

What is the timetable for the State Water Resources Control board to place and enforce limits on water that can be exported from the Delta so that outflows and water quality will be preserved?

198 gallons per capita daily (GPCD) to 166 GPCD (DWR 2012b). This represents a potential annual water savings of approximately 1.8 MAF per year that will be accomplished by 2020. This is consistent with DWR's 2009 estimate that 2.1 MAF can be conserved in roughly the same period through increased use of water-efficient appliances, reduced water use for landscaping, and tiered rate structures, such as increasing block rates or budget-based rate structures.

- **Recycled water.** The State's goal is to increase the use of recycled water over 2002 levels by at least 1 MAF per year by 2020, and by at least 2 MAF per year by 2030 (DWR et al. 2010). DWR's 2009 estimate indicates that as much as 2.25 MAF could be recovered, about half of the amount of wastewater that is treated and released to flow to the ocean.
- **Stormwater runoff.** The State's goal is to increase capture and reuse of stormwater by at least 500,000 acre-feet per year by 2020, and at least 1 MAF per year by 2030 (DWR et al. 2010). The 2008 Scoping Plan for California's Global Warming Solutions Act of 2006 (AB 32) finds that up to 333,000 acre-feet of stormwater could be captured on an annual average for reuse in Southern California alone (CARB 2008).

California's Wealth of New Water Supplies

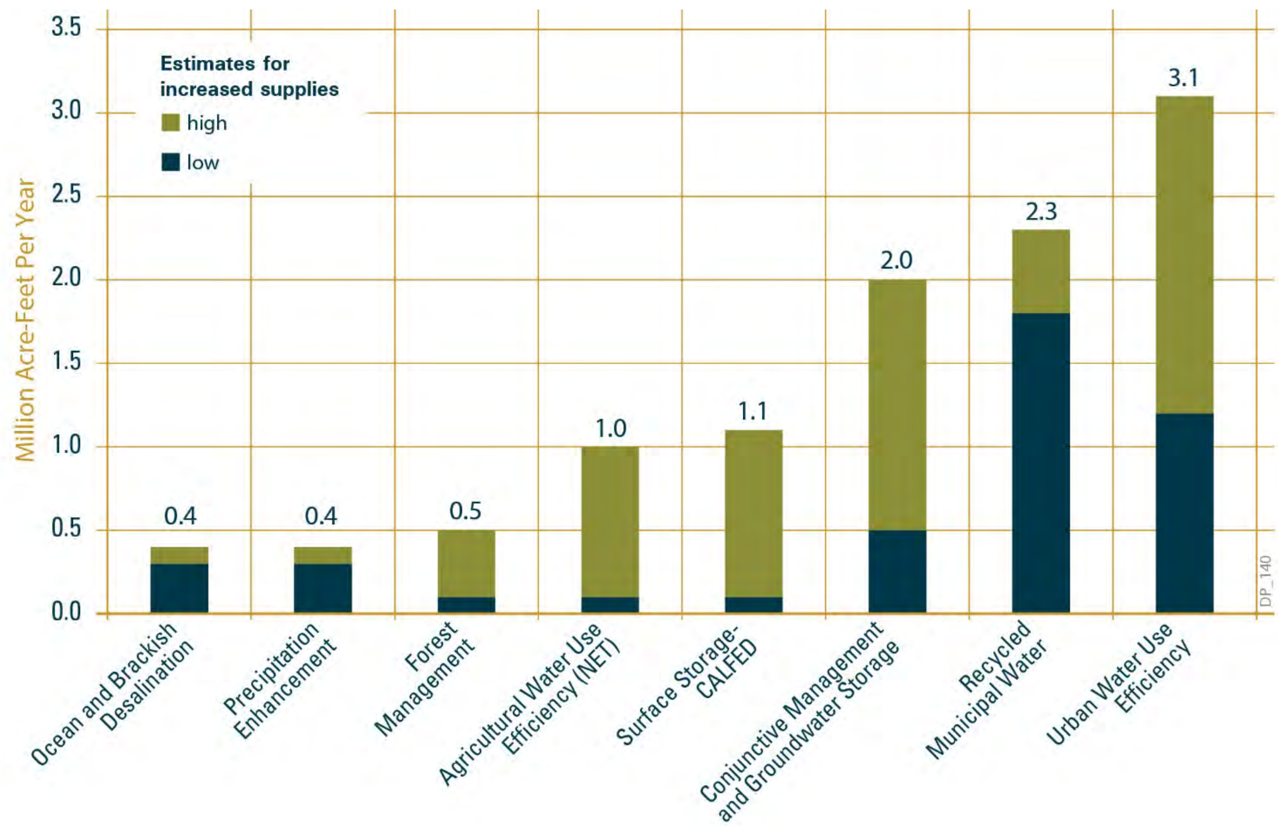
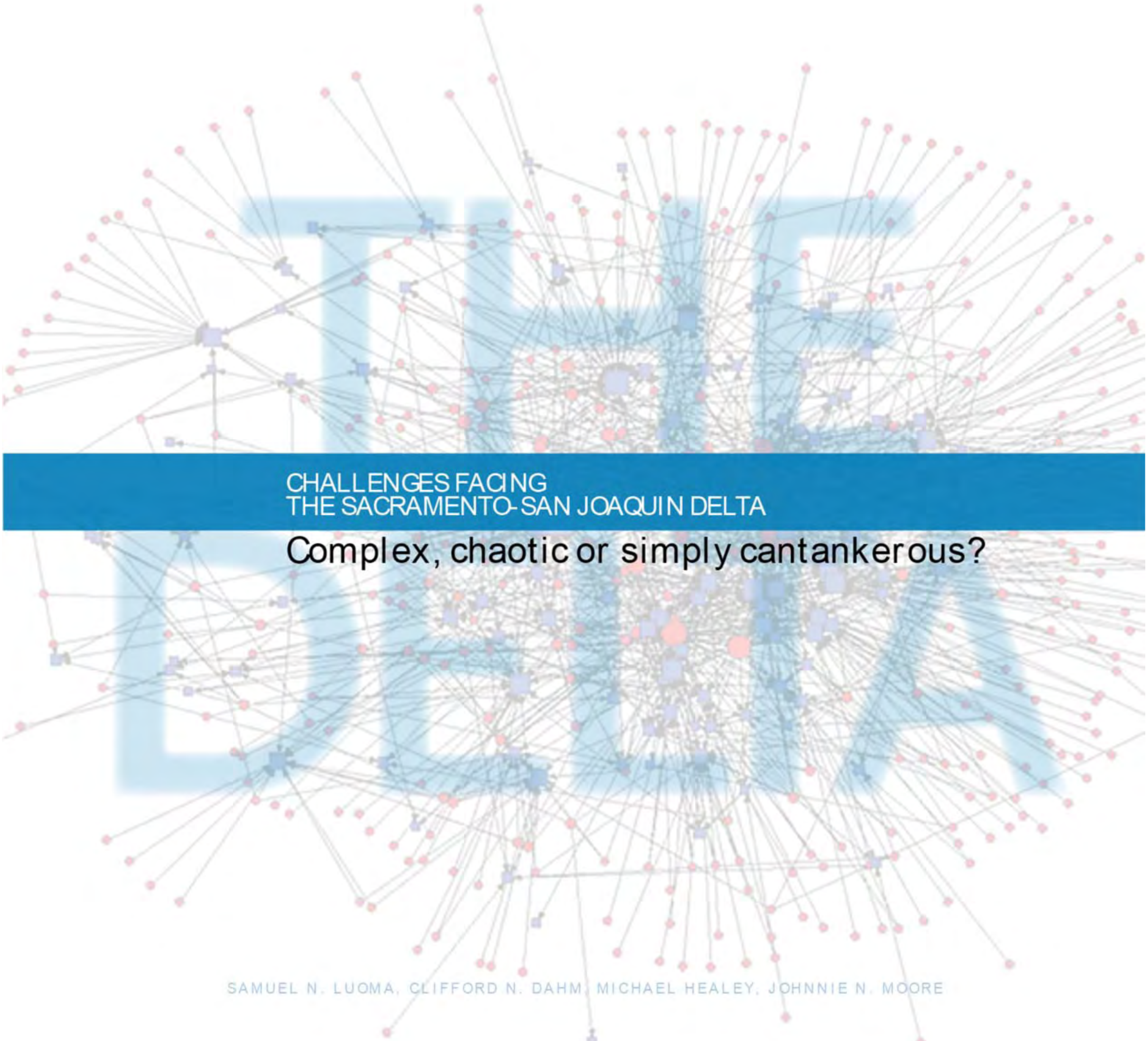


Figure 3-7 DWR estimates that California could further reduce its water demands and increase water supplies by 5 to 10 MAF per year over the next 30 years through the use of existing technologies.

Source: DWR 2009

Attachment 5



CHALLENGES FACING
THE SACRAMENTO-SAN JOAQUIN DELTA

Complex, chaotic or simply cantankerous?

SAMUEL N. LUOMA, CLIFFORD N. DAHM, MICHAEL HEALEY, JOHNNIE N. MOORE

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Agenda Item 9
Attachment 1

CREDITS

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A number of elements were added to this public information brochure that were not part of the SFEWS journal article including: the cover; the executive summary; all photos except those in Figure 2; text excerpts and pull quotes on pp. 3, 7, 12, 25 & 29.

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Challenges Facing The Sacramento-San Joaquin Delta: Complex, Chaotic, or Simply Cantankerous?

TABLE OF CONTENTS

Photo: Rick Lewis

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Sam Luoma is the lead author of this paper. He was the founding father of the CALFED Science program and served as the first Lead Scientist from 2000-2003. Luoma developed the structure for the program and worked for years to assure its independence as the provider of science for CALFED.

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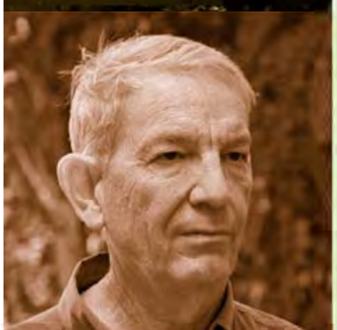
Cliff Dahm, as the fourth Lead Scientist, took the reins in July 2008 during a time of fiscal crises, staff furloughs, and stop-research orders. He led the program through the passage of the Delta Reform Act of 2009 that created the DSC, established the Delta Science Program (DSP), and enabled the Delta Independent Science Board. He also guided the DSP during the initial development of the Delta Plan. Dahm left in early 2012 and returned as interim lead scientist in fall 2015.



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Mike Healey, the third Lead Scientist, was science advisor to the Delta Vision Blue Ribbon Task Force, which laid the foundation for the legislation that created the Delta Stewardship Council. Healey served in 2007 and 2008, until Dahm took over. Healey was the editor in chief of the first issue of *State of Bay Delta Science, 2008*.

JOHNNIE N. MOORE
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Johnnie Moore served as the second Lead Scientist from 2004 to 2006, at the time when the California Bay-Delta Authority was challenged as a governing agency. Planning that eventually led to the transition to the Delta Stewardship Council was initiated on his watch.

EXECUTIVE SUMMARY

"In these times of uncertainty it is important to be nimble, be timely and be prepared in our decisions and our implementation. We cannot afford to shy away from bold actions but we must broaden the definition of "bold" to include more than engineering: conservation alternatives, the environment and governance must be a part of every decision."

— SAMUEL N. LUOMA

Executive Summary

In 2014, the California Natural Resources Agency and the U.S. Department of the Interior asked the authors of this paper, as four former leaders of The Delta Science Program, to summarize the challenges faced by water supply and ecological resource managers in this critically important region of Northern California. They concluded that the challenges are so complex as to meet the definition of a “wicked” problem. Such problems can’t be ignored, defy straightforward characterization, and have no simple solutions. Yet they must be actively managed to maximize beneficial and minimize adverse outcomes.

Several runs of Chinook salmon in the Sacramento River are endangered or listed (juveniles pictured here).
Photo: Roger Tabor, USFWS.

In California, water supply and demand are increasingly out of balance. At the same time, the very cornerstones of the water supply system are changing. Snowpack is declining with warming temperatures, groundwater is being pumped at an unsustainable rate, water infrastructure is aging, and human demand for water continues to grow. Meanwhile, many native species and ecological systems in the Delta are on the point of collapse. Add the uncertainties of drought and flood and a 60% chance of a significant earthquake by 2050 resulting in cascading levee failures, and the need for a new approach is urgent. Repeated management crises suggest that the status quo is unsustainable. Water managers no longer have the flexibility they once had in dealing with the multi-year droughts that are inherent to the California climate. Furthermore, management initiatives are often delayed by the multiplicity of agencies and actors involved and by litigation. Managing the water supply system alone is complicated. But add in the imperative to sustain the ecological and social values of the Delta and every decision becomes unimaginably complex.

In this context, the following paper calls for Delta management to become more nimble and better coordinated. The situation requires bold, timely, and well-considered actions, taken incrementally (in stages) where possible, with the understanding that any management action typically leads to new complexities that must also be managed. With water scarcity has come the awareness that problems are less amenable to traditional engineering solutions, and that attempts at dramatic, simple solutions may intensify the risk of unexpected, if not catastrophic, consequences. Simultaneous attention to a portfolio that includes actions like addressing overuse and mis-use of water, and improving ground water management and storage, should accompany any necessary water infrastructure adjustments. Renewed emphasis on reducing known stressors, restoring native ecosystems, learning from our actions, and managing collaboratively and adaptively is essential if native species are to be retained. Comprehensive modeling that takes account of the many dimensions of the Delta problem should provide a foundation for determining the best approaches to implementing restoration and water management initiatives and forecasting the degree to which they will be effective.

Thanks to the public’s long-term investment in good science, the Delta is one of the most intensively studied systems in the world. Managers have information to work with, although important questions remain unsettled. Throughout decades of conflict over water issues, all parties have agreed that advancing the state of scientific knowledge is fundamental to making constructive progress. As we enter an era of increasing uncertainty about climate and water supply, science conducted in collaboration among multiple institutions must be brought to bear and decisions must transcend individual agency directives or the needs of special interests.

Forecasting the future of complex problems like the Delta will require scientific models that can simulate the consequences of different management approaches. Such models have been developed for water operations; are in their early stages for the ecosystem (DiGennaro et al. 2012) and climate change (Cloern et al. 2011); and have been used to envision alternative futures for the Bay-Delta (e.g., Lund et al. 2010).

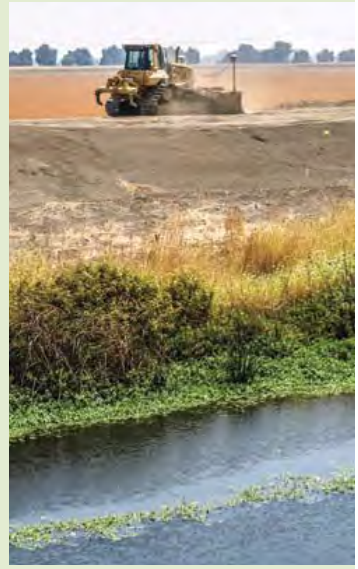
WHAT IS THE DELTA?

The Delta is where the Sacramento and San Joaquin rivers flow out of the mountains and onto valley floodplains, spreading out onto a 3,000-square-kilometer landscape of islands and shallow waterways before flowing into the San Francisco Bay. Before it was diked, drained, and developed, the Delta was a vast wetland complex of low islands, shifting channels, woody debris piles, and tule marshes. Today, the Delta is a patchwork of largely agricultural islands separated by deep channels and protected by 1,100 miles of aging levees. It hosts farms, fisheries, water projects, recreational areas, and the state capitol in Sacramento. Geographically, it is the largest delta on the Pacific coast and encompasses an area almost the size of Rhode Island.

The Delta is…

- One of the largest waterworks in the world. This critical hub of a regional water redistribution system is a complex network of dams, pumps, canals, drains and reservoirs, all of which are managed jointly by local, state and federal institutions to meet goals of flood control, water supply, and environmental conservation.
- A real place where people live and play, with a rich cultural history. More than 570,000 people live in the greater Delta, mostly in the urbanizing regions around the margin of the Delta. Many of them derive their livelihoods directly from the Delta. Most of the rest use the Delta for transportation, recreation, and as a source of water.

- The heart of California's agricultural economy, which produces more food than any other state with $45 billion in sales per year. Because California produces most of the fruits and nuts and a high percentage of vegetables consumed in the US, restrictions on water for agriculture in the greater Delta affect the availability and price of these agricultural products throughout the US and elsewhere. If production relocates because of water shortages in California, some of the conflicts over water will also relocate.



- Home to more than 750 species of plants and animals. The California Floristic Province, of which the Delta is a part, is one of 25 hotspots of biodiversity across the world cited as highest priority areas for conservation of species (Myers et al. 2000). Some species are present year round, like Delta smelt, Sacramento splittail, salt marsh harvest mouse, and soft bird's beak. Other species are important culturally or economically, including salmon, sturgeon, and migratory waterfowl and shorebirds. The presence of migratory species connects the Delta to ecosystems far to the north, south, and west just as the existence of the water distribution system connects the Delta to regions far to the south and east. The Delta is truly an internationally connected ecosystem with contributions to local and state enterprise, to regionally valuable fisheries, and to global biodiversity.

Photos, this page: Birds Eye View

Challenges remain in merging models of various types and in ensuring the models are reliable and address issues at the geographic and temporal scales appropriate for management. If carefully implemented and interpreted, such models would provide valuable guidance and a foundation for both coordination and evaluation of management initiatives.

Water scarcity has defined and will continue to define the future of the Delta and all that is linked to it. California has risen to the challenge of water scarcity in the past to build an economy and a society that is, in many ways, the envy of the world. Accepting water scarcity raises economic, ecological, water infrastructure and organizational complexities in the Delta to a new level, well beyond traditional approaches that consider water supply solutions in isolation. Nevertheless, California has the tools and the intellectual resources to manage the multiple dimensions of the problem and thereby achieve the state's twin goals of a reliable water supply and an ecologically diverse Delta ecosystem.

DELTA CHALLENGES

- California's water supply is over-allocated. State water rights allocate more than 500% of average annual river flows (Grantham and Viers 2014). The current drought, climate change, and normal year-to-year variability in precipitation are increasing uncertainty in water supply.

Photo: Chris Austin

- California's vast water management infrastructure is decaying and overtaxed. This increases the risk of catastrophe.
- Delta water availability uncertainties will have consequences throughout seven western states and into Mexico, due to California's participation in the Colorado River Basin Compact. Although the California economy has proved resilient to year-to-year water shortages in the past (Hanak et al. 2012), negative consequences of a more permanent water scarcity will be increasingly difficult to avoid (Howitt et al. 2014) and will carry over to the economies of the region, the nation, and the world.
- Native ecosystems and species are declining. Multiple interacting factors affect their well-being, only some of which are well understood. Predicting the outcome of changes to water operations, landscapes, or levees is uncertain, at best.

Photo: NOAA

- Upgrading levees to address growing risks will be costly (risks include earthquakes, storms, rising sea level). Not all levees are fixable, sustainable, or defensible in perpetuity. Failure of levees in one part of the Delta, however, increases the risk of failure elsewhere. Multiple, simultaneous levee breaks would allow a massive salinity intrusion into the Delta. Turning the Delta brackish would threaten agricultural crops and urban water supplies that rely on high-quality water exported from the area.

Photo: Birds Eye View

- Water quality is threatened by the complex spectrum of chemicals entering the Delta. Sources include agricultural runoff, industries, wastewater treatment plants, urban stormwater discharges, and atmospheric fallout. Chemicals interact with physical conditions in the Delta, and with other stressors in the system, in a dizzying number of ways, making risks to water supply and native organisms difficult to assess.
- Delta management is unusually complex. More than 230 agencies, institutions and stakeholders are involved. Each plays a useful role. However, a number of these entities have very different core interests, conflicting visions, and competing priorities. The result: institutional fragmentation that slows decision-making and confounds collaborative management.

RECIRC2655

Agenda Item 6
Attachment 1

INTRODUCTION

Thermalito Afterbay, part of the State Water Project system downstream of Oroville Dam.
Photo: Matt Elyash, CDFW

If the problem were just about allocating freshwater flows, it might be solvable. Add in the complexity of moving water through a hydrologically and hydro-dynamically complex Delta and it becomes complicated. Add the uncertainty of ecological responses and the institutional complexity of many actors with many visions and the problem becomes wicked. Then add the ever-changing water supply and ecological and economic contexts within which decisions must be made, and the problem becomes devilishly wicked.

Introduction

California, the most prosperous state in the nation, has an economy and a lifestyle built on water—and an illusion that freshwater is always abundant. However, the current drought, now entering its fourth year, has brought sharply into focus the fact that water is a scarce resource. With snowpack in the Sierras at a record low, Governor Jerry Brown has decreed serious water rationing, stating: "This is the new normal and we'll have to learn to cope with it." (KTLA 5 News 2015).

Shortages of water and conflicts over water use are nothing new in California. The Delta of the Sacramento and San Joaquin rivers (the Delta; Fig. 1) is at the center of these conflicts. Major state and federal water projects began delivering water from the Delta

Shasta Dam. Photo: USBR

in 1949 to agricultural and urban users in the San Joaquin Valley and southern California. This redistribution of water stimulated economic growth, but the projects were soon plagued by conflict over whether, when, and how to transfer water from the Delta (Hanneman and Dyckman 2009). Conflict intensified with the listing under the federal and state endangered species acts of more than 50 native species found in the Delta (DSP 2013). As public concern grew, new policies were put in place to address environmental effects. These initiatives also led to improved understanding of the Delta, the listed species, and the complexities of managing the Delta to achieve a reliable water supply and a healthy ecosystem. Nevertheless, listed species continue to decline and dissatisfaction with water deliveries continues to grow. There is concern that the present approach to water operations is unsustainable in the face of widening demands[1] and shrinking supplies. Frustration with management's inability to satisfy all the demands for water has led to litigation, distrust among parties, and the threat of policy paralysis, with cascading consequences for California, the semi-arid west and the nation (see *Delta Conflicts* at left).

In this paper we look at multifaceted questions about water and environmental management in the Delta. Our goal is not to evaluate specific recent initiatives, but to provide a larger framework to guide implementation of these and future initiatives. We illustrate how the complexity of the Delta problem complicates management and leads to inefficiency and conflict. We give examples of trade-offs, disagree-

DELTA CONFLICTS: CASCADING CONSEQUENCES

- Federal and State regulations curtail water exports from the Delta when legally protected species, like salmon and Delta smelt, are drawn into the pumps.
- Local restrictions on exporting water from the Delta impact the intricately balanced supply and demand of interdependent water transport networks throughout California and the Colorado River Basin.
- The Colorado River Basin Compact is a complicated deal that defines water rights of users in the seven states that share the river. Southern California obtains water from both the Delta and the Colorado River Basin. California's supply of Colorado River water was reduced with implementation of the Compact. Reducing supplies to Southern California from the Delta increases their reliance (within the bounds of the agreement) on water from places like Lake Mead in the Colorado River system (Fleck 2012). Integration of interstate water infrastructure via these complicated agreements means that decisions about water exports from the Delta have cascading consequences for flows in the Colorado River, as well as endangered species conservation and water supply disputes throughout the Colorado River Basin.
- With so much at stake, it is not surprising that water managers argue that water disputes throughout the arid and semi-arid western US cannot be resolved in the absence of decisions about managing the Delta (Austin 2015; Fleck 2012).

ments and the consequences of failure in managing these issues. We discuss why bold new approaches to managing Delta issues are urgently needed to address inefficiencies in water use, aging infrastructure, and the deteriorating condition of native species. We also show that it is important to ensure that those actions take full advantage of existing knowledge, are implemented incrementally where possible, and are accompanied by ongoing evaluations of outcomes and subsequent adjustments, as necessary. Our hope is that this paper will help managers and policy-makers better appreciate the complexity of water and environmental management in the Delta, and understand that there are ways to move forward.

The Problem

At its simplest, the problem of the Delta is similar to water challenges throughout the arid and semi-arid western U.S.: growing demands and over-allocated resources. For example, California has water rights that allocate over 500% of average annual river flows (Grantham and Viers 2014). Media reports often focus on the conflict over whether water should be exported from the Delta or left flowing through the Delta to San Francisco Bay to sustain listed native fish species. All this attention to flows and fish creates the impression that if only water managers in the major river basins would "get their act together," the problem could be solved. But the problem of the Delta is more complex than a simple decision about allocating flows. It is a problem with many different dimensions (Table 1) and interactions that confound simple answers.

Historically, the problem of water management was about supply: not enough

TABLE 1. The Delta Problem:
A nationally important but "wicked" problem with many dimensions and potentially contradicting solutions.

Dimension	Problem	Some Characteristics
Physical	Natural system seasonal and episodic	Strong seasonality of water supply; highly variable year-to-year; drought and floods the norm; changing climate; high earthquake damage potential.
Socio-Economic	Unsupportable demand from population, economy	Growth nearing limits of water supply; inadequate awareness that water is scarce; directly linked to the rest of the semi-arid West.
Water Supply	Increasingly vulnerable water infrastructure	Aging conveyance and levee systems stretched to limits; snowpack declining; groundwater exploited at an unsustainable rate; water used is out of balance and inadequately tracked.
Environment	Multiple stresses on ecosystem	Many native species at risk; scale of change massive, difficult or impossible to reverse; stresses difficult to manage, may act in combination, can change over space and time.
Ecosystem Restoration	Difficulty ensuring project success	Some projects help native species while others attract invasive species; benefits of water diversion mitigations questionable; successes, failures, and challenges inadequately tracked.
Institutional	Insufficiently unified vision for the Delta	Plethora of institutions with their own visions and contradicting missions; monitoring programs plentiful yet uncoordinated; management programs inconsistently coordinated and evaluated.
Science	Key uncertainties remain	Multi-institutional, collaborative approach requires new support; equal need for broadly applied science and research focused on immediate policy issues; data sharing must be improved.
Management	Contradictions among solutions	Problems can be characterized in many possible ways; single-focus problem solving can create unanticipated outcomes; management must be continual and adaptable.

THE DELTA: A WICKED PROBLEM

- If the problem were just about allocating flows, it might be solvable.
- Add in the complexity of moving water through a hydrologically and hydrodynamically complex Delta and it becomes complicated.
- Add the uncertainty of ecological responses and the institutional complexity of many actors with many visions and the problem becomes *wicked* (Dryzek et al. 2013).
- Then add the ever-changing water supply and ecological and economic contexts within which decisions must be made, and the problem becomes *devilishly wicked*.

water in the south and more abundant water in the north. California's impressive water system was designed to address this supply problem. But California's water problems can no longer be solved through supply management and traditional engineering solutions alone. Water supply and demand are increasingly out of balance, and the cornerstones of the water supply system are changing. Snowpack is declining with warming temperatures, groundwater is being mined at an unsustainable rate, the infrastructure is aging, human demand for water continues to grow and the Delta ecosystem continues to deteriorate. The accelerating pace of these changes introduces a new urgency into the need to find novel ways to manage the host of variables that affect water and the Delta ecosystem.

Human use of the Delta and surrounding lands has changed the landscape and water quality in ways that create serious environmental challenges (Fig. 2). We know that multiple factors (e.g., water flows, water quality, invasive species, predation pressure, and habitat loss) interact to increase risks to native species. Despite measures to address individual stresses, the situation for many native species is increasingly dire (Sommer et al. 2007). Largely because of massive landscape transformations, the Delta cannot be restored to what it once was (NRC 2012). But the situation for native species can be improved, and there is a new urgency in taking advantage of whatever opportunities exist to do that. Exactly how to reduce the cumulative impacts of the stresses on the ecosystem is not clear (Baxter et al. 2010), but the need to address this multiplicity of problems and their interactions is as urgent as the need to address water-supply issues.

Another aspect of the problem is that more than 230 agencies, institutions and stakeholders claim a role in water and environmental management but come with different core interests — and often conflicting visions of how the Delta should be managed. The resulting institutional fragmentation creates conflict and slows decisions. Addressing the water supply and ecosystem problems of the Delta will require management institutions that are both nimble and sufficiently coordinated to take bold, timely and well considered actions.

Formally, the problem of water and environmental management in the Delta fits the definition of a "wicked" problem in the sense of Rittel and Webber (1973; see *The Delta: A Wicked Problem* above). Recognition of the Delta as a wicked problem presents a new way to think about management. Wicked problems have no single correct

Fresh water from the Delta system supplies both irrigation water for farms and drinking water to cities as far away as Los Angeles. Delta waters also sustain fish and wildlife and recreational activities. Photos: NeilArmstrong2 (left); Bird's Eye View (center and right).

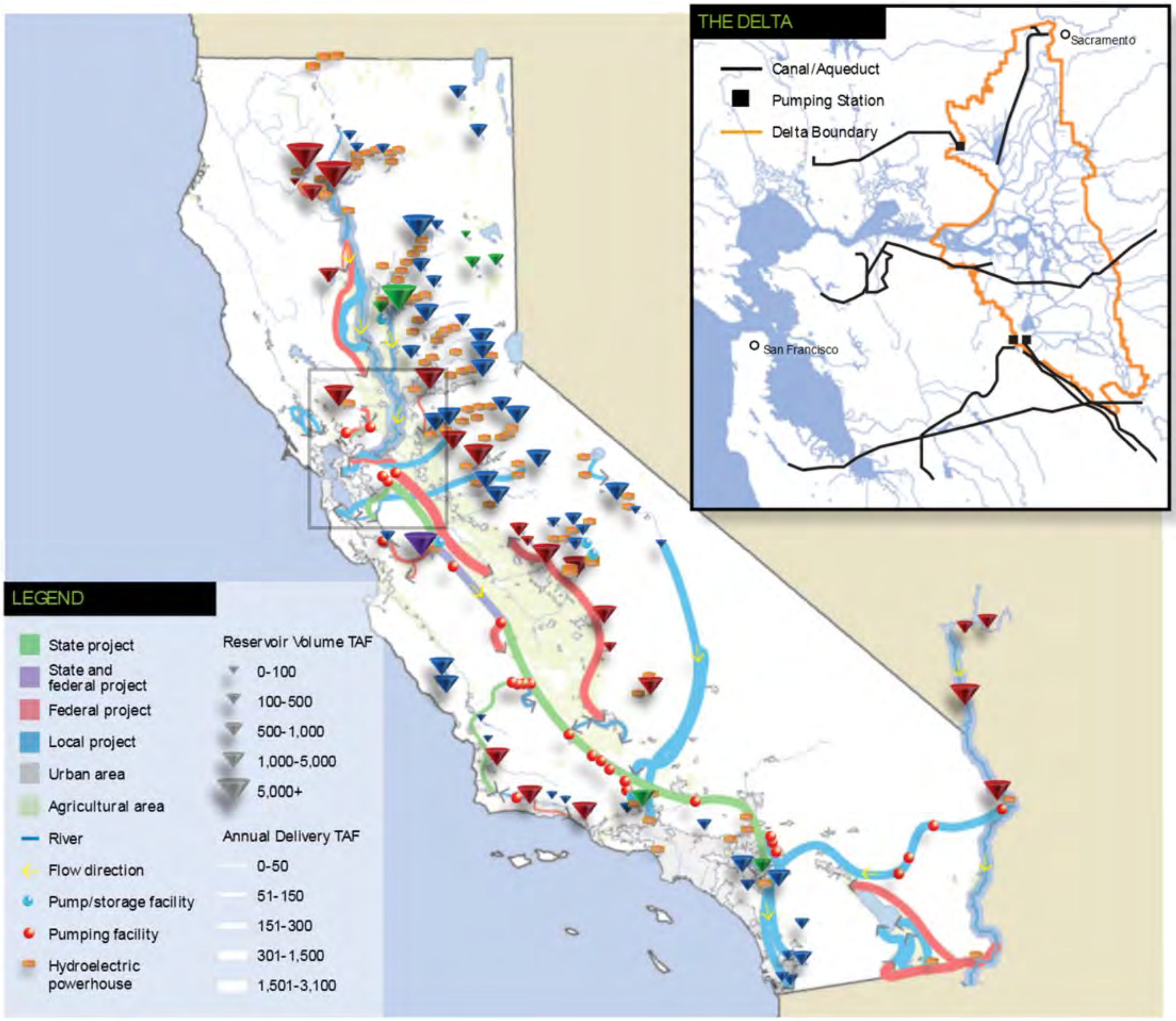


FIGURE 1. Water supply system in California (large map) showing reservoirs and canals storing and transporting water from the wetter northern areas of the state to the drier southern and coastal areas. The Delta (inset) is at the heart of the system, pumping water to the south from two large pumping plants in the southern Delta. Reservoir volume and annual delivery is in millions of acre feet. Within the Delta, different zones are dominated by different uses and economic productivity. Agriculture is the most important economic activity in the Delta's economy producing $800 million annually in crops (e.g., corn, alfalfa, tomatoes, wheat, and wine grapes). Adding all value-added activities (wineries, dairies, canneries, etc.), the Delta produces $2.6 billion in total economic output and 13,000 jobs for the counties encompassing the Delta and $5.3 billion and 25,000 jobs statewide. Recreation is the second most important economic activity in the Delta, generating $312 million and over 3000 jobs annually within delta counties, and over 5300 jobs and $353 million statewide. Natural gas from the Delta also produces more than 20% of California's gas-powered electricity (DPC 2012).

characterization and no single correct solution, only better or worse approaches to management of the situation. This means the Delta's problems cannot be solved in the traditional sense, but they can be actively managed to minimize adverse outcomes and maximize bene cial outcomes (Healey 2008). Dif cult political decisions and bold actions will be necessary, and this will require thinking outside the box, thinking holistically, making learning integral with doing, and nally and honestly embracing the equivalent value of water supply and ecological health. Addressing demand will be as important as addressing supply; restoring ecological function (as Moyle et al. [2012] suggest) will receive as much attention as re-engineering water-distribution infrastructure; and broadly coordinated actions will take precedence over individual institutional missions. The Delta Stewardship Council, the Delta Reform Act, and the Delta Plan provide an institutional and policy framework for this kind of operational innovation.

Why is the Delta Problem Important?

As the hub of a regional water-redistribution system, the Delta is a critical node in a complex network of dams, pumps, canals, drains and reservoirs, all of which are managed jointly by local, state and federal institutions to meet goals for ood control, water supply, and environmental conservation (Fig. 1). This engineering marvel is one of the largest waterworks in the world. Through California's participation in the Colorado River Basin Compact, uncertainties about water availability from the Delta have consequences throughout seven western states and into Mexico.

Water is a fundamental driver of the economy of the western US. California's economy is the most productive in the country (Fig. 2; see *Economy Underpinned* below). The water system is the lifeblood of this economic powerhouse and fuels the nation's most productive agricultural sector. The Delta contributes to the California economy in myriad other ways. Commercial shipping moves through the Delta to and from the ports of Stock-

THE INTERNATIONAL, NATIONAL AND STATE-WIDE IMPORTANCE OF AN ECONOMY UNDERPINNED BY AVAILABILITY OF WATER FROM THE CALIFORNIA DELTA

- A gross domestic product of $2.2 trillion.
- The 8th largest economy in the world, equal to Brazil's.
- Contributes 13% to the total economic output of the United States.
- Ranks 1st in the nation for patents.
- Outpaces all other states in venture capital investment with 41% of all companies in the U.S. receiving venture capital from California.
- Has the highest rate of employment by U.S. subsidiaries of foreign companies.
- Exports $174 billion of products annually ($48 billion from computer and electronics goods) for 11% of total U.S. exports.
- Imports more than $230 billion in goods from other states and countries.
- Entertainment industry in California accrues over $47 billion per year.
- California produces more food than any of the 50 states with $45 billion in sales per year, including:
  - 40% of annual national agricultural production; 45% of all the fruits and vegetables, including:
    - 98-99% of U.S. almonds, walnuts and pistachios.
    - 90-95% of broccoli, strawberries, grapes, and tomatoes.
    - 74% of all lettuce.
    - Produces many crops year round supplying the nation with fresh produce throughout the winter.
- Because California produces most of the fruits and nuts and a high percentage of vegetables consumed in the US, restrictions on water for agriculture in the greater Delta affect the availability and price of these agricultural products throughout the US and elsewhere.
- If production relocates because of water shortages in California, some of the con icts over water will also relocate.

References in footnote 3, p. 30.

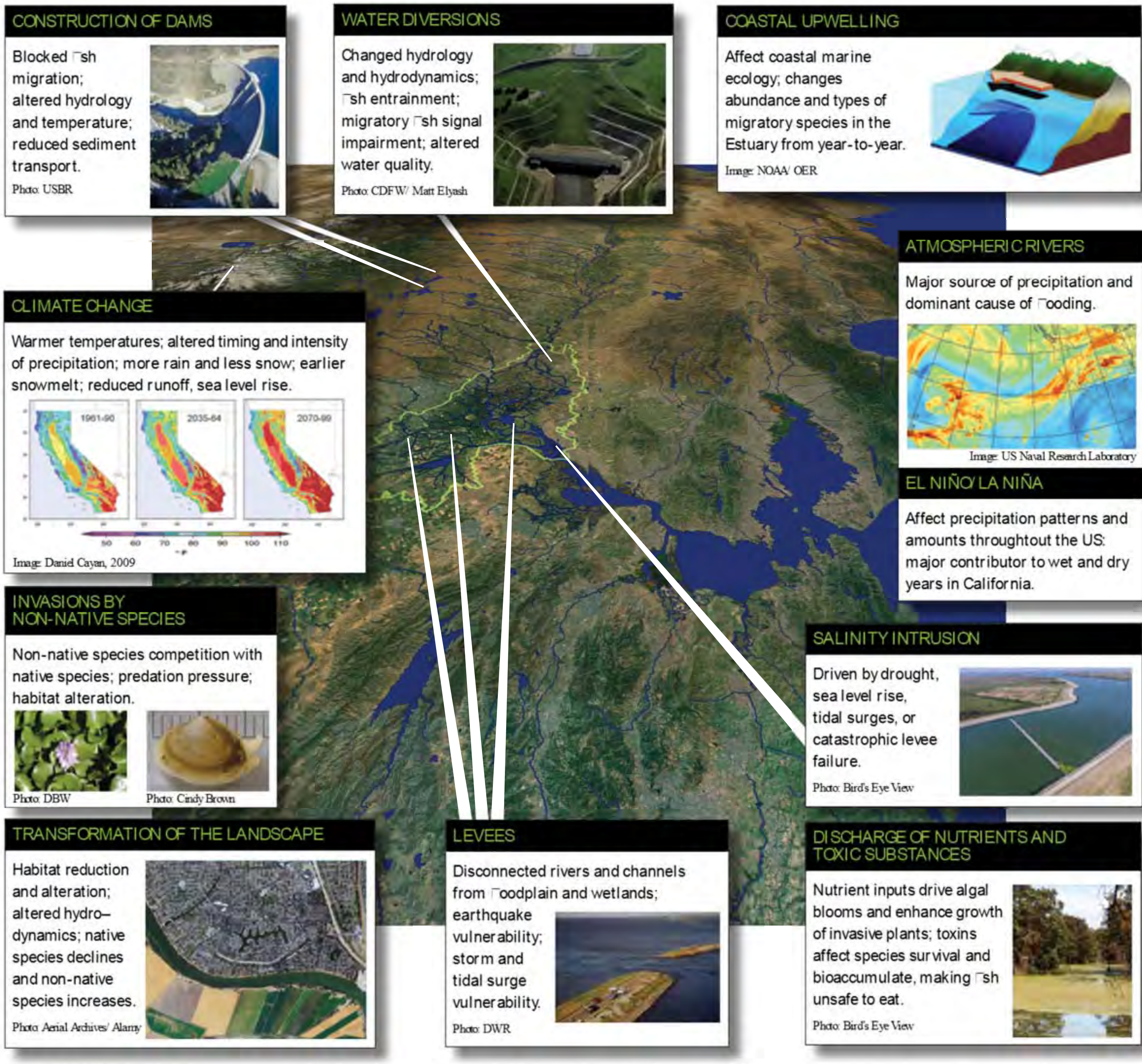


FIGURE 2. The Delta ecosystem responds to factors both within the physical Delta and from regional stressors and drivers of change, including the ocean. Eleven major factors affecting the current Delta are highlighted in this regional view of the Delta and surrounding landscapes. Aerial photo research: Amber Manfree.

ton and Sacramento, and several major rail lines cross the Delta. Natural gas is generated and stored in the Delta. Silicon Valley, the heart of America's electronics industry, gets half its water directly from the Delta. California's entertainment industry — America's largest export — is also centered in cities dependent upon Delta water (Farhi and Rosenfeld 1998). Although the California economy has proved resilient to year-to-year water shortages in the past (Hanak et al. 2012), negative consequences of a more permanent water scarcity will be increasingly difficult to avoid (Howitt et al. 2014) and will carry over to the economies of the region, the nation, and the world.

The Delta is also of considerable ecological importance. With San Francisco Bay, it is home to more than 750 species of plants and animals. The California Floristic Province, of which the Delta and Bay are a part, is one of 25 hot spots of biodiversity across the world cited as highest-priority areas for conservation of species (Myers et al. 2000). Some species are present year-round, like Delta smelt, Sacramento splittail, salt marsh harvest mouse, and soft bird's beak. Other species that are important culturally or economically, including salmon and sturgeon, utilize the Bay and Delta seasonally. Migratory waterfowl and shorebirds use the Bay and Delta as a feeding and nursery habitat during only a brief part of their lives, but these species could not exist without these systems. The presence of migratory species connects the Delta to ecosystems as distant as Alaska, the Pacific Ocean and South America, just as the water distribution system connects the Delta to regions far to the south and east. The Delta is truly an internationally connected ecosystem with contributions to local and state enterprise, to regionally valuable fisheries, and to global biodiversity.

Finally, the concept of the Delta as a place, enshrined in the 2009 Delta Reform Act, makes tangible the human dimension of issues such as water export and management, environmental management, and habitat restoration. All these activities go on in a real place, a place where people live and play, a place with a rich cultural history. More than 570,000 people live in the greater Delta itself, mostly in the urbanizing regions around the margin of the Delta (Secondary Zone, Fig. 1). Many derive their livelihoods directly from the Delta. Most of the rest use the Delta for transportation, recreation, and as a source of water. The importance of this social dimension of the Delta is a critical consideration in every decision that affects the fate of the region.

Sandhill cranes, listed species in California.
Photo: Rick Lewis

The Delta, a Study in Complexity

Physical System Complexity

The Delta began forming about 10,000 years ago when rising sea level slowed the outflow of the Sacramento and San Joaquin rivers through Carquinez Strait. Sediments accumulated east of the strait and created a complex of low islands, shifting channels, large woody debris, and tule marshes (Whipple et al. 2012) that bedeviled early settlers but were the natural habitat of many species now in trouble.

Human activity has transformed the original complex wetlands and river floodplains into a 3,000 square km patchwork of approximately 57 islands separated by 1,100 km of sloughs and winding waterways (CDWR 2015). It is the largest delta on the Pacific coast of North America (almost the size of the state of Rhode Island). The islands of the central Delta are used primarily for agriculture, although there is a small amount of residential property. Only remnants of the original marsh remain, and many of these are highly managed (Ferner 2012).

The physical character of the Delta is at the center of some of the most complex and contentious aspects of the Delta problem. The islands of the Delta are protected by 1,800 km of levees (Fig. 3). The levees are aging and at risk of failures from numerous causes. In the 1990s, 160 levee breaches occurred, and breaches continue at a high rate (Bates and Lund 2013). Delta islands have subsided, particularly in the center and western portion of the Delta where the surfaces of many islands are now five meters or more below sea level (Moore and Shlemon 2008), increasing the risk of levee failure. Droughts and floods also increase the risk of levee failure, and this risk will likely increase as these events become more frequent and more severe with climate change. Rising sea level, another consequence of climate change, further increases the risk of levee failure. Finally, the levee system is highly vulnerable to earthquakes. There is an estimated 60% probability that an earthquake of magnitude 6.5 or greater will occur in or near the Delta sometime in the next 35 years (Moore and Shlemon 2008). Levee maintenance is costly and upgrading levees to address the growing risks is costlier still. Ultimately, prioritization of maintenance and land uses will be necessary, and incremental approaches to this have been proposed (DSC 2015). But the levee system is also interconnected, making solutions more complex. Breaks or intentional breaches in one levee could increase the risk of levee failure elsewhere in the Delta. If any of these risks results in multiple, simultaneous levee breaks, there would be cascading consequences for water transit, water exports, local economics, and use of islands to benefit the ecosystem.

Remote sensing photography of Delta levee vulnerability from a joint NASA, DWR & CalTech project.

A most important consideration in the discussion of levee maintenance is that the levees are an essential part of the California water-distribution system. Delta channels are designed, in part, to channel Sacramento River water from the north Delta to the south Delta, where it is exported via massive pumps to the Central Valley and southern California (Fig. 1). This makes the levees critical to all the human uses of Delta water. One of the greatest concerns of Delta water managers is that multiple levee failures would allow a massive salinity intrusion that would threaten the many agricultural crops and urban water supplies that rely on high-quality water exported from the Delta. Desalini-

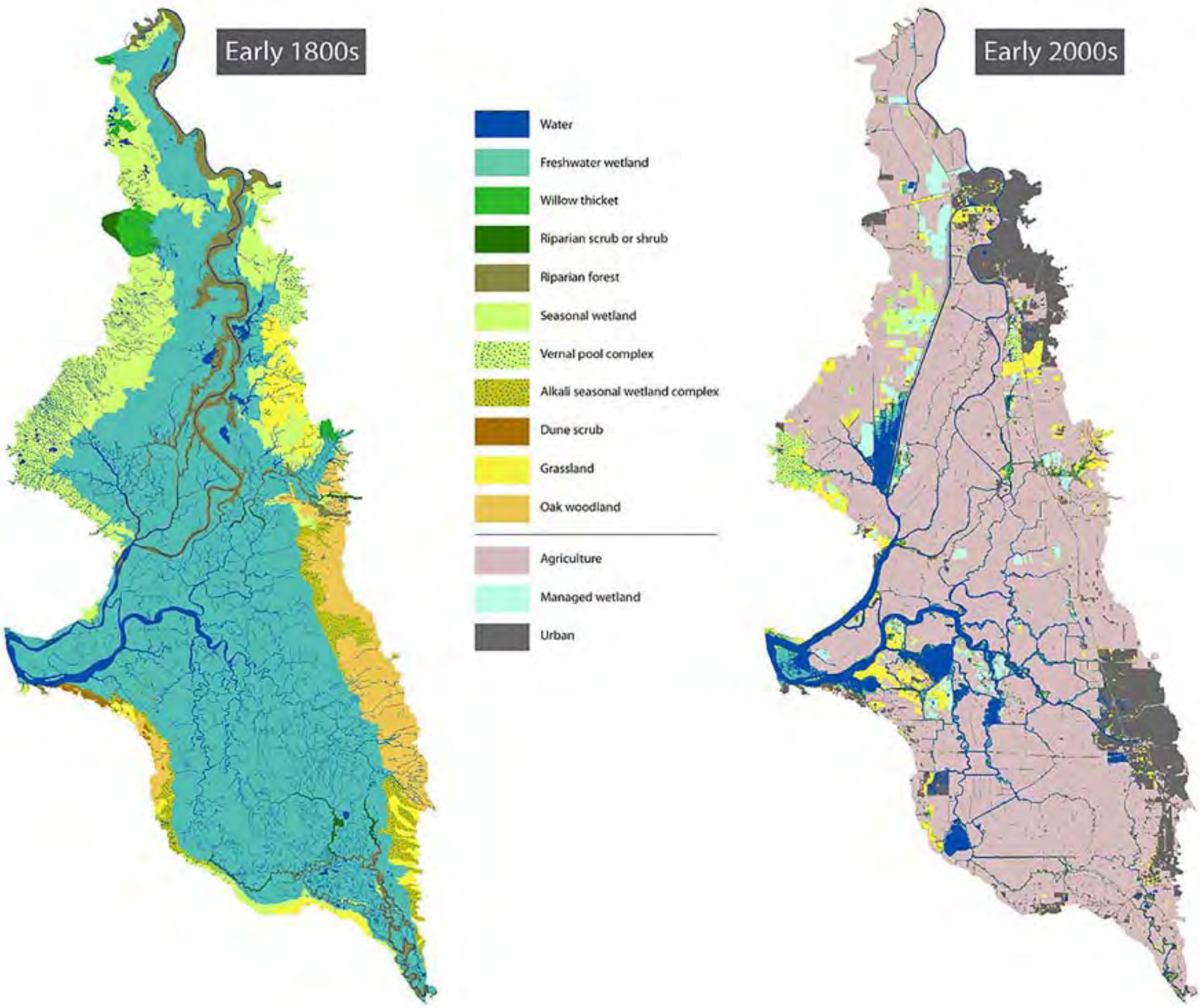


FIGURE 3. Maps of the Delta showing the transformation from a complex system of river and distributary channels of multiple sizes and shapes to the present water transport system dominated by straightened and simpliÅed channels. Transformation also included a major simpliÅcation of native landscape types to an agriculturally dominated landscape. From the Sacramento-San Joaquin Delta Historical Ecology Study, available at: www.sfei.org/ DeltaHEStudy (Whipple et al. 2012)

zation is not economically feasible to remove salt from irrigation water because of the volumes (and thus cost) involved. Water treatment facilities can remove salt from drinking water, but at a considerable increase to the cost of drinking water. In addition, there is a potential risk to human health from carcinogens that form during water treatment when the source water contains higher levels of organic matter and bromide (Richardson and Postigo 2012).

Under the current levee configuration, river flows out of the Delta provide a flow barrier that prevents intrusion of seawater from San Francisco Bay. If river flows drop too low, circulation driven by the tides (the strongest hydrodynamic force in the Delta) can carry salt, dissolved organic materials, bromide, and other chemicals to the water supply diversion points in the Delta. Reservoir releases are crucial in maintaining river flows in summer and fall when rainfall is limited. Thus, exports of high-quality water from the Delta depend upon a complex interaction among climate, reservoir operations, and levee configurations. For example, during prolonged droughts, there is increased risk that reservoir supplies will not be sufficient to maintain the flows that keep salinity away from the interior Delta. At the present time, after four years of drought, reservoir supplies are shrinking, the flow barrier is weakening, and water managers are adjusting levee configurations, each with their own problems, to ensure the quality of freshwater delivered from the Delta (Rubissow-Okamoto 2014).

Water Supply Complexity

The complexity of Delta water issues partly revolves around widening demand for water from a supply that is not only limited but also highly variable and growing increasingly uncertain. California's water supply is based upon four pillars: surface water, snowpack, groundwater, and the massive human-built infrastructure that stores and redistributes water from these sources. The human-built system is effective in managing seasonal variability and regional redistribution of water. Large storms that occur in late fall, winter, and early spring are a major source of California's water supply, contributing 30% to 45% of all precipitation in central and northern California (Dettinger et al. 2011). These storms are associated with atmospheric rivers, bands of warm, moist air from the subtropics that sweep across the Pacific and make landfall as a series of high-intensity rainstorms (with snow in the high mountains). These intense storms are a mixed blessing, sometimes providing much-needed water and at other times causing significant flooding and property damage.

California precipitation comes both as rainfall and snowfall in the high mountains. Rainfall runs off immediately, and water managers must decide whether to store this water in reservoirs for water supply or to release water to reduce future flood risk (Knowles et al. 2006). Snowpack provides a critical second source of water. California reservoirs begin to release their stored water as precipitation declines in late spring. These reservoirs are then refilled by snowmelt from carefully metered mountain snowpacks. Typically, snowpack provides just under half of California's water supply (Dettinger 2015), allowing seasonal redistribution to proceed into the late fall when the rains normally begin again.

Year-to-year variability in precipitation is a predominant feature of the California climate and is by far the greatest in the U.S. (Dettinger et al. 2011). If one or two large winter storms do not materialize, the year will be dry; if there is an additional large storm or two, the year will be wet. Complex cycles of ocean climate[2] contribute to a tendency for wet or dry periods to occur over multiple years, adding another layer of complexity to the water supply picture (Cayan et al. 1998). The reservoirs were originally designed to buffer the effect of precipitation variation, but as demand has grown the system has become increasingly less flexible. The capacity of reservoirs in the Sacramento and San Joaquin basins is about 1.1 times average annual runoff (Lund et al. 2007). Thus, reservoirs allow water managers flexibility for within-year water management but no longer provide much flexibility for dealing with multi-year droughts. Finally, long-term trends in California's water supply associated with climate change portend growing uncertainty in water supply and uncertainty about strategies for coping with increasing variability (see Uncertainties at right).

For decades, groundwater has provided the backup to lessen the effect of surface water variability. Of the total California water supply, about 40% comes

UNCERTAINTIES ABOUT CALIFORNIA'S FUTURE WATER SUPPLY ARISING FROM CLIMATE CHANGE

- More precipitation falls as rain in late winter and less as snow in mid-winter.
- Spring snowmelt occurs earlier because of higher temperatures.
- Less snow and earlier melting means less water stored as snowpack and more uncertainty about water availability from reservoirs in the late summer and fall.
- Higher temperatures yield less runoff from the same rainfall amount.
- Average precipitation increases in northern California but decreases in southern California.
- More frequent extremes: prolonged drought, floods from atmospheric rivers.
- Greater dependence on groundwater as a buffer from extremes.
- Increasing costs and decreasing availability of that buffer as groundwater is over-exploited.

Sources: Cloern et al. 2011, Dettinger and Cayan 2014 from groundwater wells (CDWR 2014). But in some regions groundwater is being used faster than it is being replenished. For example, groundwater supplies in the Central Valley have decreased by about 79 million acre feet since the early 1960s (CDWR 2014; Famiglietti et al. 2011). The current drought has greatly exacerbated the issue. From spring 2013 to spring 2014, before the worst of the present drought hit, groundwater levels dropped in 88% of the wells in California, with 22% of those wells dropping by more than 10 feet in that one year. As groundwater levels drop, costs increase, availability declines, and land subsidence occurs (Faunt and Sneed 2015). These signs of groundwater depletion add considerable uncertainty to the supply picture for the future. Exact measurements of groundwater reserves and the cost to access and use groundwater under different future climatic scenarios are crucial to understand the implications of current rates of groundwater depletion. In 2014, California passed legislation requiring that groundwater reserves be measured and groundwater use regulated. Implementation of this new law will require increased study and monitoring of the groundwater system at local, regional, and statewide scales.

Water Quality Complexity

A broad array of nutrients and potentially toxic chemicals enters the Delta from agricultural runoff, and there exists a long legacy of mining and industrialization in the watershed (van Geen and Luoma 1999; see *Contaminants* at right). Today, more than one hundred industries, wastewater treatment plants, and urban stormwater discharges release waste streams to the Bay and Delta (van Geen and Luoma 1999). The waste streams are mostly treated, but the Bay and Delta are, nevertheless, listed under the federal Clean Water Act as impaired because of the presence of a variety of toxic contaminants. People are advised not to eat striped bass, white sturgeon, and some diving ducks caught in the Bay and Delta because they may contain high concentrations of mercury, selenium, PCBs, or DDT breakdown products.

The complex spectrum of chemicals entering the Delta is continually changing over time as regulations, industry processes, and consumer preferences change. Federal and state regulations (e.g., the Clean Water Act, passed in the 1970s) have made substantial progress in reducing inputs of some toxic chemicals (metals, some organic compounds) into the Bay and Delta (van Geen and Luoma 1999) and reversed adverse ecological effects around what were once contamination hot spots (Hornberger et al. 1999). Nutrient input remains a source of concern, although management has improved in some areas (see *Nutrients* p. 20). Newly emerging contaminants pose another concern, and include pharmaceuticals, flame retardants and personal care products that are shown to cause endocrine disruption in fish and other organisms. There is evidence of toxicity to invertebrates at the base of the food web, at least near the sources of inputs for some pesticides (Weston and Lydy 2010) and PCBs (Jannsen et al. 2011). In addition, selenium causes reproductive effects in some native fish (Stewart et al. 2013). Finally, the fate of chemical wastes is interwoven with the physical characteristics of the modern Delta. Many aspects of water quality are affected by river inflows, Delta hydrodynamics, connections to the Bay, and changing temperature and turbidity. All of these interact with each toxic chemical to create variable exposures over time and space. In short, there is cause for concern about the potential for adverse effects from toxic contaminants, even though exact risks are difficult to assess and are confounded with the effects of other stressors.

Ecological Complexity

Before European colonization, the Delta was a vast, 3000 square km complex of low, forested islands, tule marsh, and meandering channels (Fig. 3). Parts of the Delta flooded and drained with each tidal cycle, and most of the Delta flooded during the spring, after which parts dried out during the long period of low river flow in the summer and autumn. The tidal and seasonal cycles of flooding, draining, drying, erosion and deposition created and sustained the Delta. This was the environment in which native species evolved and in which they thrived. The life cycles of many native species were cued to these natural rhythms. As tides rose and inundated island marshes, fish would invade the marsh along tidal

CONTAMINANTS IN THE DELTA AND SAN FRANCISCO BAY

- Mercury from historic mining sources contaminates food webs.
- Selenium from Central Valley irrigation drainage and Bay refineries affects reproduction of native predator species in the Bay.
- Organic chemicals remaining in sediments from historic use accumulate in food webs including DDT and its breakdown products, and polychlorinated biphenyls (PCBs).
- Pharmaceuticals, flame retardants, and personal care products from waste treatment facilities disrupt endocrine systems of aquatic organisms and birds.
- Multiple, changing pesticides from agriculture and urban uses cause toxicity at least near their points of release.
- Nutrient inputs from waste water treatment facilities and other sources affect Delta food webs.
- Nitrogen, phosphorous and other nutrients stimulate nuisance or toxic algal blooms and water weeds as turbidity of water declines.

Emergency barrier erected on the False River in 2015 to prevent salinity intrusion into areas tapped for drinking and irrigation water. Photo: Bird's Eye View

"Times of severe drought provide a stark reminder of the complexities of current and future Delta challenges. Drought also underscores the importance of planning for a rapidly changing world. Quick fixes to solve one problem may be necessary, but holistic integrated solutions are ultimately required."

— CLIFFORD DAHM

NUTRIENT INPUTS: A CHANGING ISSUE WITH REGIONAL IMPLICATIONS

- The waterways of the Delta are enriched with nitrogen, phosphorus, and other nutrients that come from natural sources, agricultural inputs and wastewater treatment facilities.
- Nutrients typically fuel the growth of phytoplankton (open water algae) and aquatic plants that form the base of the food web in the Delta. Plant productivity determines the availability of food resources to zooplankton, aquatic invertebrates, and fish.
- Annual primary production of the phytoplankton in the Delta has typically been low compared with other estuaries because of limited light penetration into turbid waters and the low residence time of water in the Delta (Jassby et al. 2002). Feeding by bottom-dwelling animals that filter the water column also reduces phytoplankton availability to the pelagic food web.
- Summer blooms of a harmful algae (*Microcystis aeruginosa*), that began in 1999, are a new concern (Lehman et al. 2005), for the first time raising the specter of ecological problems from nutrient inputs.
- The problem has been accentuated by an increase in the clarity of the water that allows more light penetration. This occurred as the residual sediments from hydraulic mining passed through the ecosystem and dams captured sediments that originated upstream.
- Nutrient availability, especially ammonium from wastewater treatment plants, facilitated the invasion of two non-native aquatic plants (Brazilian waterweed and water hyacinth) which are now well established in the Delta (Santos et al. 2009). Both grow well in high nitrogen environments if light is available, and are effective at using ammonium as a source of nitrogen.
- Programs are being initiated to reduce nitrogen discharges. A sustained commitment to experimental nitrogen-removing technologies illustrates that creative new ways to address stressor problems exist. Although it is uncertain to what degree nitrogen reductions alone will shift trajectories for native species, it is an example of bold, prudent action with a low probability of cascading negative outcomes.

Photo: Bird's Eye View

channels, feeding on the abundant food resources of the marshes before retreating into the main Delta channels as the tide ebbed. Shorebirds would also populate the emerging mud flats to probe for food. Fish species such as splittail were adapted to the seasonal flooding, moving onto the floodplains to spawn during the spring floods and retreating to the main river channels with their young as the flood receded.

Very little of this historic ecosystem remains (Fig. 3). The modern Delta is a patchwork of leveed islands separated by channels. These islands do not flood on tidal or even seasonal cycles, unless levees fail. Little wetland habitat remains, and what does is not subject to the extent of flooding and drying that characterized the historic wetlands.

Beyond transformation of Delta habitats, human development imposes a wide array of additional drivers of environmental change (Fig. 2) with effects that vary among species, locations, and with time. The severity of the cumulative effects of these stresses is manifested in the estimate that 80% of native fish species are in decline (Hanak et al. 2011). Many of the risks from individual stressors are understood, but the relative importance of each stressor to the cumulative consequences is difficult to pinpoint. Moreover, natural cycles and climate change constantly shift the baseline conditions in the ecosystem (Cloern and Jassby 2012), adding to the complexity of determining why changes are occurring. As a result, predicting the outcome when water operations, land forms, or the levees are changed is uncertain, at best.

Since passage of the Central Valley Project Improvement Act of 1992, federal and state agencies have focused attention on how to sustain viable populations of native species in the Delta while still maintaining water exports from the Delta. Early attention focused on prevention of mortality at the export pumps (see *Preventing Mortality* p.21) and management of flows through the Delta for the benefit of native species. More than a decade of litigation has been driven by uncertainties about the effectiveness of the regulations that curtail exports, and how these curtailments and other water management operations, in real time, negatively affect the populations of legally

PREVENTING MORTALITY OF LEGALLY PROTECTED FISH SPECIES IN THE DELTA

- One focus of Delta management is regulations that curtail water exports when legally protected species, such as salmon and Delta smelt, are drawn into the pumps.
- At a larger scale, water project operations also affect water movement and water quality throughout the greater Delta changing, for example, cues that fish such as salmon use to direct their seasonal migration from spawning rivers to the sea and back.
- Today only 5% of the young salmon that enter the Delta in their seaward migration survive to enter the ocean (del Rosario et al. 2013). That proportion dropped from 40% in the 1990s.
- It is difficult to determine unambiguously how much of this mortality is caused by water operations, how much by habitat change or how much by interactions with other causes of mortality such as predation by non-native species (Fig. 2).
- Survival of migrating chinook salmon has been improved to 86 – 94% by scientifically supported actions in the Columbia River system (northwest US; Muir et al. 2001). This means improving migratory survival is feasible and is an example of an opportunity to improve the situation for native species.

Steve Martarano/ USFWS

HOW MUCH WATER FOR THE ENVIRONMENT?

- It is common to hear that only 50% of California's water supply is diverted for human use and that the other 50% goes to the environment. (Different sources give slightly different figures for the water balance.)
- In general, one-third of all California water (60% of the environmental water) is in wild and scenic rivers far north of the Delta watershed. These rivers are protected by laws that were established in the 1960s and have been repeatedly declared off limits to the Delta because of poor accessibility, environmental protection and economic reasons.
- The most controversial segment of all water is the approximately 10% (20% of environmental water) that flows through the Delta.
- Most of this water is used for increasing flow that prevents salinity intrusion into the Delta pumping stations. This water may be beneficial to the environment, but it is just as important to human water uses.
- 1-2% of the water is used for wetlands maintenance, which is not highly controversial.
- Most of the controversy is over the 1% or so of the water used to protect endangered species of fish.
- California's recent water wars are about this last remnant of the original inflows to the Delta, a sign of the tightening supply versus demand equation.

Sources: Fox 2015; Mount 2011

THE PELAGIC ORGANISM DECLINE

- Four pelagic species, two native species (Delta smelt and longfin smelt) and two introduced species (juvenile striped bass and threadfin shad), declined to record low numbers in only a few years beginning in 2002 - 2004.
- The collapse of these populations occurred despite management actions intended to improve conditions in the Delta and relatively moderate hydrological conditions at the time.
- Before this event, most attention had focused on water exports as the principal cause of the declining abundance of native species. Careful re-examination and re-analysis of data was catalyzed by the dramatic change in fish populations.
- Although different stresses (Fig. 2) figured most prominently in different studies, all showed that direct effects of water exports was only one factor - and perhaps no the most important factor - in this most recent species decline in abundance.
- Conceptual models, rooted in ecological theory, are developing ideas about how a number of drivers of change interact to cause precipitous declines in species. These models are qualitative and generalized, but do provide a useful framework for organizing and synthesizing both data and ideas related to the conservation of pelagic fish species.

Delta smelt. Photo: Dave Giordano, Ecositemedia

protected fish species. Even defining water allocations for the environment versus human use has been a source of controversy (see *How Much...* p. 21).

As more has been learned about the Delta ecosystem, it is clear that recovery of native species will require cumulative effects from all stressors to be addressed. A good example of the dire circumstances that characterize the Delta ecosystem is the recent sharp decline of several native fish species, termed the pelagic organism decline or POD (see *Pelagic Organism* above). Statistical studies, improved conceptual models, and improvements in quantitative modeling of the environment all point to multiple causes for the POD, and perhaps a broad change in the overall ecological regime of the Delta. Initial studies of the POD were focused on declines in abundance of a few species such as Delta smelt or longfin smelt and their link to water diversions. But broader conceptual models (e.g., IEP MAST 2015) led to the recognition that more species and other events were involved with this change. The idea that focusing action on one problem will allow relaxation of the regulation of others has underlain much of the contentious dialogue about Delta restoration. The POD studies and others show that concerted action on multiple fronts offers the best opportunity for progress.

It is difficult to pin down the causes of events such as the POD, in large measure because today's Delta is essentially an alien habitat to the hundreds of native species that try to live there. Under these circumstances, it is no surprise that many native species are struggling to survive and that many factors are implicated in their low population numbers. The Delta cannot be returned to the way it was 200 years ago. The great challenge is to figure out how to provide enough suitable living space in the modern Delta for these species to persist (Moyle et al. 2012). The challenge is increased by the continually evolving nature of the ecosystem as new species arrive, and as land use and climate change (see *Non-Native Species* p. 23).

Institutional Complexity

Because managing water and environment is inherently complex, the tendency is to break the perceived problem down into what seem like manageable pieces and address each piece more or less independently. The result has been a plethora of agencies, departments, and commissions at federal, state, regional and local levels of government, each dedicated to addressing one or more components of water and environmental management (Fig 4). Private interests, like the State Water Contractors, and non-governmental organizations, like the San Francisco Estuary Institute and the Nature Conservancy, are also involved. The repeated crises in management of the Delta have only served to increase this institutional complexity (DSC 2013).

When so many institutions with different mandates are involved in management of a critical resource such as the Delta, integration and coordination are critical.

Small irrigation pump draws from Delta waterway infested with invasive aquatic plants (left); Overbite clam (below). Photos: Bird's Eye View and Andrew Cohen (respectively).

Although there are notable examples of long-standing cooperation and integration among state and federal agencies (the Interagency Ecological Program, for example), there are also notable examples of decision-making that is fragmented and uncoordinated, leading to inefficiency and poor outcomes (NRC 2012). One consequence of the fragmentation of responsibility and authority over the Delta is the increased difficulty of addressing Delta problems. The complexity provides a multiplicity of ways for individuals and organizations that are dissatisfied with water or environmental management to seek redress for their dissatisfaction through litigation. The Delta Reform Act of 2009 attempted to address this complexity by establishing the Delta Stewardship Council with responsibility for achieving the coequal goals of a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. Time will tell whether the Council can achieve sufficient cooperation or has sufficient authority to address institutional complexity.

NON-NATIVE SPECIES AND THE RESTORATION CONUNDRUM

- Aquatic and terrestrial habitats are heavily invaded by non-native species delivered by international shipping, recreational boating, the horticulture and pet industries, agriculture, or deliberate introduction.
- San Francisco Bay and the Delta have been described as the most heavily invaded estuary in the world (Cohen and Carlton 1998). Cohen and Carlton (1998) showed that 40-100% of species found in various aquatic habitats was non-native.
- The consequences of invasions by exotic species can be dramatic.
- A 1986 invasion of the overbite clam changed phytoplankton dynamics in Suisun Bay, and eliminated what was once a large spring bloom of plants essential to native food webs.
- Introduced predators, like striped bass and largemouth bass, have grown to large populations in the Delta, and their predation on native fishes is thought to contribute to the decline of such species.
- Restoration of shallow water habitats is often plagued by invasive plants and invasive predators instead of fostering more habitat for native species. Currently, it is unclear how best to reduce populations of invasive species or how to increase the certainty that new habitat will be best suited for native species.

The Role of Science

As we noted earlier, the Delta is one of the most studied ecosystems in the world. A growing understanding underpins ongoing adaptations in managing the Delta. Throughout the decades of conflict over water issues, all parties have recognized that advancing the state of scientific knowledge is fundamental to making constructive progress. As we enter an era of increasing uncertainty about climate and water supply, commitments to multi-institutional science that informs policy beyond agency decisions are critical. Continuing advancement of scientific understanding and effective integration of science into management will require science that embraces differences of scientific opinion, structures science in a way that is useful for management decisions, and quantifies uncertainty. Looking into the future of complex problems like the Delta will require scientific models that can simulate the consequences of different management approaches. Such models have been developed for water operations; are in their early stages for the ecosystem (DiGennaro et al. 2012) and climate change (Cloern et al. 2011); and have been used to envision alternative futures for the Bay-Delta (e.g., Lund et al. 2010). The understanding necessary to integrate and strengthen these models is growing rapidly, but is scattered among agencies and research institutes and needs to be brought together. Challenges remain in merging models of various types, and in ensuring the model output is sufficiently reliable for management. But if carefully implemented and interpreted, such models can provide valuable guidance to policy, management, and science (Healey et al. 2008).

Continuously improving models and scientific understanding of the Delta problem is necessary but not sufficient to manage successfully the complex technical, political and resource challenges facing the Delta. There will always be uncertainties that surround any action. Difficult political choices will be necessary. Adaptive management is the preferred approach to implementing management actions in the face of uncertainty. Regular monitoring and evaluation of the Delta's response to management is the best way to detect unexpected outcomes and adjust management actions to deal with uncertainties. Although a number of monitoring and assessment programs exist to aid in such evaluations, there is not as yet a unified set of performance criteria for the key dimensions of the Delta problem. As adaptive management becomes more fully implemented, such criteria must be developed, implemented, and reported on regularly. Effective adaptive management also requires collaboration, communication, and transparency among all interest groups as well as a willingness to overcome the institutional barriers to collaborative decision-making. Recent commitments to collaborative decision-making are encouraging (e.g., the Collaborative Adaptive Management and Policy Team) but sustaining those initiatives has always been a challenge.

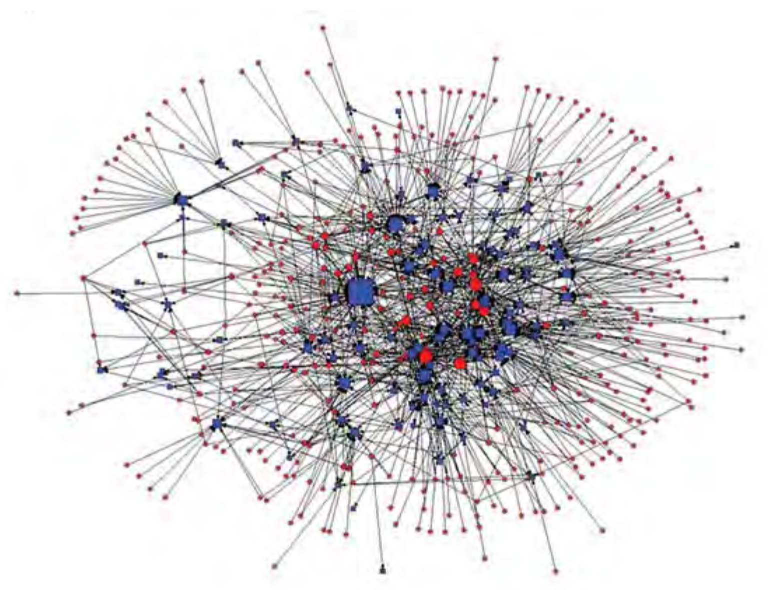


FIGURE 4. Complexity diagram of actors (red circles) and institutions (blue squares) involved in water governance of San Francisco Bay (With permission from Lubell et al. 2014).

CONCLUSION

Fishing family along the Sacramento River.
Photo: Bird's Eye View

Continuously

improving models and scientific understanding is necessary but not sufficient to manage successfully the complex technical, political and resource challenges facing the Delta. Difficult political choices will be necessary in the face of uncertainty. Risks can be reduced by tracking the response of the Delta, in all dimensions, and adjusting actions accordingly

Conclusions: Coping with Complexity

The Sacramento-San Joaquin Delta is at the hub of an interconnected water-delivery system that feeds the impressive economy of California and also influences the economies of most of the western U.S. At the same time, the Delta is an ecological resource of international significance with a rich social and cultural history. The challenge in managing the Delta is to preserve all these important functions in the face of a widening demand for water that frequently exceeds available supply, including demand from a growing population, a growing economy, valuable agriculture, and a unique environment. The challenge is enhanced by climate change, which is raising temperatures, changing storm patterns, and reducing snowpack, leading to an increasingly uncertain supply of water and changing environmental conditions. Unsustainable mining of groundwater (Bredehoeft and Alley 2014) is increasing costs and decreasing the availability of a source of water that has long provided a buffer against drought. Water managers no longer have the flexibility they once had in dealing with the multi-year droughts that are inherent to the California climate. Managing the water supply system alone is complicated. But add in the imperative to sustain the ecological and social values of the Delta and every decision becomes considerably more complex. The current arrangement for addressing this combination of complexity, uncertainty, and change is unsustainable as evidenced by both declines in native species and dissatisfaction with water deliveries.

From an environmental perspective, the ecosystem of the Delta is vastly transformed from its original state, making life difficult for a host of native species. Multiple interacting factors affect the well-being of native species. Some of these factors are well understood, but their interactions and cumulative consequences are not, making it impossible to make definitive statements about what is causing native species to decline. As a result, predicting the outcome when water operations, land forms, or the levees are changed is uncertain, at best. Nevertheless, opportunities exist to conserve and restore aspects of the native system and to structure the rest of the Delta to make it more hospitable to native species. Realizing those opportunities without jeopardizing water supply is the ultimate challenge in managing the Delta.

Many of the approaches used in water-scarce environments elsewhere are under-utilized in the Delta. While adjustments to the infrastructure as it ages are essential, opportunities exist to simultaneously redefine bold action as we pursue proven (although not always initially popular) ways to work more effectively with what we have (www.energy.ca.gov/wet/). Examples include the following:

- Groundwater recharge and conjunctive use offer storage potential beyond that available for surface waters (CIWR 2015).
- Initiatives to promote water reuse, water recycling, and desalination in selected circumstances are under-utilized and can help address the imbalance between demand and supply (ACWA 2015).
- Priorities for maintenance and upgrades of the levees can be built from growing understanding of physical vulnerabilities, climate change, economics, and water transit needs (DSC 2015).
- Making water conservation a continual, long-term, statewide investment is a necessary part of accepting water scarcity (USEPA 2015; NatGeo 2014).
- Greater attention to both the tributaries and the Bay in Delta planning, including wetlands restoration, offer opportunities for both protection from sea level rise and ecosystem restoration (Save the Bay 2015).
- Continuing the precedent of improving water quality from tributary inputs and within Delta sources can help counter the expansion of exotic species (Brown and Caldwell 2015).

- Risk reduction for catastrophic Delta infrastructure failure can include investing in targeted levee improvements, addressing additional stresses from sea-level rise and planning for climatic extremes such as atmospheric rivers and long-term droughts.
- Making the "One Delta, One Science" concept a reality will improve the underpinning for political actions in the face of uncertainty (DSP 2013).

Complex, wicked problems like the Delta rarely yield to the simplistic solutions directed at only one dimension of the problem. The lack of flexibility resulting from the already complete allocation of a shrinking water supply, combined with the serious deterioration of the native ecosystem, will reduce the effectiveness of many traditional engineering solutions in the Delta. History shows that large-scale, irreversible, physical changes in the water system are particularly risky (see San Luis Drain opposite) unless they promote flexibility and are implemented incrementally (see South Florida Example p. 28). Incremental, as used here, does not imply "small," but "implementation in stages" such that lessons learned from early increments can be used to improve design of later increments. While economics alone may not always support such an approach, it is time to recognize that other dimensions of the issue also must carry weight.

New approaches to scenario-building and modeling can help managers explore the potential outcome of major management initiatives and anticipate problems before they arise. Modeling and scenario-building needs to be a collaborative, multi-institutional activity. As we enter an era of increasing uncertainty about climate, water supply, the fate of the Delta's native ecosystem, and institutional complexity, multi-institutional collaborative approaches will become increasingly important.

IMPLEMENTING INADEQUATELY UNDERSTOOD ENGINEERING SOLUTIONS: THE SAN LUIS DRAIN EXAMPLE

An example of implementing a simple solution to a complex problem is the issue of irrigation drainage in the Central Valley.

- As a part of the Central Valley Water project in the 1950s, governments were obligated to deal with the return drainage that resulted from the export of water from the Delta.
- The simplest solution was to build drainage infrastructure under the agricultural fields and a canal (the San Luis Drain) to take the drainage to San Francisco Bay.
- The first increment of that system was completed in the 1980s with the drainage canal temporarily terminating near Kesterson Wildlife Refuge.
- Soon after the drainage disposal began, severe deformities were observed in birds, including birds that were part of the international Pacific Flyway. Later studies showed a massive ecological disaster, which was eventually attributed to heretofore unknown selenium contamination in the drainage (Presser 1994).
- Later studies showed that a similar, if not worse outcome was likely if the drain was extended to the Bay (Presser and Luoma 2000).
- Dealing with this problem has been much more expensive than the San Luis Drain itself. Adverse effects of irrigation drainage products such as selenium will always be an important consideration in any plans that change water redistribution systems. The selenium problem cannot be solved, but it is being incrementally managed by land retirement and multiple, local in-valley treatment systems. The San Luis Drain was a multi-million dollar "stranded investment" that resulted from a poorly understood, simplistic engineering "solution" to a complex problem with many dimensions.

San Joaquin Valley master drain plan circa 1965. Map: DWR

INCREMENTALLY APPROACHING A COMPLEX PROBLEM: A SOUTH FLORIDA EXAMPLE

Most Delta restoration projects have not been in place long enough to draw conclusions about the approaches being used. But the Kissimmee River in south Florida provides an example of how an incremental approach to restoration can work. Key elements of this widely proclaimed restoration success are listed here (see Dahm et al. 1995):

- River channelized for flood control from 1962-1971 at a cost of $38 million
- Collapse of key bird and fish communities
- Mounting interest and public pressure for restoration
- Pilot project to reroute some canal water back onto floodplain from 1984-1988 with positive responses from birds and fish
- Design phase for a large-scale restoration in the early 1990s with a rigorous evaluation program
- Testing sediment plug from old spoils piles to see if the channelized river could be rerouted onto the old floodplain in 1996; plug functioned as designed
- Construction of Phase One restoration 2000-2001 for about 30 kilometers of river and 3,200 hectares of wetland
- Initial restoration largely successful
- Currently carrying out Phase Two of restoration
- Restoration costs to date approaching one billion dollars

Kissimmee River restoration, showing flood control channel filled in so river meanders could be restored.
Photo: South Florida Water Management District

Water scarcity has defined and will continue to define the future of the Delta and all that is linked to it. California has risen to the challenge of water scarcity in the past to build an economy and a society that is, in many ways, the envy of the world. The present problem of water scarcity seems more complex and less amenable to traditional engineering solutions than in the past. But California has the tools and the intellectual resources to manage the problem and to achieve the twin goals of a reliable water supply and an ecologically diverse Delta ecosystem.

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Yolo Bypass floodplain during drought.
Photo: Bird's Eye View

As we enter an era of increasing uncertainty about climate, water supply, the fate of the Delta's native ecosystem, and institutional complexity, multi-institutional collaborative approaches will become increasingly important. California has the tools and the intellectual resources to manage these problems and, as difficult as they are, achieve the twin goals of reliable water supply and an ecologically diverse Delta ecosystem.

Footnotes

1 Widening demands for water are expected from projected population growth, economic growth, and demands to use water for the environment. The Delta Reform Act of 2009 states its "coequal" goals as "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place" (CA Water Code 85054). "Widening" means overall demand, not necessarily increasing demand per capita.

2 The El Niño Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO) phenomena are two examples of ocean climate influences (http://www.pmel.noaa.gov/tao/elnino/el-nino-story.html).

3 http://www.bloomberg.com/news/articles/2015-01-16/brown-s-california-overtakes-brazil-with-companies-leading-world
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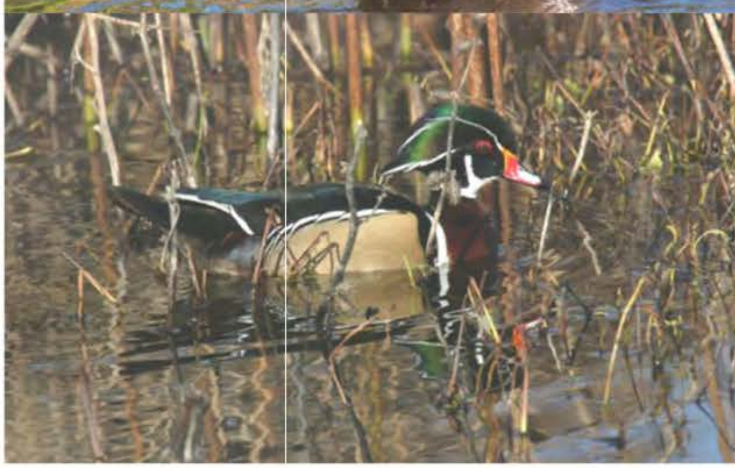



Moving and Storing California's Water

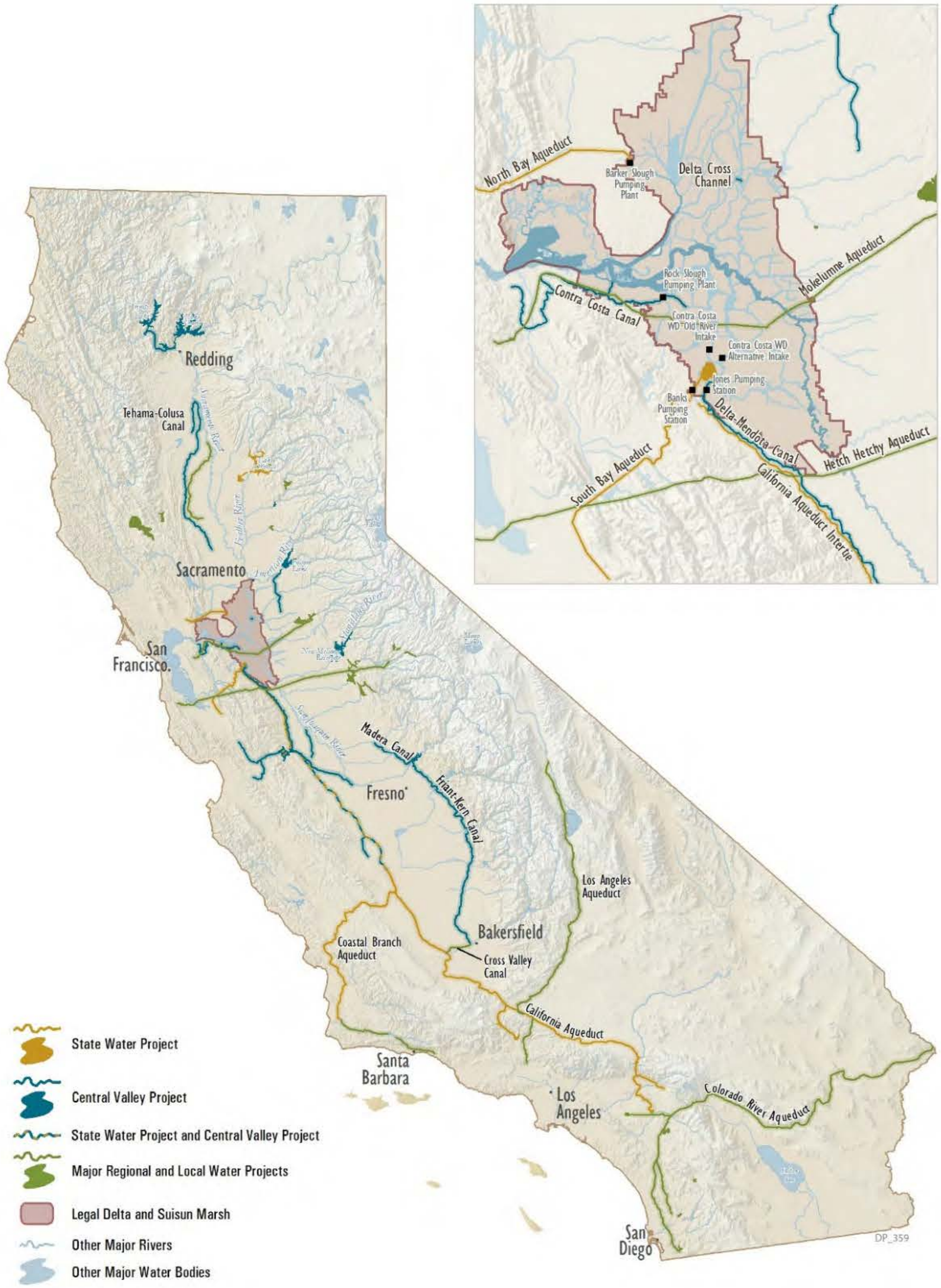


Figure 3-2 Large State, federal, and local dams and canal systems play an important role in storing and conveying water throughout California to meet a variety of urban and agricultural water demands.

Source: Adapted from DWR 2009

Critically Overdrafted Groundwater Basins

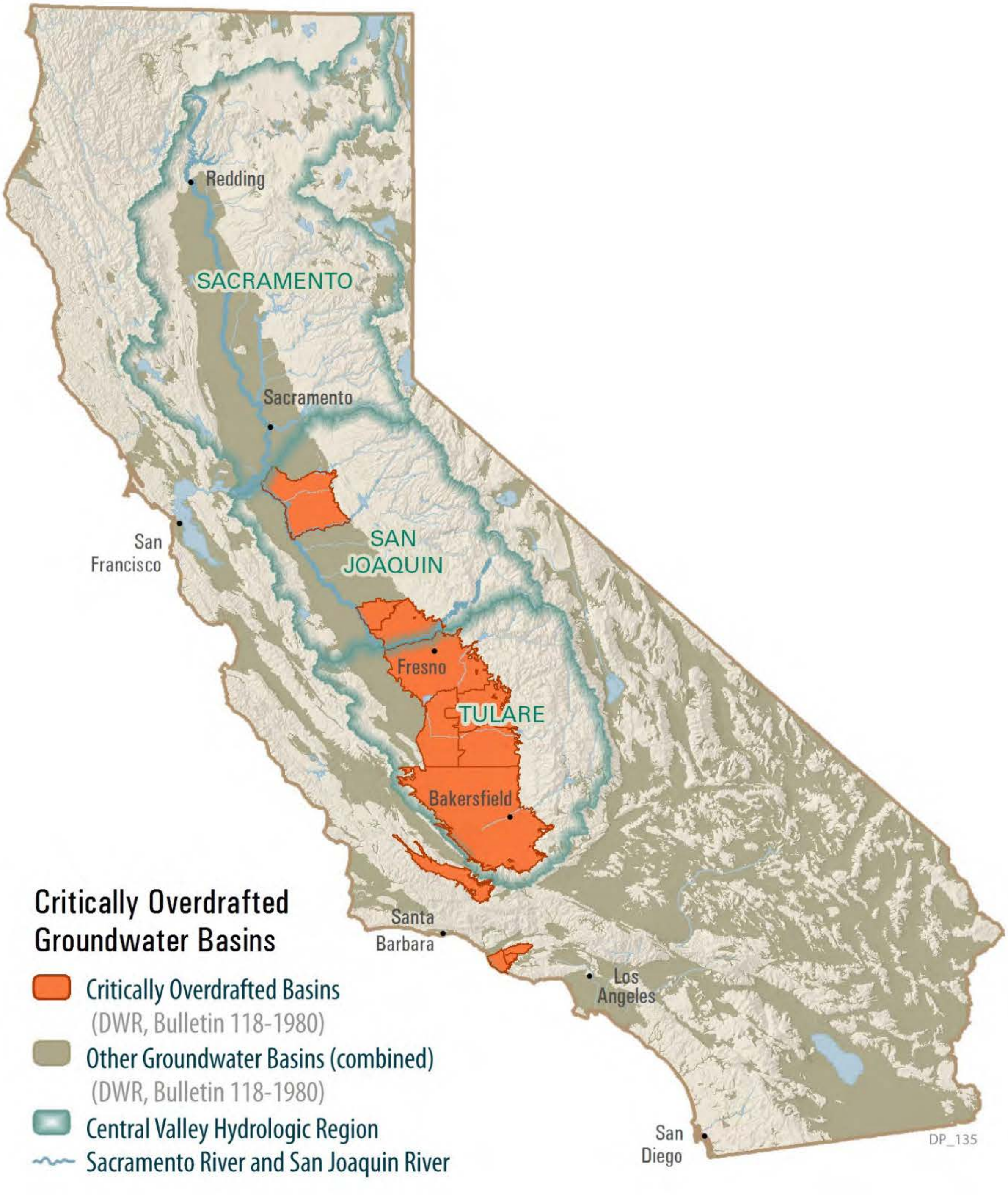


Figure 3-9 Groundwater overdraft is a critical water supply problem, especially in the Central Valley. More than 40 percent of Californians rely on groundwater for some portion of their supply, and many small- and moderate-sized communities are entirely dependent on groundwater for drinking water.

Sources: DWR 2003a; DWR 2009

FULL TEXT OF MEASURE J94
GOLETA WATER DISTRICT

AN AMENDMENT TO THE SAFE WATER SUPPLIES ORDINANCE

THE PEOPLE OF THE GOLETA WATER DISTRICT, COUNTY OF SANTA BARBARA, STATE OF CALIFORNIA, DO ORDAIN AND ENACT THE FOLLOWING ORDINANCE WHICH SHALL BE AN AMENDMENT TO THE SAFE WATER SUPPLIES ORDINANCE:

RECITALS:
WHEREAS, the voters of the Goleta Water District ("District") enacted the SAFE Water Supplies Ordinance ("SAFE") in June 1991 authorizing the participation by the District in the State Water Project and providing for the bond financing to develop the Project Facilities necessary for delivery of that water to the District; and

WHEREAS, the District is now a member of the Central Coast Water Authority, the members of which are cooperating collectively to develop the Project Facilities which are now under construction; and

WHEREAS, SAFE provides for the creation of a Drought Buffer of water stored in the Goleta groundwater basin to protect against future drought emergencies and a Water Supply Distribution Plan to protect the District's water supplies against new demands until deliveries from the State Water Project are available; and

WHEREAS, this proposed amendment to SAFE maintains all the provisions regarding the protection of water supplies provided by the Drought Buffer and the Water Supply Distribution Plan; and

WHEREAS, pursuant to provisions of the judgment in the lawsuit known as Wright v. Goleta Water District, the District is required to develop a Water Plan to provide the necessary water supplies to achieve a balance between supply and demand for water within the District. The District's Water Plan is based on continuing to use the maximum amount of water available from the Cachuma Project; prudent management of the Goleta groundwater basin; use of the newly constructed wastewater reclamation project to replace existing use of potable water for turf irrigation; a continuing water conservation planning effort; participation in the State Water Project; and the necessary level of commitment to a desalinated seawater project. As a result of the long-term water supply deficit in the District, the District has been operating under a water connection moratorium for over twenty years. Once fully implemented the District's Water Plan should provide adequate supplies to meet long-term water demand in the District; and

WHEREAS, the forty year water service contract with the United States Bureau of Reclamation for delivery of water from the Cachuma Project will expire in May 1995. Negotiations are currently under way to renew that contract. The Bureau of Reclamation has required that the Cachuma Project be subjected to an environmental review process which is now being undertaken. It appears likely that the District's yield from the Cachuma Project after contract renewal will be less than the current yield as a result of the dedication of water for environmental enhancement purposes on the lower Santa Ynez River; and

WHEREAS, the Southern California Water Company is a Santa Barbara County water purveyor which currently holds rights to an entitlement to 3,000 acre feet per year of water from the State Water Project and has given notice of its intent to sell 2,500 acre feet of that entitlement. The Goleta Water District has identified itself as a potential purchaser of the entitlement. It is the intent of this Ordinance to authorize the acquisition and use of that entitlement; and

WHEREAS, the District estimates the annual cost of the Southern California Water Company entitlement to be $500 per acre foot of water delivered to the District. The entitlement acquisition is intended to reduce the long-term costs of water to the District and its customers in that alternative supplies that would be available, and necessary to meet the District's long-term demand would be more expensive than the water available from Southern California Water Company. The District's cost analysis of the acquisition is available at the District office.

NOW, THEREFORE, THE FOLLOWING ORDINANCE IS ENACTED INTO LAW:

1. The District is authorized to acquire an additional entitlement to the State Water Project in an amount of up to 2,500 acre feet per year, which is currently available from the Southern California Water Company. This entitlement will supplement the 4,500 acre feet per year authorized by the voters in originally adopting the SAFE Water Supplies Ordinance. This authorization shall provide for the payment of all costs of the acquisition and use of any additional entitlement acquired. Due to the controversy concerning the physical ability of the State Water Project to deliver its full contractual commitments, the District shall plan for the delivery of 3,800 acre feet per year of water as the amount of firm average long-term yield. The District's total State Water Project entitlement includes the basic entitlement of 4,500 acre feet per year, the District's share of the drought buffer held by the Central Coast Water Authority and the entitlement acquired pursuant to this authorization. Any excess water actually delivered over 3,800 acre feet per year shall be stored in the Goleta groundwater Central basin until the basin is replenished to its 1972 level, for use during drought conditions.

2. Enactment of this Ordinance shall comply with all applicable law, including the California Environmental Quality Act.

3. If adopted, this Ordinance shall be an amendment to the SAFE Water Supplies Ordinance adopted by the electorate in June, 1991, which amended and superseded the Responsible Water Policy Ordinance,

originally adopted by the electorate in 1973. Paragraph 1 of this Ordinance shall amend and fully supersede paragraph 6 of the SAFE Water Supplies Ordinance. All other provisions of the SAFE Ordinance shall remain in full force and effect. If adopted, this Ordinance may not be modified except pursuant to a vote of the electorate of the District.

4. This Ordinance shall be liberally construed and applied in order to fully promote its underlying purposes. If any word, sentence, paragraph or section of this Ordinance is determined to be unenforceable by a court of law, it is the intention of the District that the remainder of the Ordinance shall be enforced.

FULL TEXT OF MEASURE H91
GOLETA WATER DISTRICT
Ordinance 91-01
SAFE WATER SUPPLIES ORDINANCE

THE PEOPLE OF THE GOLETA WATER DISTRICT, COUNTY OF SANTA BARBARA, STATE OF CALIFORNIA, DO ORDAIN AND ENACT THE FOLLOWING ORDINANCE WHICH SHALL BE KNOWN AS THE *SAFE WATER SUPPLIES ORDINANCE*:

RECITALS:

Whereas, the Goleta Water District ("District") faces a significant shortage of water to meet current long-term water demands of its customers as determined by the State Department of Water Resources and the Santa Barbara County Flood Control and Water Conservation District in their 1985 Santa Barbara County Water Project Alternatives study; and

Whereas, a drought emergency was declared in Santa Barbara County in 1990 following four years of below normal precipitation within Santa Barbara County and, in the future, the District will continue to be subject to recurring drought cycles which will threaten the ability of the District to meet the health and safety needs of its customers unless new and diversified, long term water projects are developed; and

Whereas, the District relies exclusively on local water supplies to meet its current water demand, which supplies originate entirely within Santa Barbara County and which supplies are all subject to the same climatic conditions; and

Whereas, in the absence of a system limiting the District's authority to provide new and/or additional water service connections without first mandating groundwater storage of water in wet years for use in dry years (a "drought buffer program") District customers may face severe water shortage in the future; and

Whereas on October 1, 1990 the Board of Directors of the Goleta Water District adopted a Water Supply Management Plan which includes use of water supplies from both a desalting plant and the State of Water Project; and;

Whereas, the District is a party to an agreement with the Santa Barbara County Flood Control and Water Conservation District entitled "Water Supply Retention Agreement" dated December 11, 1984 which it executed on June 28, 1986 (the "WSRA") entitling the District to 4,500 acre feet per year from the State Water Project, and has executed amendments thereto; and

Whereas, the District is also a party to a "Contract for Preliminary Studies for Financial Feasibility, Preliminary Design and Environmental Review Under State Water Supply Contract" (the "Design and EIR Agreement") dated June 2, 1986 but did not identify itself as a proposed participant in the preliminary studies in response to the "Notice of Intent to Request Preliminary Studies" for the Coastal Branch and the Mission Hills Extension of the California Aqueduct given by the city of Santa Maria on or about May 24, 1986; and

Whereas, the WSRA and its amendments and the Design and EIR Agreement contain the ways and means to provide for a long term solution to the existing drought emergency and to the ongoing water shortage within the County of Santa Barbara; and

Whereas, the District has a duty to provide a permanent, reliable water supply to its residents.

NOW, THEREFORE, THE FOLLOWING ORDINANCE IS ENACTED INTO LAW:

I Drought Buffer

1. In each year, commencing in the first year the State Water Project makes deliveries to the District, the District shall, after providing service to its existing customers, commit at least 2,000 acre feet of its water supply (the "Annual Storage Contribution") to the Goleta Central Basin either by direct injection or by reduction in groundwater pumping. The water so stored in the Central Basin shall constitute the District's "Drought Buffer".
2. The Drought Buffer may be pumped and distributed by the District only to existing customers and only in the event that a drought on the South Coast causes a reduction in the District's annual deliveries from Lake Cachuma. The Drought Buffer cannot, under any circumstances, be used by the District as a supplemental water supply to serve new or additional demands for water within the District.
3. Unless and until the Central Basin water level rises to 100% of its 1972 levels, the District shall be required to make its Annual Buffer Commitment. Thereafter, for so long as the District maintains the Central Basin at or above 1972 levels, the District may utilize the yield of the Central Basin to lower the cost of water service to existing customers.

II Water Supply Distribution Plan

4. The District shall be forbidden from providing new or additional potable water service connections to any property not previously served by the District until all of the following conditions are met:
   a. District is receiving 100% of its deliveries normally allowed from the Cachuma Project;
   b. The District has met its legal obligations required by the judgment in Wright v Goleta Water District;
   c. Water rationing by the District is eliminated;
   d. The District has met its obligation to make its Annual Storage Commitment to the Drought Buffer.
5. For each year in which the conditions of paragraph 4, have been met, the District shall be authorized to release 1% of its total potable water supply to new or additional service connections and if such new releases are authorized, the District shall permanently increase the size of the Annual Storage Commitment made to the Drought Buffer by 2/3 of the amount of any release for new or additional uses so that safe water supplies in times of drought shall not be endangered by any new or additional demands.

III State Water Supply

6. Due to controversy concerning the physical ability of the State Water Project to deliver its full contractual commitments, District shall plan for delivery of only 2,500 acre feet per year as the amount of the firm new yield from the State Water Project. Any excess water actually delivered shall be stored in the Goleta Groundwater basin for use in drought.
7. The District shall immediately either (a) give Notice of its Intention to Request Construction of

Described Project Facilities under the State Water Contract, as provided for in Section 5(a)(1) of the WSRA or (b) respond to any such notice previously given by any other Contractor as provided for in Section 5(a)(2) of the WSRA that it wishes to participate in the described project.

8. The Project Facilities to be constructed pursuant to the Notice of Intention shall be the Mission Hills and Santa Ynez Extensions of the Coastal Branch of the California Aqueduct and required water treatment facilities and other appurtenant facilities (herein the "Project Facilities").

9. The District agrees, pursuant to section Section 5(a)(2) of the WSRA, that the time for determination of participation and sizing of the Project Facilities may be any date on or after September 1, 1992 agreeable to the other participants.

10. The District shall, in the shortest time lawfully possible, exercise all of its rights and fulfill all of its obligations under the WSRA, including the payment of any monies required thereunder.

11. The District shall file a Late Request to Amend, pursuant to Secton 3(f) of the Design and EIR Agreement, and agrees to pay its proportionate share of all costs required by said Section 3(f) and any amounts required under Section 3(g) of said Design and EIR Agreement.

12. The District, or the Santa Barbara Water Purveyors Agency, or any other joint powers agency of which the District is a member or may become a member for such purposes, may issue revenue bonds ("bonds") from time to time in an amount not to exceed Forty-Two Million Dollars ($42,000,000.00) to provide funds to finance the District's pro rata share of the costs and expenses under the WSRA and the Design and EIR Agreement. Said bonds shall be used for the purposes of constructing the Project Facilities, including without limitation, any and all necessary facilities required for the delivery of State Project Water pursuant to the WSRA to the District through the Coastal Branch of the California Aqueduct, including any and all expenses incidental thereto or connected therewith, and shall include, without limitation, the cost of acquiring rights of way, the cost of constructing and/or acquiring all buildings, equipment and related personal and real property required to complete the Project Facilities, and the engineering, environmental review, inspection, legal and fiscal agent's fees, costs incurred by the District or joint powers agency in connection with the issuance and sale of such bonds, and reserve fund and bond interest estimated to accrue during the construction period and for a period of not to exceed twelve (12) months after completion of construction, such bonds to be payable from the District's water revenues, to bear interest at a rate or rates not to exceed the legal maximum from time to time, and to mature in not more than forty (40) years from the date of issuance.

13. This Ordinance shall be submitted to a vote of the people of the District in compliance with the requirements of Section 5(a)(4)(1) of the WSRA and pursuant to Elections Code Section 5201.

14. All actions taken pursuant to this Ordinance shall be in compliance with all local, state and federal environmental protection laws. Nothing in the Ordinance shall be construed to require such compliance prior to the election provided for herein.

15. This Ordinance shall be liberally construed and applied in order to fully promote its underlying purposes. If any word, sentence, paragraph or section of this Ordinance is determined to be unenforceable by a court law, it is the intention of the District that the remainder of the Ordinance shall be enforced.

16. If adopted, this ordinance shall be an amendment to the Responsible Water Policy Ordinance adopted by the people in May, 1973, and may not be modified except pursuant to the vote of the electorate of the District. To the extent that the provisions of this ordinance conflict with that ordinance or any prior ordinance or measure previously enacted by the District or the voters of the District, the provisions of this ordinance shall control. To the extent that the provisions of this Ordinance conflict with any other ordinance or measure adopted at the same election, the ordinance or measure receiving the highest number of affirmative votes shall control.

17. Nothing herein is intended to affect the rights of any parties nor the obligations of the District pursuant to the judgment in the action know as Wright v Goleta Water District, Santa Barbara Superior Court Case No. SM57969.

18. This ordinance shall take effect immediately upon being approved by a majority vote of the votes cast at the election.

Attachment 9 RECIRC2655

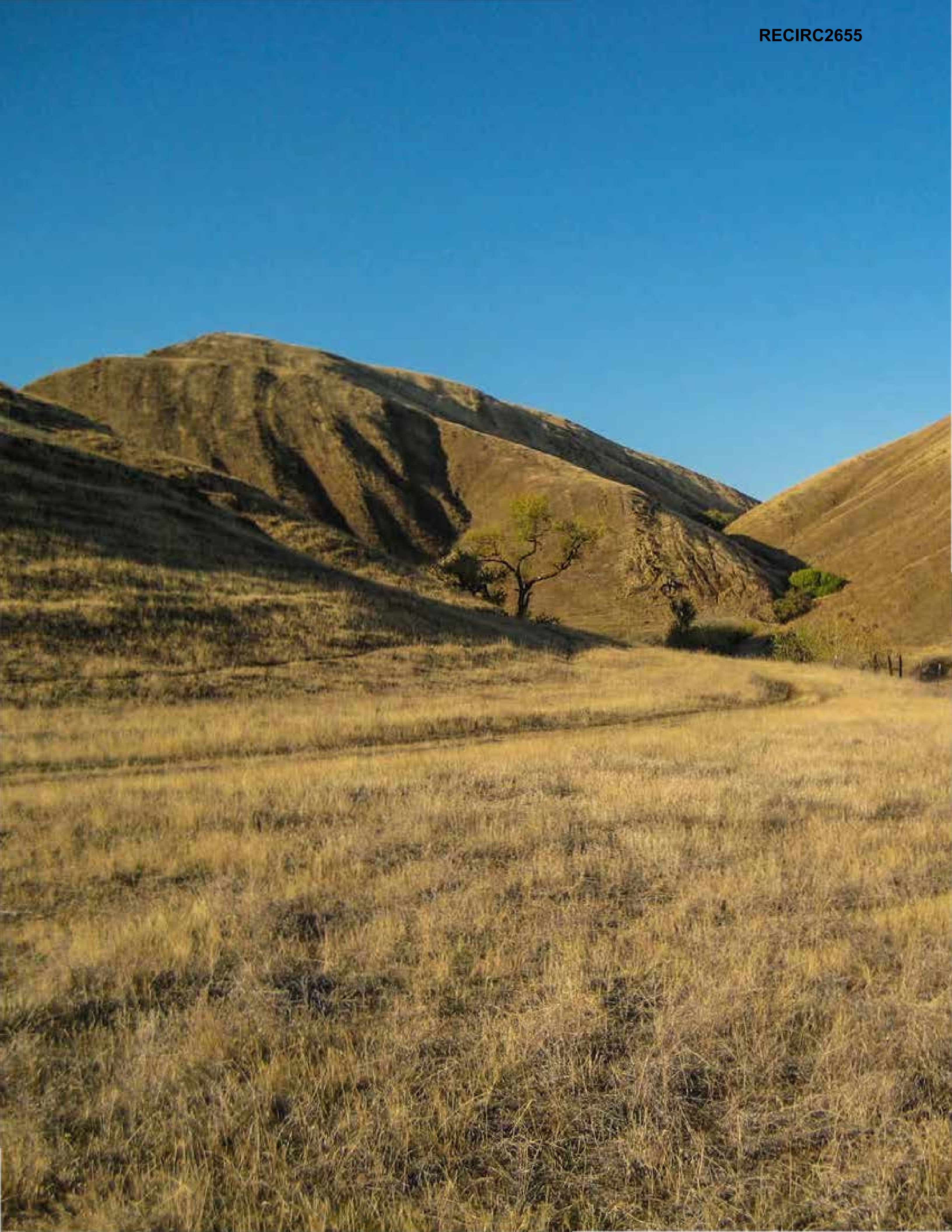
North-of-the-Delta Offstream Storage

Investigation Highlights

May 2014

PUBLIC SAFETY ENVIRONMENTAL STEWARDSHIP ECONOMIC STABILITY

RECIRC2655



INVESTIGATION HIGHLIGHTS
A Summary

• North-of-the-Delta Offstream Storage (NODOS) would provide a robust set of benefits, including water supply reliability for municipal and industrial uses, agriculture, and wildlife refuges; ecosystem enhancement actions to improve fish survival in major northern California rivers and the Sacramento-San Joaquin Delta (Delta); water quality improvements for Delta water users and estuarine species; flexible hydropower generation to support renewable energy sources such as wind and solar; recreation opportunities at the new reservoir and improved recreation at existing reservoirs; and local flood damage reduction below the new reservoir. Total water supply benefits would be up to 500 thousand acre-feet (TAF) per year on average and over 600 TAF per year during dry and critical years.

• The mix of NODOS benefits would also support improved flexibility and long-term viability of the Central Valley Project (CVP) and State Water Project (SWP). As the current drought is showing, flexibility of these projects is impaired during multiple dry years or droughts. In addition to providing the benefits described above, NODOS would improve CVP and SWP flexibility by increasing water in storage, including during drought conditions. Average annual improved storage would be up to 1.4 million acre-feet (MAF); annual drought period storage would be improved by up to 1.1 MAF.

• Estimated project cost ranges between $3.6 billion and $4.1 billion.

• Benefits would exceed costs. Net benefits, or the total economic value of annual benefits would exceed total annual costs by $61 million, $77 million, and $72 million for Alternatives A, B, and C respectively. The benefit-cost ratios for the three alternatives would be 1.32, 1.43, and 1.35 respectively.

• NODOS benefits would be resilient. A slightly modified operation and emphasis of objective priorities would be required with Bay Delta Conservation Plan (BDCP) conveyance and operations. The mix of water supply benefits would remain robust. NODOS operations would also be resilient to climate change effects, including potential changes in runoff and sea level rise. Total water supply benefits decreased by 4% in one BDCP scenario; and total water supply benefits increased or were unchanged in the climate change scenario and the BDCP with climate change scenario.

• Public benefits can be quantified for the benefit packages evaluated. The currently released reports do not include the final cost allocation, which would provide an approach to determining public and non-public investment needs. Even so, a preliminary cost allocation estimates the public benefit allocation at about 40%, including ecosystem restoration, water quality, water supply reliability for wildlife refuges, recreation, and flood damage reduction.

• The impacts of NODOS implementation are evaluated and potential mitigation measures are described in the Preliminary Administrative Draft (PAD) Environmental Impact Report (EIR). DWR is not soliciting and will not respond to comments submitted on this PADEIR, although any comments received will be retained and may be considered during preparation of a future public draft EIR.

• The Governor's California Water Action Plan (Water Action Plan) directs the California Department of Water Resources (DWR) to work with the Legislature, U.S. Bureau of Reclamation (Reclamation), and Sites Project Joint Powers Authority (JPA) to help facilitate a funding partnership in support of a financeable, multi-benefit storage project.

Introduction

The Governor's Water Action Plan and the current drought have re-energized discussions of the need for more storage. The Water Action Plan presents water challenges facing California and lays out three over-arching goals: reliability, restoration, and resilience. One of ten actions to meet these goals is, *"expand water storage capacity and improve groundwater management."* This document highlights how NODOS would improve the reliability, restoration, and resilience of California's water resources to support the Water Action Plan goals.

Five documents associated with the NODOS Investigation are available online at http://www.water.ca.gov/storage:

- NODOS Investigation Highlights (this report), by DWR
- NODOS Preliminary Administrative Draft EIR, by DWR
- NODOS Investigation 2013 Progress Report, by Reclamation and DWR
- NODOS Preliminary Design and Cost Estimate Report, by DWR
- NODOS Sensitivity Analysis of Operations with the BDCP Technical Memorandum, by the Sites Project JPA

This document highlights important information from these planning documents, which comprise most of the administrative drafts of the environmental and feasibility reports being prepared for the investigation.

Offstream storage reservoirs located north-of-the-Delta have been studied since the 1940s. The CALFED Bay-Delta Program (CALFED), a cooperative Federal and State agency partnership, recommended further study of NODOS in 2000. DWR and Reclamation are nearing completion of a Feasibility Study, including an EIR/EIS and Feasibility Report, in cooperation with local and regional water interests.

An initial step in the NODOS Investigation was consideration of problems and needs in the study area, which defined the NODOS planning objectives. The project objectives and portfolio of benefits are shown in Figure 1. Additionally, operational flexibility would be supported by additional water in storage. Operational flexibility of the SWP and CVP systems has diminished over time. Contractual commitments to water users, as well as water quality and fish survival requirements, have all increased since California's two largest water projects were built. These increasing demands on the systems have resulted in less water in storage. The CVP and SWP systems have become increasingly inflexible—a "loss of resiliency," as described in the California Water Plan Update. As the reservoirs are operated to meet these increasing commitments, additional stressors are anticipated. Climate change effects will require increased reservoir releases to maintain Delta salinity and to control water temperatures downstream of existing reservoirs.

NODOS would take advantage of existing water facilities, including Tehama-Colusa Canal, as shown here.

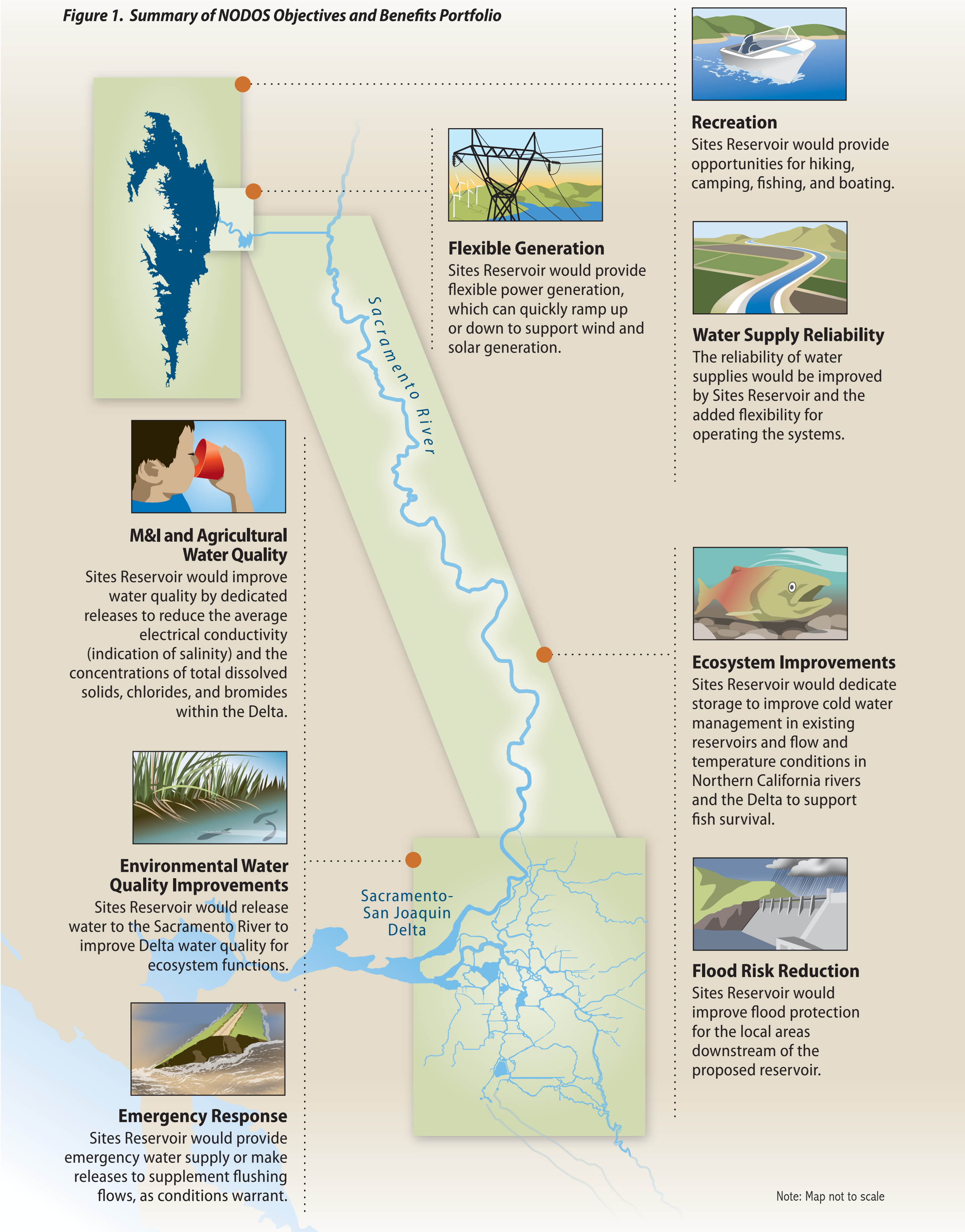


Figure 1. Summary of NODOS Objectives and Benefits Portfolio

Through a robust plan formulation process, many reservoir locations were considered and Sites Reservoir was selected as the preferred location alternative. A range of reservoir sizes, various conveyances, and operational scenarios were also considered. The operation of Sites Reservoir is an essential part of the NODOS investigation. The NODOS alternatives evaluated in detail are depicted in Figure 2.

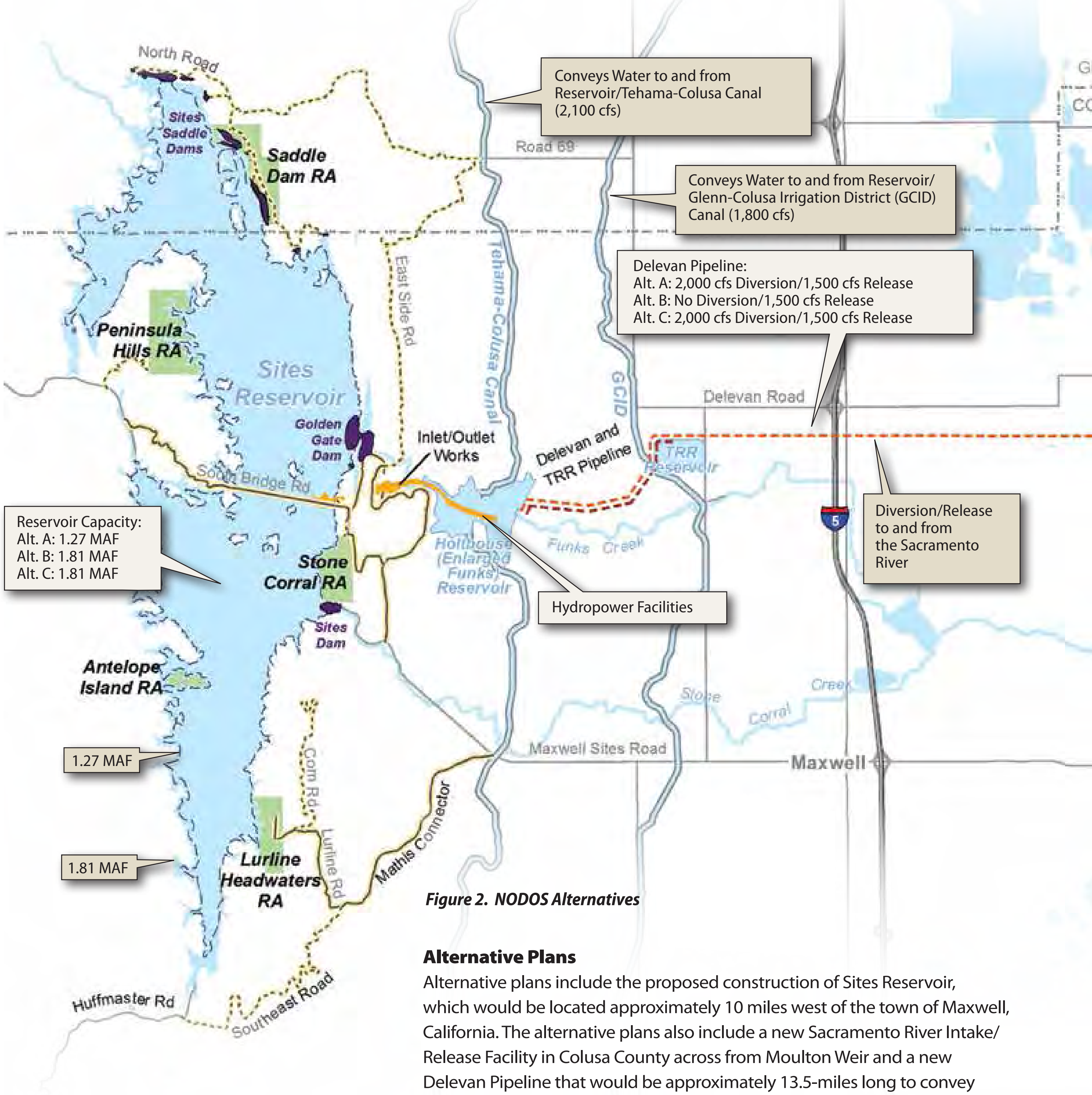
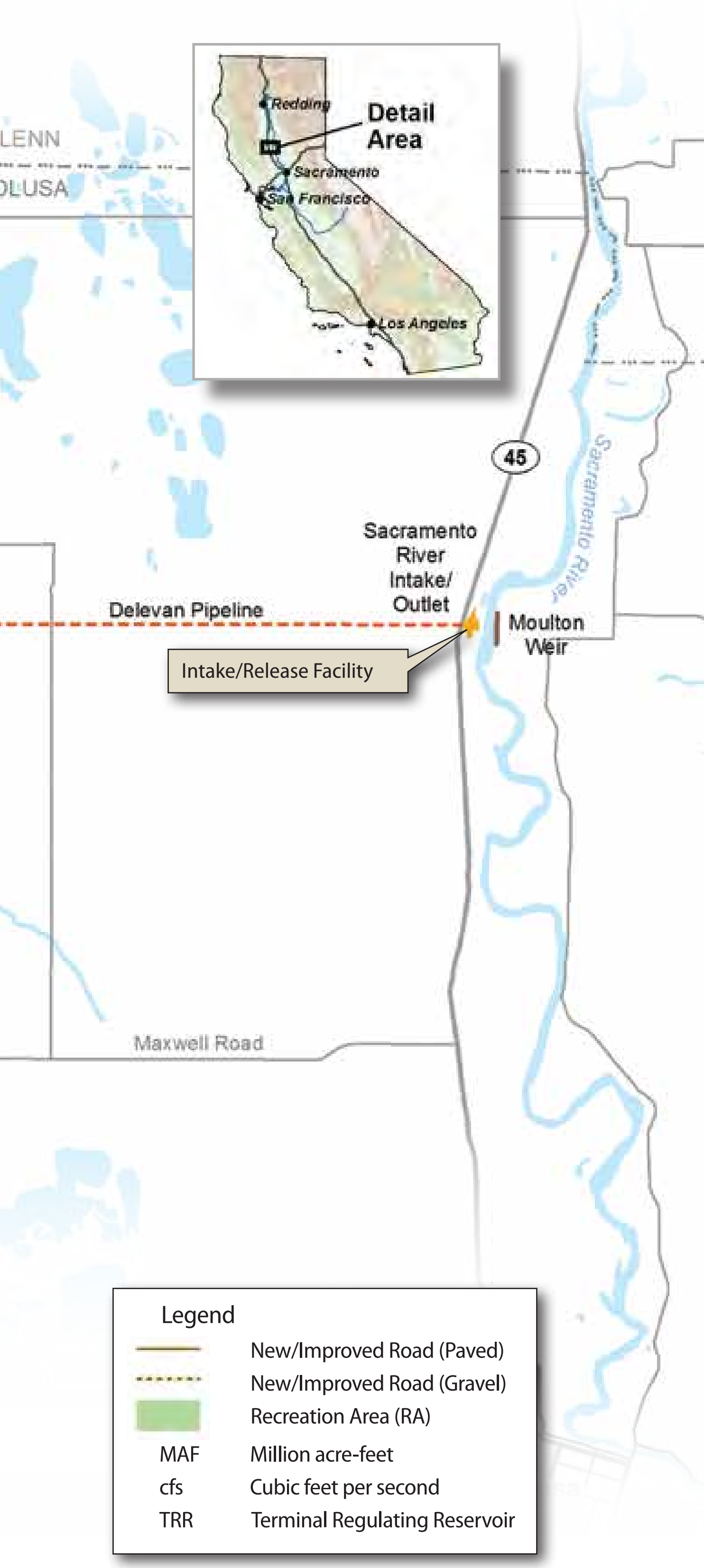


Figure 2. NODOS Alternatives

Alternative Plans

Alternative plans include the proposed construction of Sites Reservoir, which would be located approximately 10 miles west of the town of Maxwell, California. The alternative plans also include a new Sacramento River Intake/ Release Facility in Colusa County across from Moulton Weir and a new Delevan Pipeline that would be approximately 13.5-miles long to convey water between the Sacramento River and Sites Reservoir. Each alternative plan was formulated to meet the planning objectives described previously.



ALTERNATIVE PLANS

No Project/No Action Alternative

No actions would be taken to provide storage north of the Delta to meet the planning objectives.

ALTERNATIVE A:

1.27 MAF Sites Reservoir with Delevan Pipeline

- 1.27 MAF Sites Reservoir with conveyance to and from the reservoir provided by the existing Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal
- New Delevan Pipeline (2,000-cfs diversion/1,500-cfs release)
- New hydropower facilities
- Ecosystem enhancement actions to support anadromous and endemic fish populations

ALTERNATIVE B:

1.81 MAF Sites Reservoir with Release-only Delevan Pipeline

- 1.81 MAF Sites Reservoir with conveyance to and from the reservoir provided by the existing Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal
- New release–only Delevan Pipeline (1,500-cfs release)
- New hydropower facilities
- Ecosystem enhancement actions to support anadromous and endemic fish populations

ALTERNATIVE C:

1.81 MAF Sites Reservoir with Delevan Pipeline

- 1.81 MAF Sites Reservoir with conveyance to and from the reservoir provided by the existing Tehama-Colusa Canal and Glenn-Colusa Irrigation District Canal
- New Delevan Pipeline (2,000-cfs diversion/1,500-cfs release)
- New hydropower facilities
- Ecosystem enhancement actions to support anadromous and endemic fish populations

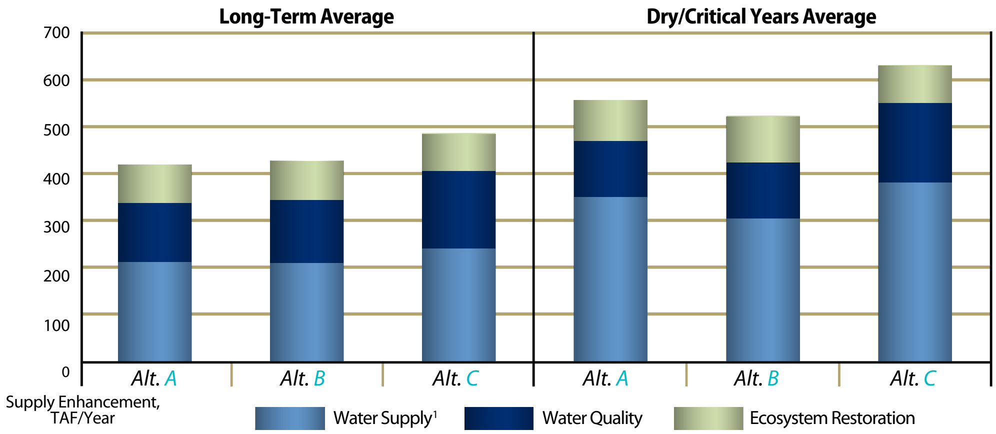
Alternatives Considered and Eliminated From Further Detailed Analysis

Initially, 52 alternative reservoir locations were considered before identifying Sites Reservoir as the preferred location for additional storage. The iterative plan formulation and screening process is documented in the NODOS Preliminary Administrative Draft Environmental Impact Report (2014) and the Progress Report (2013).

Benefits

NODOS benefits focus on reliability, restoration, and resilience for much of California. Benefits would occur from Trinity to San Diego counties (north to south) and Butte to Santa Clara counties (east to west), as well as in the Sacramento-San Joaquin Delta. Water supply benefits are described in three purpose categories: water supply reliability (labeled as water supply), water quality, and ecosystem restoration. Figure 3 shows the quantities of water supply (in thousands of acre-feet (TAF)) dedicated to these purposes for the three alternatives.

Figure 3. NODOS would increase water supply for multiple purposes



[1]Water supply for municipal and industrial, agriculture, and wildlife refuges

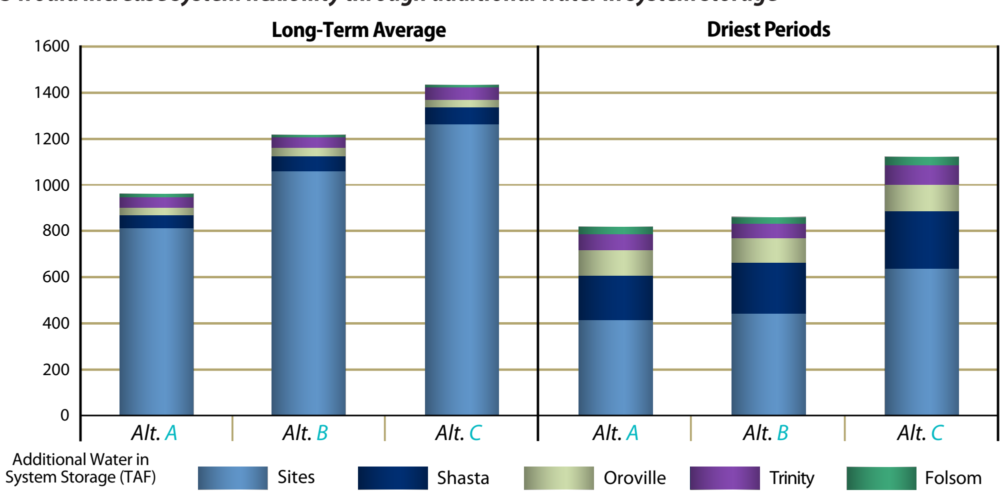
Reliability

Reliability would be improved for all three water supply purposes: water supply, water quality, and restoration. Water supply reliability would be improved for municipal and industrial, agriculture, and wildlife refuge users. Water quality would be improved by providing dedicated supplemental Delta outflow. Restoration water supply would be dedicated to support actions in the Delta and its tributaries.

Average annual water supplies would range from 400 to almost 500 TAF per year. The proposed reservoir's operations have been designed to emphasize supplies during drier conditions. Consequently, when the State is experiencing dry conditions (during Dry and Critical years), water supplies would increase to from 500 to over 600 TAF per year. In addition to these water benefits, flexible hydropower generation to support renewable energy sources such as wind and solar would be included.

NODOS also would support a more robust water system by improving storage conditions in reservoirs north-of-the-Delta (NOD). Figure 4 shows that NODOS would increase the average NOD storage by about 1.0 MAF/year to 1.4 MAF/year; during driest periods (droughts), storage would be improved by over 800 TAF (17% system storage improvement) to 1.1 MAF (23% system storage improvement). Having this additional water in the existing reservoirs would improve fishery conditions below those dams and the viability of the CVP and SWP systems.

Figure 4. NODOS would increase system flexibility through additional water in system storage

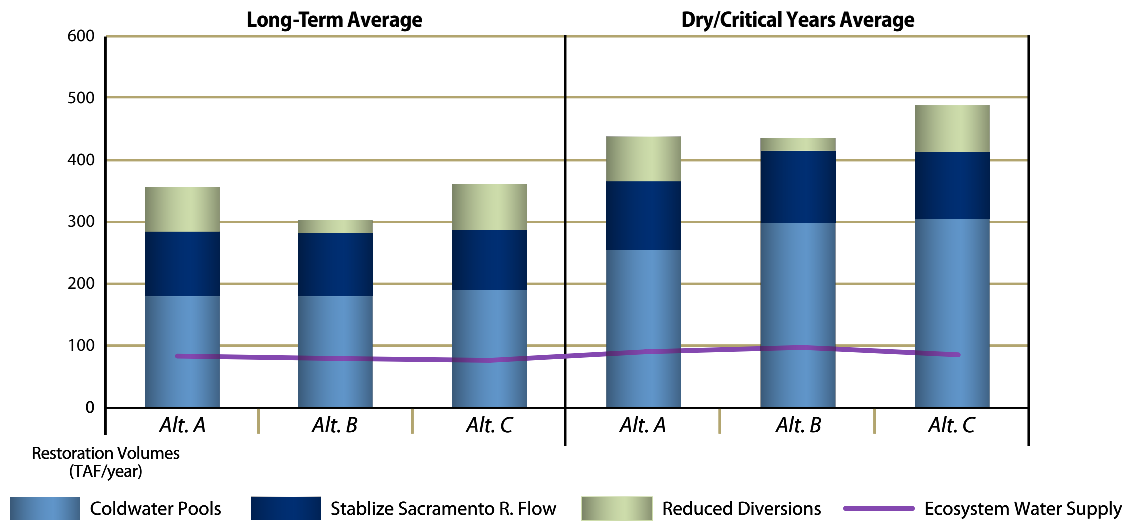


Restoration

Storage from NODOS would provide a source of additional water within the SWP and CVP systems that could be used to facilitate several ecosystem restoration actions to improve conditions in the Delta and Sacramento River watershed. Restoration would be accomplished by providing improved streamflow and lower water temperatures below existing reservoirs and in the Delta to support ecosystem needs. NODOS would improve ecosystem conditions by: increasing the reliability of coldwater pool storage at Shasta Lake (and by extension Trinity Lake), Lake Oroville, and Folsom Lake; providing supplemental releases from Shasta Lake to improve the temperature regime of the Upper Sacramento River; providing stable flow regimes in the Sacramento and American rivers to improve egg survival and fish habitat; increasing the flexibility of the SWP and CVP to meet salinity standards and improving salinity conditions in the Delta with dedicated releases to support estuarine fish species; and providing increased flows (Spring–Fall) in the lower Sacramento River by reducing diversions at Red Bluff and Hamilton City and by providing supplemental flows at the new Delevan Pipeline.

The volumes of water associated with most NODOS restoration actions are shown in Figure 5. Average coldwater pool augmentation at Shasta, Trinity, Oroville, and Folsom would range from 180 TAF/year to 190 TAF/year, while during drier conditions (i.e. Dry and Critical years), coldwater pools would be improved by 250 TAF/year to 300 TAF/year. Supplemental Sacramento River stability flows and reduced diversions are also shown, with average total volumes of water ranging from 300 TAF/year to 350 TAF/year and drier conditions volume ranging from 430 TAF/year to 480 TAF/year. Also shown in Figure 5 is the dedicated restoration water supply quantity from Figure 3, indicating NODOS project efficiencies in providing the ecosystem actions. Much of the restoration water volume would be used again for other purposes. Restoration volumes would be almost four to over five times the restoration water supply.

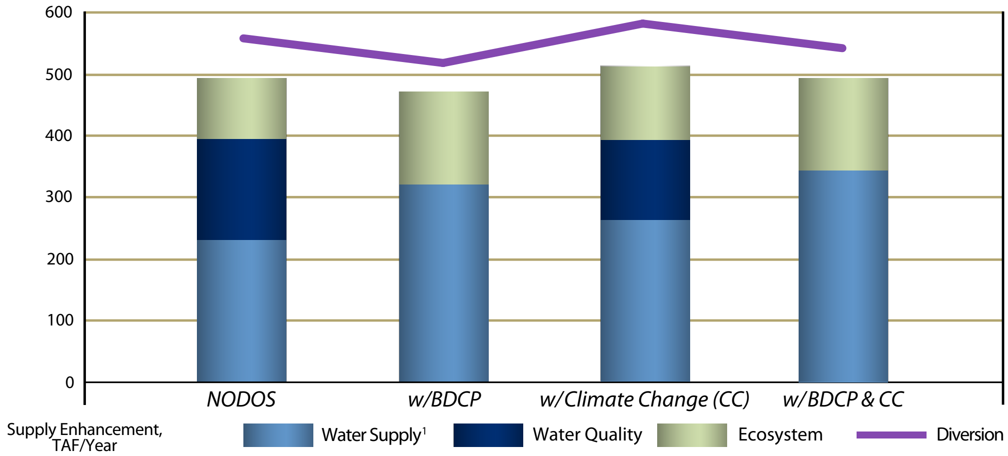
Figure 5. NODOS would provide Ecosystem Restoration Action Volumes



Resilience

The NODOS Investigation evaluated NODOS performance with potential alternative futures, including four climate change scenarios and three BDCP conveyance and operations scenarios. While the operations of NODOS were modified to accommodate alternative futures (particularly with BDCP), sensitivity studies indicate that NODOS performance would be resilient. Figure 6 shows a comparison of NODOS performance (Alternative C) with alternative futures. For example, water diversion to fill NODOS would be reduced by 7% with BDCP, increased by 4% with climate change and sea level rise, and decreased by 3% with both climate change and BDCP. NODOS water quality actions would not be needed with the BDCP scenarios because BDCP would provide significant water quality improvements with its north Delta diversion location. With BDCP, NODOS water would be shifted for uses supporting restoration and increasing water supply reliability. Both water supply reliability and restoration benefits would be increased with each alternative future as compared to the No Action future. Total benefits would be decreased by 4% with BDCP, increased by 4% with climate change, and unchanged with both.

Figure 6. NODOS would be resilient with alternative futures



[1]Water supply for municipal and industrial, agriculture, and wildlife refuges

Benefits and Costs

A comparison of the project benefits and costs indicates economic feasibility, as shown in Table 1. Total estimated project costs range from $3.6 billion to $4.1 billion, resulting in annual costs (including construction, interest during construction, and operations and maintenance) of $178 million to $204 million. The value of annual benefits would range from $249 million to $276 million, resulting in benefit-cost ratios (i.e. Total Benefits/ Total Costs) of 1.32, 1.43, and 1.35 for alternatives A, B, and C respectively. Net Benefits would range from $61 million to $77 million per year.

A NODOS Value Planning Study has identified up to $600 million in total project savings. Proposals for cost savings include use of roller-compacted concrete for the main dams, moving or modifying various reservoir-related structures, and refining pipeline conveyance designs. These cost saving proposals will be considered and incorporated in the NODOS Feasibility Report.

Table 1. Preliminary estimated NODOS benefits and costs ($Million, 2013 dollars)

	Alternative A	Alternative B	Alternative C
Total Project Cost	3,823	3,623	4,140
Annual Cost (C)	189	178	204
Annual Benefits (B)	249	255	276
Annual Net Benefits (B–C)	61	77	72
Benefit-Cost Ratio (B/C)	1.32	1.43	1.35

Next Steps

The impacts of NODOS implementation are evaluated and potential mitigation measures are described in The Preliminary Administrative Draft EIR. DWR is not soliciting and will not respond to comments submitted on this PADEIR, although any comments received will be retained and may be considered during preparation of a future public draft EIR. DWR will work with the Legislature, Reclamation, and the Sites Project JPA to help facilitate a funding partnership in support of a financeable multi-benefit offstream storage project.

The following five documents associated with the NODOS Investigation will be available online at **http://www.water.ca.gov/storage:**

NODOS Investigation Highlights (this report) by DWR

NODOS Preliminary Administrative Draft EIR by DWR

NODOS Investigation 2013 Progress Report
by Reclamation and DWR

NODOS Preliminary Design and Cost Estimate Report by DWR

NODOS Sensitivity Analysis of Operations with the BDCP Technical Memorandum by the Sites Project JPA

Any questions, contact: Sean Sou, DWR (916) 651-9269, **Sean.Sou@water.ca.gov**

California Department of Water Resources
1416 Ninth Street, Sacramento, CA 95814
www.water.ca.gov

Attachment 10

Planning Agreement

regarding the

Bay Delta Conservation Plan

October 6, 2006

TABLE OF CONTENTS

BAY DELTA CONSERVATION PLAN
Planning Agreement

This agreement (Planning Agreement) regarding the planning and preparation of the Bay Delta Conservation Plan (BDCP) is entered into as of the Effective Date by and among the California Resources Agency, the Fishery Agencies, the Potential Regulated Entities, and the Non-Governmental Organizations, as listed in Exhibit A.

1. Definitions

The following terms as used in this Planning Agreement will have the meanings set forth below.

1.1. "BDCP" means the Bay Delta Conservation Plan, a conservation plan prepared to meet the requirements of Federal Endangered Species Act (FESA), California Endangered Species Act (CESA) and/or the Natural Community Conservation Plan Act (NCCPA).

1.2. "Biological Assessment" or "BA" means the information prepared by or under the direction of a Federal Action Agency for the purpose of identifying the potential effects of the agency action within the Planning Area on species which are listed or proposed to be listed and critical habitat which has been designated or proposed, and submitted to the United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service (NMFS) pursuant to section 7(c)(1) of FESA.

1.3. "CEQA" means the California Environmental Quality Act, Public Resources Code, section 21000, *et seq.*

1.4. "CESA" means the California Endangered Species Act, California Fish and Game Code, section 2050, *et seq.*

1.5. "Covered Activities" means those certain activities that will be addressed in the BDCP and for which the Potential Regulated Entities may seek take authorizations pursuant to the California Fish and Game Code (section 2080.1, section 2081, and/or section 2835) and FESA.

1.6. "Covered Species" means those certain species that may be identified in the BDCP, both listed and non-listed, whose conservation and management are provided for in the BDCP, and which may be authorized for take under State and/or federal law once the BDCP is approved.

1.7. "CVP" means the Central Valley Project.

1.8. "Effective Date" means the date on which this Planning Agreement has been executed by the Parties, as listed in Exhibit A.

1.9. "Federal Action Agency" means a federal agency that authorizes, funds, or carries out actions that may require consultation with USFWS and/or NMFS pursuant to FESA section 7(a)(2).

1.10. "FESA" means the federal Endangered Species Act, 16 United States Code section 1530, *et seq.*

1.11. "Fishery Agencies" means Department of Fish and Game (DFG), USFWS and NMFS.

1.12. "Habitat Conservation Plan" or "HCP" means a conservation plan prepared pursuant to section 10(a) (1) (B) of FESA.

1.13. "Implementing Agreement" or "IA" means an agreement that defines the terms for implementing the BDCP.

1.14. "Statutory Delta" means the Sacramento-San Joaquin Delta as defined by section 12220 of the California Water Code.

1.15. "Listed Species" means those species designated as candidate, threatened or endangered pursuant to CESA and/or listed as threatened or endangered under FESA.

1.16. "MOA Projects" means those projects identified in Attachment B (water supply projects), Attachment C (water quality projects), Attachment D (ecosystem projects", Attachment E, (levees and other work in the waterways), and Attachment F (project schedules) to the "Memorandum of Agreement for Supplemental Funding for Certain Ecosystem Actions and Support for Implementation of Near-Term Water Supply, Water Quality, Ecosystem, and Levee Actions."

1.17. "Natural Community Conservation Plan" or "NCCP" means a conservation plan created to meet the requirements of Fish and Game Code, section 2800, *et seq.*

1.18. "Natural Community Conservation Planning Act" or "NCCPA" means Fish and Game Code, section 2800, *et seq.*

1.19. "NEPA" means the National Environmental Policy Act, United States Code section 4321, *et seq.*

1.20. "Non-Governmental Organizations" or "NGOs" means the Non-Governmental Organizations identified in Exhibit A. As of the Effective Date, the Non-Governmental Organizations are American Rivers, Environmental Defense, the Natural Heritage Institute, and The Nature Conservancy. Additional NGOs may be added as Parties in accordance with Section 9.6 of this Planning Agreement.

1.21. "Other Delta Water Users" means the Other Delta Water Users identified in Exhibit A. As of the Effective Date, Mirant Delta is the sole Other Delta Water User. Additional Other Delta Water Users may be added as Parties in accordance with Section 9.6 of this Planning Agreement.

1.22. "Party" means an entity that is a signatory to this Planning Agreement. Such entities may be referred to individually as "Party" or collectively as "Parties." Additional Parties may be added in accordance with Section 9.6 of this Planning Agreement. The Parties are identified on Exhibit A.

1.23. "Planning Area" means the geographic area proposed to be addressed in the BDCP as described in section 5 and Exhibit B.

1.24. "Potential Regulated Entities" means certain federal and non-federal entities that export, divert or otherwise benefit from diversion of water from the Delta and/or its tributaries within the Planning Area, which may seek take authorizations pursuant to the California Fish and Game Code (section 2080.1, section 2081, and/or section 2835) and/or FESA. The Potential Regulated Entities are identified in Exhibit A. As of the Effective Date, Reclamation, Department of Water Resources (DWR), the Water Contractors, and Other Delta Water Users are the Potential Regulated Entities. Additional Potential Regulated Entities (i.e., Water Contractors and Other Delta Water Users) may be added as Parties in accordance with Section 9.6 of this Planning Agreement.

1.25. "Section 7" means 16 United States Code section 1536.

1.26. "Section 10" means 16 United States Code section 1539.

1.27. "Steering Committee" means the committee established in accordance with Section 7.4.1 of this Planning Agreement.

1.28. "SWP" means the State Water Project.

1.29. "Water Contractors" means the Water Contractors identified in Exhibit A. As of the Effective Date, the Water Contractors are Metropolitan Water District (MWD), Kern County Water Agency (KCWA), Santa Clara Valley Water District (SCVWD), Zone 7, San Luis Delta Mendota Water Agency (SLDMWA) and Westlands Water District (WWD). Additional Water Contractors may be added as Parties in accordance with Section 9.6 of this Planning Agreement.

2. Purposes of this Agreement

The purposes of this Planning Agreement are to:

- Define the Parties' goals and commitments with regard to development of the BDCP;
- Define the initial geographic scope of the Planning Area;
- Identify a preliminary list of natural communities and species known or reasonably expected to be found in those communities that are intended to be the initial focus of the BDCP;
- Identify preliminary conservation objectives for the Planning Area;
- Establish a process for the inclusion of independent scientific input into the planning process;
- Ensure coordination among the Fishery Agencies, particularly with respect to FESA;
- Establish a process to review certain interim projects within the Planning Area that will help achieve the preliminary conservation objectives and maintain viable conservation opportunities and alternatives for the BDCP; and
- Ensure public participation and outreach throughout the planning process.

The Potential Regulated Entities have not yet determined whether it would be feasible or practicable to implement the BDCP, if it is developed, to meet the substantive requirements of the NCCPA. However, to enable the BDCP to serve as an NCCP, should that be feasible and practicable, the Parties intend that this Planning Agreement will fulfill the NCCPA's requirements for planning agreements and will establish a mutually agreeable planning process for the BDCP that meets the procedural requirements of the NCCPA, CESA and FESA.

3. Planning Goals

The planning goals for the BDCP include the following:

- Provide for the conservation and management of Covered Species within the Planning Area;
- Preserve, restore and enhance aquatic, riparian and associated terrestrial natural communities and ecosystems that support Covered Species within the Planning Area through conservation partnerships;
- Allow for projects to proceed that restore and protect water supply, water quality, and ecosystem health within a stable regulatory framework;
- Provide a means to implement Covered Activities in a manner that complies with applicable State and federal fish and wildlife protection laws, including CESA and FESA, and other environmental laws, including CEQA and NEPA;
- Provide a basis for permits necessary to lawfully take Covered Species;
- Provide a comprehensive means to coordinate and standardize mitigation and compensation requirements for Covered Activities within the Planning Area;

- Provide a less costly, more efficient project review process which results in greater conservation values than project-by-project, species-by-species review; and
- Provide clear expectations and regulatory assurances regarding Covered Activities occurring within the Planning Area.

These BDCP planning goals are consistent with the objectives of the CALFED Bay-Delta Program as set forth in the CALFED Record of Decision (ROD). (August 28, 2000, ROD, at pp. 9, 10.) While the Parties have developed specific decision-making protocols for the BDCP in section 7.4.1, they anticipate exchanging information and cooperating with participants in other public processes, such as the proposed Delta Vision Process.

The goal of the BDCP to "provide for the conservation and management of Covered Species" means that the plan will ensure the implementation of measures that will contribute to the recovery of Covered Species, taking into consideration the scope of the BDCP Planning Area in relation to the geographic range of the Covered Species, and the effect of Covered Activities on these species in relation to other activities not addressed by the BDCP. The Parties acknowledge that this planning goal is intended to reflect the constraints inherent to the BDCP that may limit its capacity to ensure the recovery of Covered Species.

The Parties further recognize that, until conservation strategies are developed for the Covered Species and their habitats, and conservation partnerships formed, the cost and feasibility of achieving these goals will not be known. During the development of the BDCP, the BDCP goals, preliminary conservation objectives, Covered Species, Covered Activities, and Planning Area may be modified to ensure that implementation of the BDCP will be practicable. The Parties recognize that, regardless of any such modifications, the BDCP must meet applicable State and federal regulatory requirements to support the issuance of permits or authorizations for Covered Activities.

4. Compliance with Federal and State Fish and Wildlife Protection Laws

The Planning Area contains valuable biological resources, including native species of fish and wildlife and their habitats. Among the species within the Planning Area are certain species that are protected, or may be protected in the future, under CESA and/or FESA. The Parties intend for the BDCP to meet the requirements of State and federal fish and wildlife protection laws that apply to Covered Activities and to provide a basis for State and federal authorizations for the take of Covered Species that may be caused by Covered Activities.

Under State law, take of species listed pursuant to CESA may be authorized under Fish and Game Code section 2080.1, section 2081, (both provisions of CESA) or section 2835 (a provision of the NCCPA). The NCCPA provides that after the approval of an NCCP, DFG may permit the taking of any identified species, listed or non-listed, whose conservation and management is provided for in the NCCP. Take of listed species may also be authorized pursuant to CESA. Non-listed species may be included as covered species in a conservation plan prepared pursuant to CESA, but a CESA take authorization would become effective with regard to non-listed species only if and when such species were listed.

The Parties intend for the BDCP to be sufficient to support the issuance of take authorizations for Covered Activities under CESA or the NCCPA. Alternatively, the BDCP may be developed to support the issuance of take authorizations under both CESA and the NCCPA, in which case, at DFG's discretion, take authorizations may be provided under CESA for some Covered Activities and Covered Species and under the NCCPA for those species whose conservation and management are provided for under the BDCP.

The Parties also intend for the BDCP to serve as a Habitat Conservation Plan that meets the requirements of section 10(a)(2)(A) of FESA, and to serve as a Biological Assessment that provides the basis for consultations between Reclamation and the USFWS and/or NMFS under section 7(a)(2) of FESA, to support the issuance of take authorizations for Covered Activities. The Parties acknowledge that the BDCP may be used to address compliance with other applicable federal and State statutes.

FESA provides that after the approval of an HCP, USFWS and/or NMFS may permit the taking of fish and wildlife species covered in the HCP if the HCP and permit application meet the requirements of section 10(a)(2)(A) and (B) of FESA. Take authorization for FESA-listed fish and wildlife species covered in the HCP are generally effective upon approval of the HCP and issuance of an incidental take permit. Take authorization for any non-listed species covered in the HCP becomes effective if and when the species is listed pursuant to FESA.

For actions authorized, funded or carried out by a Federal Action Agency, take of listed species may be authorized under section 7 of FESA based on a biological opinion prepared by the USFWS and/or NMFS. Take of non-listed species cannot be authorized under section 7 of FESA.

4.1. Potential Regulated Entities' Obligation to Implement the BDCP

The Potential Regulated Entities recognize that they will be obligated to implement and/or fund implementation of measures in the BDCP that are required to appropriately minimize and mitigate (including, in certain instances, to avoid destruction or adverse modification of critical habitat pursuant to section 7 of FESA) the impacts of Covered Activities on Covered Species and their habitat within the Planning Area in accordance with applicable federal and State fish and wildlife protection laws. However, the Parties may elect to include in the BDCP additional measures that exceed what is necessary to appropriately minimize or mitigate Covered Activities. For example, the BDCP may include measures that are necessary to provide for the conservation and management of Covered Species, but are not necessary to minimize and mitigate the impacts of Covered Activities. The Parties acknowledge that the Potential Regulated Entities' execution of this Planning Agreement and participation in the BDCP planning process does not reflect a commitment on the part of the Potential Regulated Entities to assume the obligation to implement conservation measures that exceed minimization and mitigation requirements. Rather, the Parties expect that the obligation to fund and/or to implement any such conservation measures would be shared by the Parties and that the Potentially Regulated Entities' share would be roughly proportional to the impact of their Covered Activities on Covered Species and their habitats. The shared obligation would be defined by mutual agreement and set forth in the Implementing Agreement. Nothing in this Planning Agreement obligates the Potentially Regulated Entities to fund or implement measures to minimize and mitigate impacts to Covered Species resulting from the activities of individuals or entities that do not participate in the implementation of the BDCP or to fund and/or implement conservation measures required as a result of such activities.

4.2. Future FESA Section 7 Consultations

To the extent allowed under law, the Parties intend that the measures adopted to meet regulatory standards included in the BDCP, once approved by the USFWS and NMFS and included as a condition of federal incidental take authorizations to any Potential Regulated Entity, will serve as the range of measures to be incorporated into biological opinions associated with future section 7 consultations between the USFWS and/or NMFS and a Federal Action Agency regarding Covered Activities that may adversely affect listed Covered Species and/or that may result in the destruction or adverse modification of critical habitat.

4.3. Other Fish and Wildlife Protection Laws

Based on the BDCP, the Potential Regulated Entities may seek approval or authorization under other State and federal fish and wildlife protection laws, including, but not necessarily limited to, the Magnuson-Stevens Fishery Act, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and various provisions of the Water Code and Fish and Game Code. The Parties agree to collaborate to explore the feasibility of developing the BDCP to serve as the means by which Covered Activities may comply with these additional laws.

4.4. Concurrent Planning for Wetlands and Waters of the United States

Based on the BDCP, the Potential Regulated Entities may seek future programmatic permits or other forms of authorization under the Clean Water Act, section 1600 *et seq.* of the Fish and Game Code, and the Rivers and Harbors Act, as necessary for Covered Activities. The Parties agree to work together to explore the feasibility of undertaking concurrent but separate planning regarding these permits. However, such programmatic permits or other forms of authorization are not necessary for approval of the BDCP or for issuances of take permits.

4.5. Regulatory Assurances Under FESA

Upon approval of the BDCP and issuance of incidental take permits for Covered Activities, USFWS and NMFS will provide assurances to those Potential Regulated Entities that receive coverage under FESA Section 10(a) that neither the USFWS nor NMFS will require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for Covered Species, without the consent of the affected Potential Regulated Entities, in accordance with 50 C.F.R. section 17.22(b)(5), section 17.32(b)(5), and section 222.307(g).

4.6. Regulatory Assurances Under the NCCPA

If the BDCP meets the criteria for issuance of NCCP permits under section 2835 of the Fish and Game Code, DFG will approve the BDCP and provide assurances consistent with its statutory authority upon issuance of NCCP permits. Under section 2820(f) of the Fish and Game Code, DFG may provide assurances for the Covered Activities commensurate with the level of long-term conservation and associated implementation measures provided in the BDCP, including the assurance that, if unforeseen circumstances arise during implementation of the BDCP, DFG will not require additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources without the consent of the affected Potential Regulated Entities, as long as the BDCP is being implemented consistent with the terms of the Implementation Agreement and associated take permit.

5. Planning Area

Because the Parties expect that the BDCP's Covered Activities will be situated within the Statutory Delta, the Planning Area for the BDCP will consist of the Statutory Delta. The Parties anticipate, however, that it may be necessary for the BDCP to include conservation actions outside of the Statutory Delta that advance the goals and objectives of the BDCP, including as appropriate, conservation actions in the Suisun Marsh, Suisun Bay, and areas upstream of the Delta. The Parties intend that conservation actions will be implemented pursuant to cooperative agreements or similar mechanisms with local agencies, interested non-governmental organizations, landowners, and others. A map of the Planning Area is attached hereto as Exhibit B.

6. Preliminary Conservation Objectives

The preliminary conservation objectives the Parties intend to achieve through the BDCP are to:

- Provide for the protection of Covered Species and associated natural communities and ecosystems that occur within the Planning Area;
- Preserve the diversity of fish, wildlife, plant and natural communities within the Planning Area;
- Minimize and mitigate, as appropriate, the take of proposed Covered Species;
- Preserve and restore habitat and contribute to the recovery of Covered Species;
- Reduce the need to list additional species;
- Set forth species-specific goals and objectives;
- Set forth specific habitat-based goals and objectives; and
- Implement an adaptive management and monitoring program to respond to changing ecological conditions;

- Avoid actions that are likely to jeopardize the continued existence of Covered Species or result in the destruction or adverse modification of critical habitat.

6.1. Conservation Elements

6.1.1. Ecosystems, Natural Communities, and Covered Species List

The BDCP will employ a strategy that focuses on the conservation of ecosystems, natural communities, and ecological processes in the Planning Area. In addition, the BDCP will establish species-specific minimization, mitigation, conservation and management measures where appropriate.

The BDCP will focus primarily on aquatic ecosystems and natural communities. The BDCP may also cover adjacent riparian and floodplain natural communities, as appropriate, to fully address the impacts of Covered Activities and to provide for the conservation of Covered Species. Natural Communities that are likely to be addressed by the BDCP include: riverine aquatic, lacustrine, tidal sloughs, tidal perennial aquatic, nontidal perennial aquatic, saline emergent wetland, freshwater emergent wetland, and riverine natural communities.

Species that are intended to be the initial focus of the BDCP include aquatic species such as Central Valley steelhead, Central Valley Chinook salmon (spring run and fall/late-fall runs), Sacramento River Chinook salmon (winter run), Delta smelt, green sturgeon, white sturgeon, splittail, and longfin smelt. Other species that will be considered for inclusion in the BDCP include Swainson's hawk, bank swallow, giant garter snake and valley elderberry longhorn beetle.

This list identifies the species that will be evaluated for inclusion in the BDCP as proposed Covered Species and is not necessarily the BDCP's final Covered Species list. The Parties anticipate that species may be added or removed from the list once more is learned about the nature of the Covered Activities and the impact of Covered Activities on native species within the Planning Area. Issuance of State and federal take authorizations for any particular Covered Species will require an individual determination by the applicable Fishery Agency that the BDCP meets applicable State and/or federal permit issuance requirements.

6.1.2. Conservation Areas and Viable Habitat Linkages

The BDCP will protect, enhance, or restore aquatic, and associated riparian and floodplain habitat throughout the Planning Area and provide or enhance habitat linkages, where appropriate within the Planning Area. The BDCP will also identify where linkages between important habitat areas inside and outside the Planning Area should occur. The BDCP conservation strategy will address a range of environmental gradients and ecological functions, and will address appropriate principles of ecosystem management, ecosystem restoration, and population biology.

6.1.3. Project Design

The BDCP will ensure that each Covered Activity is appropriately designed to avoid and/or minimize direct and indirect impacts to Covered Species and their habitats.

7. Preparing the BDCP

The Parties intend that this Planning Agreement will establish a mutually agreeable process for preparing the BDCP that meets the procedural requirements of the NCCPA, CESA and FESA. The process used to develop the BDCP will incorporate independent scientific input and analysis and include extensive public participation with ample opportunity for comment from the general public and from key groups of stakeholders, as described below.

7.1. Best Available Scientific Information

The BDCP will be based on the best available scientific information, including, but not limited to:

- Principles of conservation biology, community ecology, aquatic ecology, individual species' ecology, and other appropriate scientific data and information;
- Thorough information about all natural communities and proposed Covered Species within the Planning Area; and
- Advice from well-qualified, independent scientists.

7.2. Data Collection

The Parties agree that the BDCP will be based on the best available scientific information, and that the Parties will collaborate to ensure that such information is obtained through a range of credible governmental and non-governmental sources. Data collection efforts for preparation of the BDCP will be coordinated with existing efforts, including the CALFED Science Program. Preference should be given to collecting data essential to address the needs of natural communities and proposed Covered Species for purposes of developing conservation measures and strategies for the BDCP. The science advisory process and analysis of existing information may reveal data gaps currently not known that are necessary for the full and accurate development of the BDCP. Data needed for preparation of the BDCP may not be known at this time nor identified herein. Therefore, the Parties anticipate that data collection priorities may be adjusted from time to time during the planning process. All data collected for the preparation and implementation of the BDCP will be made available to the Fishery Agencies in hard and digital formats, as requested.

7.2.1. Types of Data

Data will be gathered to establish baseline conditions, evaluate impacts of Covered Activities on Covered Species, and develop conservation strategies and measures for Covered Species. Data needed to accomplish these tasks may include, but will not necessarily be limited to: species life histories, species occurrence, population abundance and distribution, population trends, population genetics, habitat locations and conditions, hydrologic regime, hydrodynamics, salinity, temperature, flow patterns, water quality, barrier and hazard types and locations, habitat connectivity, ecological threats and stressors, and riverine processes.

7.3. Independent Scientific Input

The Parties intend to include independent scientific input and analysis to assist in the preparation of the BDCP. For that purpose, independent scientists representing a broad range of disciplines, including conservation biology and locally-relevant ecological knowledge, will, at a minimum:

- Recommend scientifically sound conservation strategies for species and natural communities proposed to be covered by the BDCP;
- Recommend a range of conservation actions that would address the needs of species, ecosystems, and ecological processes in the Planning Area proposed to be addressed by the BDCP;
- Recommend management principles and conservation goals that can be used in developing a framework for the monitoring and adaptive management component of the BDCP; and
- Identify data gaps and uncertainties so that risk factors can be evaluated.

The independent scientists may be asked to provide additional feedback on key issues during preparation of the BDCP, and may prepare reports regarding specific scientific issues throughout the process, as deemed necessary by the Parties.

The Parties will design and implement the science advisory process, in consultation with the Steering Committee and the CALFED Science Program, and will ask the CALFED Science Program's Independent Science Board to recommend potential science advisors. The Parties will develop a detailed scope of work for the independent science advisory process and establish funding and payment procedures. The independent science advisory process will include the use of a professional facilitator, input from technical experts, and production of a report by the scientists. The Parties will make the report available to the public during the planning process.

7.4. Public Participation

The Parties will ensure an open and transparent process with an emphasis on obtaining input from a balanced variety of public and private interests. The planning process will provide for thorough public review and comment.

7.4.1. Steering Committee and Interested Observers

To assist in the development of the BDCP, the Parties have formed a Steering Committee. The Steering Committee consists of representatives of the Parties, with the USFWS and NMFS participating as ex officio members. The Parties expect that Steering Committee will be the principal forum within which key policy and strategy issues pertaining to the BDCP will be discussed and considered. The Parties intend that the meaningful exchange of ideas and viewpoints during Steering Committee meetings will help guide the development of the plan.

7.4.1.1. Process

The Steering Committee will convene in regularly scheduled public meetings, and its proceedings will be facilitated by the Secretary's Office of the California Resources Agency. The Steering Committee may elect to form subcommittees and workgroups as it may deem appropriate to analyze issues in greater detail and to report back to the full Steering Committee. Members of the Steering Committee are encouraged to caucus between such meetings. Staff and consultants from the Parties will work with the Steering Committee to provide technical expertise and share information for the development and implementation of the BDCP. Technical documents, draft agreements, and other information or documents will be provided to members of the Steering Committee at a stage early enough to allow for meaningful participation in deliberations.

With respect to those matters that are considered by the Steering Committee, the Parties agree that every reasonable effort should be made to have each such matter approved by a consensus of the members. Consensus is reached when a position reflects the predominant opinion of the Steering Committee members. In the event that a Steering Committee member opposes a proposal that has predominant support, that member will propose for further discussion an alternative that it would support. The Parties will make all reasonable efforts to prevent disputes and resolve matters by consensus in the Steering Committee. However, the Parties acknowledge that if consensus about a given matter is not reached in the Steering Committee, the Potential Regulated Entities, in consultation with the Fishery Agencies, will decide how to address the matter and maintain progress in the development of the BDCP.

7.4.1.2. Reserved Authority

The Parties recognize that decisions made by the Steering Committee in the course of preparing the BDCP are preliminary and are not legally binding. The Parties further recognize that several Parties have statutory or legal responsibilities that cannot be delegated, and that no action of the Steering Committee or provision of this Agreement shall be construed to delegate or abrogate any of those responsibilities.

7.4.1.3 Interested Observers

The Parties recognize the involvement of "Interested Observers," representing other stakeholder interests. Interested Observers will be provided notice of Steering Committee meetings and invited to attend. At each Steering Committee meeting, Interested Observers and other members of the public will have an opportunity to provide comments. A list of Interested Observers will be maintained on the BDCP website.

7.4.2. Outreach

Parties will provide access to information for persons interested in the BDCP, including interested tribes and people of all races, cultures and socio-economic status. The Parties expect and intend that public outreach regarding preparation of the BDCP will be conducted largely by and through the Steering Committee meetings. In addition, Parties will hold public meetings to present key decisions regarding the preparation of the BDCP to allow the public the opportunity to comment on and inquire about the decisions. The Parties may use Bay Delta Public Advisory Committee or its successor as a venue for public meetings. Other outreach efforts will include a BDCP website and informational mass mailings.

7.4.3. Availability of Public Review Drafts

The Parties will designate and make available for public review in a reasonable and timely manner "public review drafts" of pertinent planning documents including, but not limited to, plans, memoranda of understanding, maps, conservation guidelines, and species coverage lists. Such documents will be made available by the Parties at least ten working days prior to any public hearing addressing these documents. In addition, the Parties will make available all reports and formal memoranda prepared by the Steering Committee. Not all documents drafted during preparation of the BDCP will be distributed for public review. However, the Parties will periodically designate various pertinent documents drafted during preparation of the BDCP as "public review drafts", and will make these documents available to the public. The Parties agree the Internet will be the principal means of making documents available for public review, but that more traditional means such as distribution and display of hard copies of such documents will be used where practicable.

7.4.4. Public Hearings

Public hearings regarding development of the BDCP will be planned and conducted in a manner that satisfies the requirements of CEQA, NEPA, and any other applicable State or federal laws.

7.4.5. Public Review and Comment Period Prior to Adoption

The Potential Regulated Entities will make the draft BDCP and Implementing Agreement available for public review and comment a minimum of 60 days before adoption. The draft BDCP and Implementing Agreement will be distributed with the draft environmental impact report prepared for the BDCP pursuant to CEQA and/or the draft environmental impact statement prepared for the BDCP pursuant to NEPA.

7.5. Covered Activities

The BDCP will identify and address the Covered Activities carried out by the Potential Regulated Entities that may result in take of Covered Species within the Planning Area. Covered Activities may include, but are not necessarily limited to, existing or new activities related to:

- Conveyance elements of the State Water Project (SWP) and Central Valley Project (CVP)
- Operational activities, including emergency preparedness, of the SWP and CVP
- Operational activities related to water transfers involving Water Contractors or to serve environmental programs
- Maintenance of the SWP, CVP, and other Potential Regulated Entities' facilities

- Facility improvements of the SWP and CVP
- Ongoing operation of, and recurrent and future projects related to Other Delta Water Users
- Projects designed to improve salinity conditions
- Conservation measures included in the BDCP, including, but not limited to, adaptive habitat management, restoration, enhancement and monitoring activities

The Parties intend that the BDCP will allow Covered Activities in the Planning Area to be carried out in compliance with FESA and applicable provisions of the Fish and Game Code, and potentially with other laws as described in Section 4.

7.6. Interim Project Processing

The Parties recognize that before the Fishery Agencies approve the BDCP, certain projects and activities associated with Potential Regulated Entities may be proposed within the Planning Area. The Parties agree to the following interim project process to: (1) help ensure that new major discretionary projects approved or initiated in the Planning Area before completion of the Plan are consistent with the preliminary conservation objectives (section 6) and do not compromise successful completion and implementation of the Plan; (2) facilitate CEQA, CESA, and FESA compliance for such interim projects that require it; and (3) ensure that processing of such interim projects is not unduly delayed during preparation of the Plan.

The Parties acknowledge and agree that MOA Projects will not require separate or additional review pursuant to the interim project process set forth in this section. The Parties recognize that the MOA Projects will be required to comply with all applicable State and federal wildlife protection laws and environmental review processes. Other projects or activities within the Planning Area that are proposed by the Potential Regulated Entities that require discretionary approvals will be subject to the interim project process. The Parties agree that the development of the BDCP shall not delay the implementation of any of the MOA Projects or interim projects.

7.6.1. Notification Process for Interim Projects

The PRE proposing to undertake or approve an interim project will notify the Fishery Agencies of the project prior to the time, or as soon as possible after, the project description or application is deemed complete. The PRE will notify the particular individuals designated by the Fishery Agencies to be notified of interim projects, and will provide these designated individuals with (1) a depiction of the project location on a United States Geological Survey 7.5 minute quadrangle map with the quadrangle name and section, township, and range identified; (2) copy of the project description or application, including a description of the project along with the land cover types present on the project site using the most current land cover data available to the PRE; and (3) any other biological information available to the PRE about the project area.

7.6.2. Fishery Agency Review of Interim Projects

Information concerning interim projects will be presented to the Fishery Agencies in a complete and timely manner, and the Fishery Agencies will use reasonable efforts to review and provide any comments on the projects to the referring PRE within the legally prescribed comment periods. The Fishery Agencies will recommend mitigation measures or project alternatives that would help achieve the preliminary conservation objectives and will not preclude important conservation planning options or connectivity between areas of high habitat values. Any take of listed or candidate species arising out of an interim project will be authorized in accordance with applicable federal and/or state law. In providing any such authorizations, the Fishery Agencies acknowledge that they may not impose mitigation measures or project alternatives that result in regulatory obligations that exceed the requirements of applicable State and federal wildlife protection laws.

7.6.3. Coordinating Interim Process with BDCP Preparation

The Parties will meet as needed to discuss interim projects and to coordinate with development of the BDCP. Independent scientific input will be considered by the Parties during interim project review.

7.7. Protection of Habitat and Other Resources During Planning Process

7.7.1. Conservation Actions

The Parties may elect to preserve, enhance or restore, either by acquisition or other means, aquatic and associated riparian and floodplain habitat in the Planning Area that support native species of fish, wildlife or natural communities prior to approval of the BDCP. The Parties will confer with the Fishery Agencies regarding potential resources to be protected. The Fishery Agencies agree to credit such resources toward the land and water acquisition or habitat protection, enhancement, and restoration requirements of the BDCP, as appropriate, provided these resources are appropriately conserved, restored or enhanced, and managed and contribute to the BDCP's conservation strategy.

7.7.2. Mitigation

Actions to protect, enhance, or restore habitat that are undertaken solely to mitigate the impacts of specific projects, actions, or activities approved prior to BDCP approval will only be considered as mitigation for those projects, actions or activities. Such measures will be considered during the BDCP analysis, but will not count toward future mitigation obligations of the BDCP.

7.8. Implementing Agreement

An Implementing Agreement that includes specific provisions and procedures for the implementation, monitoring and funding of the BDCP will be developed for the BDCP. A draft of the Implementing Agreement will be made available for public review and comment with the final public review draft of the BDCP. The Implementing Agreement will contain provisions for:

- Conditions of species coverage;

- The long-term protection of any habitat reserves or other measures that provide equivalent conservation;
- Implementation of mitigation and conservation measures;
- Adequate funding to implement the plan;
- Terms for suspension or revocation of the take permit;
- Procedures for amendment of the BDCP, Implementing Agreement, and take authorizations;
- Implementation of monitoring and adaptive management;
- Oversight of BDCP effectiveness and funding; and
- Periodic reporting.

8. Commitment of Resources

8.1. Funding

The Parties agree that they will work together to bring available funding to the planning effort.

8.1.1. Funding of Fishery Agencies' Costs

As set forth in Section III(A) of the "Memorandum of Agreement for Supplemental Funding for Certain Ecosystem Actions and Support for Implementation of Near-Term Water Supply, Water Quality, Ecosystem and Levee Actions," (see Exhibit C) for calendar years 2006 and 2007, Reclamation and DWR on behalf of the SWP shall contribute an aggregate of approximately $3 million annually for the collective use of DFG, USFWS, and NMFS staff and for administrative costs related to the development of the BDCP. The Fishery Agencies shall use the contributed funds to provide technical and scientific information, analyses, and advice to assist in the timely and efficient development of the BDCP. Reclamation and DWR may be reimbursed in whole or in part in the event that Other Delta Water Users become Parties to this Agreement.

8.1.2. DFG and DWR Assistance with Funding

DFG and DWR agree to cooperate with the other Parties in identifying and securing, where appropriate, federal and State funds that may be used to support the development and implementation of the BDCP. DFG and DWR's commitments and obligations under this Planning Agreement are subject to the availability of appropriated funds and the written commitment of funds by an authorized DFG or DWR representative.

8.1.3. USFWS, NMFS, and Reclamation Assistance with Funding

The USFWS, NMFS, and Reclamation agree to cooperate with the other Parties in identifying and securing, where appropriate, federal and State funds earmarked for habitat conservation planning purposes. Potential federal funding sources may include: the USFWS' Cooperative Endangered Species Conservation Fund, Land and Water Conservation Fund, and land acquisition grants or loans through other federal agencies such as the Environmental Protection Agency, the Army Corps of Engineers, or the Departments of Agriculture or Transportation. The commitments of the USFWS, NMFS and Reclamation under this Planning Agreement are subject to the requirements of the federal Anti-Deficiency Act (31 U.S.C. section 1341) and the availability of appropriated funds. The Parties acknowledge that this Planning Agreement does not require any federal agency to expend its appropriated funds unless and until an authorized officer of that agency provides for such expenditures in writing.

9. Miscellaneous Provisions

9.1. Public Officials Not to Benefit

No member of or delegate to Congress will be entitled to any share or part of this Planning Agreement, or to any benefit that may arise from it.

9.2. Statutory Authority

The Planning Agreement is not intended, nor will it be construed, to modify any authority granted by statute, rule or regulation, or to make applicable to the CVP any State law that, in the absence of this Planning Agreement, would not apply to the CVP.

9.3. Multiple Originals

This Planning Agreement may be executed by the Parties in multiple originals, each of which will be deemed to be an official original copy.

9.4. Effective Date

The Effective Date of this Planning Agreement will be the date on which it is fully executed by the Parties.

9.5. Duration

This Planning Agreement will be in effect until the BDCP is approved and permitted by the Fishery Agencies, but shall not be in effect for more than three years following the Effective Date, unless extended by amendment. This Planning Agreement may be terminated pursuant to Section 9.7 below.

9.6. Amendments

This Planning Agreement can be amended only by written agreement of all Parties; provided, however, that without amending this Planning Agreement, new Potential Regulated Entities and other Parties may be added pursuant to the process described in Section 7.4.1.

9.7. Termination and Withdrawal

Subject to the requirement in Section 9.7.1 of the Planning Agreement, any Party may withdraw from this Planning Agreement upon 30 days' written notice to the other Parties, after which time the withdrawing Party shall no longer be a Party. The Planning Agreement will remain in effect as to all non-withdrawing Parties unless the remaining Parties determine that the withdrawal requires termination of the Planning Agreement. This Planning Agreement can be terminated only by written agreement of all non-withdrawing Parties.

9.7.1. Funding

In the event that federal, State or local funds have been provided to assist with BDCP preparation or implementation, any Party withdrawing from this Planning Agreement shall return to the granting agency unspent funds awarded to that Party prior to withdrawal. A withdrawing Party shall also provide the remaining Parties with a complete accounting of the use of any federal, State or local funds it received regardless of whether unspent funds remain at the time of withdrawal. In the event of termination of this Planning Agreement, all Parties who received funds shall return any unspent funds to the grantor prior to termination.

9.8. No Precedence

This Planning Agreement is not intended, and shall not be construed, to modify any existing or subsequently amended law, rule, regulation or other legal authority, or requirements established thereunder.

The Parties' execution of this Planning Agreement and participation in the development of the BDCP is voluntary and does not ensure that any of said Parties will participate in later planning phases of the BDCP or related agreements or actions. As provided in Section 9.7, above, any Party may withdraw from this Planning Agreement. In addition, participation in this Planning Agreement shall not be deemed acquiescence to the development of an NCCP. The Potential Regulated Entities shall decide whether to seek approval of the BDCP under the NCCPA or to apply for a section 2081 permit at or before the time that the BDCP is finalized.

The Parties recognize that participation in this Planning Agreement or in the BDCP planning process does not constitute, expressly or implicitly, an authorization by any of the Fishery Agencies to take any species listed under CESA and/or FESA. The Parties further recognize that such participation does not reflect or represent an acknowledgement by any Party that its activities or projects are not in compliance with any State or federal law or that the BDCP is necessary to comply with any such law.

SIGNATURES:

Dated: NOV 1 3 2006, 20__

APPROVED AS TO LEGAL
FORM AND SUFFICIENCY

OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

THE U.S. BUREAU OF RECLAMATION

By:

Title: Deputy Regional Director

Dated: 11-2, 2006

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

By:

Title: GENERAL MANAGER

Dated: 12/6, 2006

THE KERN COUNTY WATER AGENCY

By:

Title: General Manager

Dated: Nov. 14, 2006

THE NATIONAL MARINE FISHERIES SERVICE

By:

Title: Regional Administrator

Dated: 11/14, 2006

THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

By:

Title: Director

Approved as to legal form and sufficiency:

acting ~~Asst~~ Chief Counsel, DWR CC

SIGNATURES:

Dated: October 24, 2006

THE CALIFORNIA RESOURCES AGENCY

By: Mike Chrisman

Title: Secretary for Resources

Dated: 6 NOV., 2006

U.S. FISH AND WILDLIFE SERVICE

By:

Title: CNO MANAGER

Dated: 10/24, 2006

CALIFORNIA DEPARTMENT OF FISH AND GAME

By:

Title: DIRECTOR

Dated: 11/20, 2006

THE SANTA CLARA VALLEY WATER DISTRICT

By:

Title: Chief Operating Officer
Water Utility Enterprise

SIGNATURES:

Dated: Oct. 26, 2006

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, ZONE 7

By: [signature]

Title: General Manager

Dated: 12/6, 2006

THE SAN LUIS & DELTA MENDOTA WATER AUTHORITY

By: [signature]

Title: Executive Director

Dated: 12.6., 2006

THE WESTLANDS WATER DISTRICT

By: Thomas W. Birmingham

Title: General Manager

Dated: 12/6, 2006

MIRANT DELTA

By: Jeffrey D. Russell

Title: PRESIDENT

Dated: 11/8, 2006

AMERICAN RIVERS

By: Rebecca R. Wodder

Title: PRESIDENT

SIGNATURES:

Dated: October 30, 2006 ENVIRONMENTAL DEFENSE

By: Ann Hayden

Title: Water Resource Analyst

Dated: 25 Oct, 2006 THE NATURAL HERITAGE INSTITUTE

GREGORY A. THOMAS

By: [signature]

Title: President

Dated: 11-14, 2006 THE NATURE CONSERVANCY

By: Anthony Saracino

Title: Director of CA Water Policy

SIGNATURES:

Dated: 26 July, 2007

THE BAY INSTITUTE

By: [signature]

Title: Program Director

Dated: August 3, 2007

CONTRA COSTA WATER DISTRICT

By: [signature]

Title: Asst General Manager

Dated: March 15, 2007

DEFENDERS OF WILDLIFE

By: [signature]

Title: CA Program Director

Dated: March 30, 2007

CALIFORNIA FARM BUREAU FEDERATION

By: [signature]

Title: President

SIGNATURES:

Dated: March 9, 2009

FRIANT WATER AUTHORITY

By: [signature]

Title: General Manager

Dated: March 12, 2009

NORTH DELTA WATER AGENCY

By: [signature]

Title: Manager

EXHIBIT A

The Parties to the Planning Agreement are as follows:

The California Resources Agency
The Resources Agency mission statement is to restore, protect and manage the state's natural, historical and cultural resources for current and future generations using creative approaches and solutions based on science, collaboration and respect for all the communities and interests involved. The Resources Agency is home to all California's natural resources policies and programs. It operates on a $4.1 billion budget, employs over 14,500 people in 24 departments, commissions, boards and conservancies on conservation, water, fish and game, forestry, parks, energy, coastal, marine and landscape.

Fishery Agencies

The California Department of Fish and Game
DFG is the agency of the State of California authorized to act as trustee for the fish and wildlife of the State, designated rare and endangered plants, game refuges, ecological reserves, and other areas administered by the Department. DFG also administers and enforces the provisions of the Fish and Game Code and is authorized to enter into agreements with federal and local governments and other entities for the conservation of species and habitats. Take of threatened or endangered species which is incidental to an otherwise lawful activity may be authorized by DFG under CESA. DFG may also permit taking and provide regulatory assurances under the NCCPA for identified species whose conservation and management is provided for in a DFG-approved NCCP.

The United States Fish & Wildlife Service
The USFWS is an agency of the United States Department of the Interior authorized by Congress to administer and enforce FESA with respect to terrestrial wildlife, certain fish species, insects and plants, to enter into agreements with states, local governments, and other entities to conserve threatened, endangered, and other species of concern, to authorize incidental take under FESA, and to provide regulatory assurances in accordance with 50 C.F.R. section 17.22(b)(5) and section 17.32(b)(5).

The National Marine Fisheries Service
NMFS is an agency of the United States Department of Commerce authorized by Congress to administer and enforce FESA with respect to marine mammals and certain fish species (including anadromous fish), to enter into agreements with states, local governments, and other entities to conserve federally threatened, endangered, and other species of concern, to authorize incidental take under FESA, and to provide regulatory assurances in accordance with 50 C.F.R. section 222.307(g).

Potential Regulated Entities

The California Department of Water Resources
DWR operates and maintains the State Water Project, including the California Aqueduct. The Department also provides dam safety and flood control services, assists local water districts in water management and conservation activities, promotes recreational opportunities, and plans for future statewide water needs.

The U.S. Bureau of Reclamation
The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner. Originally conceived under the Reclamation Act of 1902 as a means to help settle the West by providing infrastructure for agricultural development, the Reclamation program focused on the construction of dams and facilities to store and convey water. As the potential for additional project purposes was identified by the states and local entities, Congress supplemented the Reclamation Act to add hydropower production, flood control, municipal and industrial water, recreation, and fish and wildlife enhancement to the list of authorized project purposes.

Water Contractors

The Metropolitan Water District of Southern California
MWD is a special water district organized and existing under California Water Code Appendix, Chapter 109. MWD acquires and develops water for delivery to 26 public agencies who in turn deliver water directly to homes and businesses, or to other water agencies who ultimately deliver the water to retail customers. The water acquired and developed by MWD, which includes water from the State Water Project, serves approximately 18 million people in portions of six southern California counties (Ventura, Los Angeles, Orange, San Bernardino, Riverside, and San Diego).

The Kern County Water Agency
KCWA is a special water district organized and existing under California Water Code Appendix, Chapter 99. KCWA is a contractor for water from the State Water Project. The State Water Project water is diverted to 15 member units and is used to irrigate, in whole or in part, more than 500,000 acres of prime farmland and to serve municipal water throughout Kern County, including the City of Bakersfield.

The Santa Clara Valley Water District
SCVWD is a special district organized and existing under California Water Code Appendix, Chapter 60. SCVWD's water supply includes water developed by both the Central Valley Project and the State Water Project. SCVWD's water supply serves approximately 1.7 million people in homes and businesses located throughout Santa Clara County, including the vital high technology industry in the area known as "Silicon Valley." SCVWD is a member agency of the SLDMWA.

Alameda County Flood Control and Water Conservation District, Zone 7
Zone 7 Water Agency is one of the 10 active zones of the Alameda County Flood Control and Water Conservation District. Zone 7 receives up to 75% of its water from the State Water Project. Along with flood protection, Zone 7 manages the local ground water basins and is the wholesale water supplier to all of eastern Alameda County and a population of more than 190,000. Treated water is sold to local retailers,including the cities of Livermore and Pleasanton, the Dublin San Ramon Services District, and the California Water Service Company. Zone 7 also distributes untreated water to local agriculture operations and golf courses.

The San Luis & Delta Mendota Water Authority
The SLDMWA is a joint powers authority formed pursuant to California Government Code section 6500 *et seq.* The SLDMWA consists of 32 member public agencies that contract with Reclamation for water supply from the CVP for distribution and use within areas of San Joaquin, Stanislaus, Merced, Fresno, Kings, San Benito, and Santa Clara Counties, California.

The Westlands Water District
WWD, a member of the SLDMWA, is a California water district formed pursuant to California Water Code section 34000 *et seq.* WWD holds contractual rights to receive water from Reclamation, through the Central Valley Project, for distribution and consumption within the areas of Fresno County and Kings County. WWD provides water for municipal and industrial uses, and for the irrigation of approximately 500,000 acres on the west side of the San Joaquin Valley in Fresno County and Kings County. WWD's farmers produce more than 60 high quality commercial food and fiber crops sold for the fresh, dry, canned and frozen food markets, both domestic and export. More than 50,000 people live and work in the communities, dependant on WWD's agricultural economy

<u>Other Delta Water Users</u>

Mirant Delta
Mirant Corporation owns and operates two natural-gas fired power generation plants on the Delta, one in Pittsburg and one in an unincorporated area of Contra Costa County east of Antioch. Both plants use water from the adjacent Sacramento River for power generation operations.

<u>Non-Governmental Organizations</u>

American Rivers
American Rivers is a national non-profit conservation organization founded in 1973 dedicated to protecting and restoring healthy natural rivers and the variety of life they sustain for people, fish, and wildlife. We deliver innovative solutions to improve river health; raise awareness among decision-makers and the public; serve and mobilize the river conservation movement; and collaborate with our partners to develop the Citizens' Agenda for Rivers which creates a unified vision for improving river health across the country. We have a membership of approximately 40,000. Our national office is located in

Washington, DC and we operate a regional office in the Northwest with locations in Seattle and Portland. In addition, we have six field offices in California, Connecticut, Nebraska, Pennsylvania and South Dakota.

The Bay Institute
The Bay Institute was founded in 1981 by pioneers of a new advocacy approach which viewed the entire Bay-Delta ecosystem as a single, interdependent watershed. They claimed that environmental reform benefiting the Bay must recognize the importance of events in the farthest reaches of the watershed just as urgently as those along the Bay shoreline, and that reduced freshwater flow was the biggest factor in the decline of the estuary's fish and wildlife resources.

Today, this approach is accepted wisdom. Tragically, it is also widely recognized that the water quality of the Bay and its river Delta is unacceptable, and that species and habitats are in danger.

The Bay Institute uses a combination of scientific research, political advocacy, and public education to work toward the environmental restoration of the entire watershed which drains into San Francisco Bay. This watershed includes the Sacramento River and the San Joaquin Rivers as well as their tributaries, Suisan Marsh, San Pablo Bay, and San Francisco Bay. The land area covers 40 percent of California. Nearly half of the surface water in California starts as rain or snow that falls in this area, and about half of that is diverted for use on farms, in homes, and in factories. The remaining water flows downstream through the largest inland delta, the largest brackish water marsh, and the largest estuary on the west coast of the Americas.

The Bay Institute's work encompasses the centers of political and economic power, from Sacramento to Los Angeles to Washington DC., where it fights to place long-term environmental needs on equal footing with other priorities in the formation of the area's environmental and economic policies.

California Farm Bureau Federation
The California Farm Bureau Federation is a non-governmental, non-profit, voluntary membership California corporation whose purpose is to protect and promote agricultural interests throughout the state of California and to find solutions to the problems of the farm, the farm home and the rural community. Farm Bureau is California's largest farm organization, consisting of 53 county Farm Bureaus currently representing approximately 91,000 members in 56 counties.

The Farm Bureau strives to protect and improve the ability of farmers and ranchers engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of California's resources.

Contra Costa Water
The Contra Costa Water District (CCWD) was formed in 1936 to provide water for irrigation and industry and is now one of the largest urban water districts in California and a leader in drinking-water treatment technology and the protection of the Sacramento-San Joaquin Delta (Delta). CCWD provides treated and untreated water to approximately 550,000

people in Central and Eastern Contra Costa County in Northern California. CCWD receives water under contract from the Central Valley Project and under its own water rights. All of CCWD's water supply is delivered through the Delta to the Contra Costa Canal or for storage in Los Vaqueros Reservoir, which is used for water quality control and emergency storage.

Defenders of Wildlife
Defenders of Wildlife is a national non-profit organization, with more than half a million members nationwide, of which more than 125,000 members reside in California. Defenders is dedicated to the protection of all native wild animals and plants in their natural communities. Defenders focuses its programs on addressing the accelerating rate of species extinction, loss of biological diversity, and habitat alteration and destruction. Defenders' California Program office is located in Sacramento, California, with additional offices in Bodega Bay, Monterey, Stockton, and Joshua Tree.

Environmental Defense
Environmental Defense is a national non-profit organization, with over 50,000 members residing in California. The organization seeks to link science, economics and law to create innovative, equitable and cost-effective solutions to today's most important environmental problems. For more than three decades, Environmental Defense has used technical, legal and political expertise to advocate for the protection and restoration of the San Francisco Bay-Delta ecosystem through water policy reform and market-based incentives to encourage efficient and equitable water use.

The Friant Water Authority
FWA is a joint powers authority formed pursuant to California Government Code section 6500 et seq. FWA, consisting of twenty water, irrigation and public utility districts in the southern San Joaquin Valley, operates and maintains the Friant-Kern Canal, which is a conveyance feature of the Friant Division of the Central Valley Project. Friant Division water supplies are made available pursuant to an exchange of San Joaquin River water rights that involves exports from the Delta. The Friant Division service area includes approximately one million acres and 15,000 mostly small family farms on the east side of the southern San Joaquin Valley (Merced, Madera, Fresno, Tulare and Kern Counties). Friant Division water supplies are also relied upon by several cities and towns, including the City of Fresno, as a major portion of their municipal and industrial water supplies. FWA also represents the interests of the four largest Cross Valley Canal contractors.

The Nature Conservancy
The Nature Conservancy is an international nonprofit membership organization, whose mission is to preserve plants, animals, and natural communities by protecting the lands and waters they need to survive. Founded in 1951, The Nature Conservancy and its more than one million embers have safeguarded more than 12 million acres in all 50 states and Canada. The Conservancy has also worked with like-minded partner organizations to preserve more than 100 million acres in Canada, Latin America, the Caribbean, the Pacific, and Asia. In California, The Nature Conservancy has protected more than 1.2 million acres, including over 10,000 acres in the Delta.

The Natural Heritage Institute

Natural Heritage Institute is a non-profit corporation organized under the laws of the State of California. Natural Heritage Institute's mission is to restore and protect rivers and other aquatic ecosystems in California, other states, and world-wide. It acts in two capacities: as a law firm which represents other conservation organizations and public agencies, and also independently on its own behalf. In these several capacities, since 1989 it has actively participated in regulatory proceedings to establish or modify water rights, water quality standards, and other requirements for the protection and restoration of the Bay-Delta.

North Delta Water Agency

The North Delta Water Agency (NDWA) was formed by a special act of the Legislature in 1973. Its boundaries encompass approximately 277,000 acres, including portions of Sacramento, San Joaquin, Solano, and Yolo counties. The NDWA administers a water rights settlement contract, entered into in 1981, with the Department of Water Resources for the protection of water rights and water quality for farmers and municipal water users in the North Delta. The 1981 Contract is essentially a guarantee by the State of California that, on an ongoing basis, suitable water will be available in the North Delta for agriculture and other beneficial uses. To that end, the Contract requires DWR to operate the State Water Project to meet specific water quality criteria for the Delta channels within NDWA boundaries while guaranteeing the water rights of NDWA water users against any challenge by the State of California. In return, NDWA makes an annual payment to DWR. In addition, the NDWA has assessment authority and collects assessments from property owners in the North Delta to fund the expenses and obligations of the Agency, including its annual payment to DWR. The NDWA is managed by a board of directors consisting of five members, each of whom is elected from one of the five divisions defined in the act forming the Agency.

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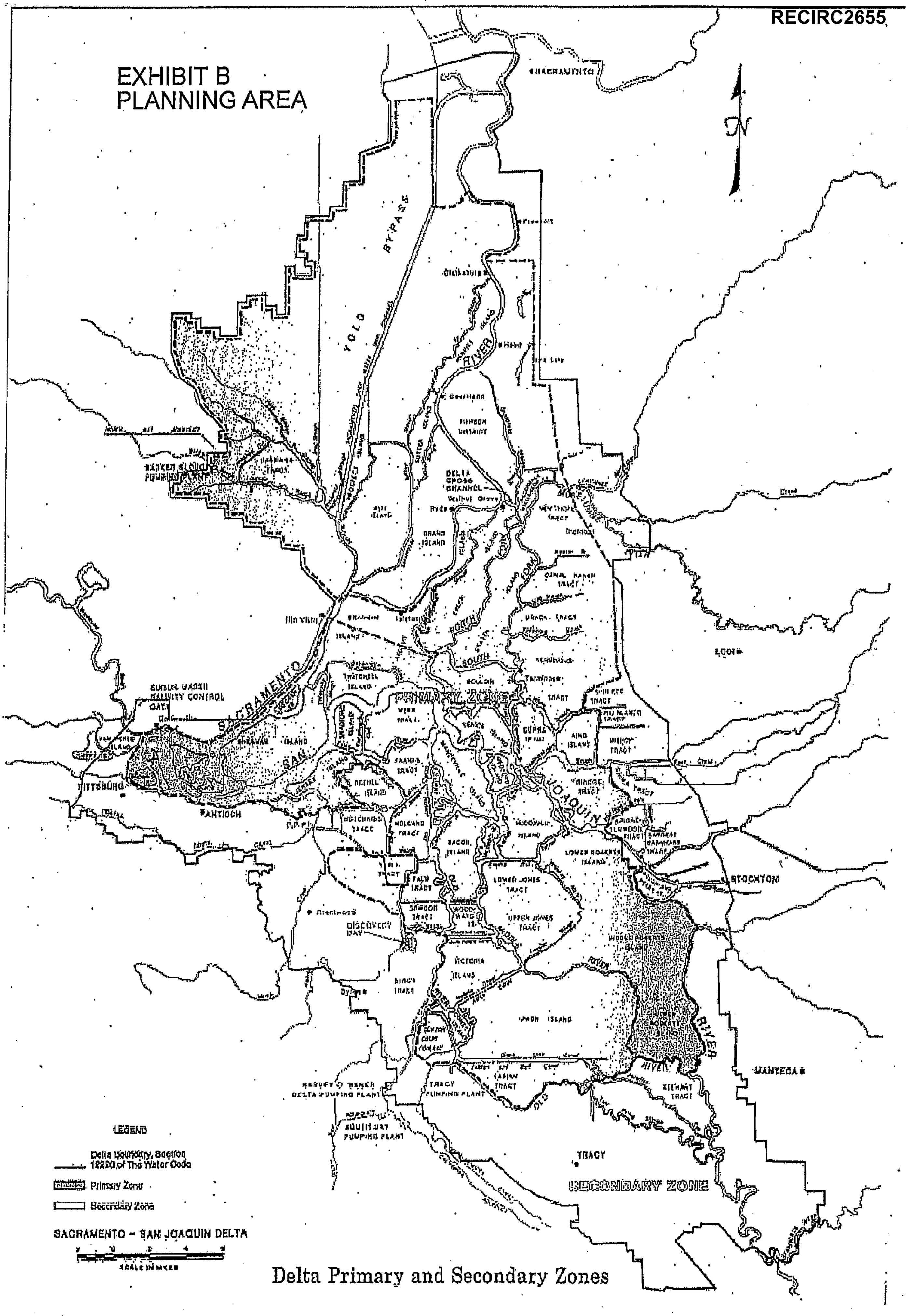
EXHIBIT B
PLANNING AREA



Delta Primary and Secondary Zones

EXHIBIT C

III. Near-Term Funding

Subject to Section V, this MOA proposes to provide, over the next two years, $60 million in contributions for the BDCP, Species Recovery Capital Fund, Ecosystem Restoration Program, POD Studies, and the 100-Year Vision for the Future of the Delta. This $60 million does not include the value of the commitments made pursuant to Section III.E for the Environmental Water Account.

In order to provide sufficient supplemental funds, which when combined with state, federal and other funding that will enable implementation of priority ecosystem restoration projects for Delta pelagic and anadromous fish through the end of Stage 1 (December 31, 2007), the following near-term funding is proposed:

A. BDCP

1. For calendar years 2006 and 2007, the USBR and DWR on behalf of the State Water Project (hereinafter referred to as The Projects) shall contribute an aggregate of $3 million annually for the collective use of DFG, USFWS, and NOAA Fisheries for staff and administrative costs related to the development of the BDCP. The budget in Attachment A details how these funds are anticipated to be spent.
2. The Projects and/or other applicants who have activities that will be covered by the BDCP will develop a cost-share agreement as part of the application process for the BDCP, which may provide for reimbursement of the The Projects and/or other applicants if new parties are able to utilize work for which The Projects and/or other applicants paid.
3. DFG, USFWS, and NOAA Fisheries will expend contributions made under this section consistent Attachment A.
4. DFG, USFWS, and NOAA Fisheries shall seek additional contributions for agency costs from other BDCP participants.
5. DFG, USFWS, and NOAA Fisheries will apply for additional funding through a Federal Endangered Species Act (FESA) Section 6 application.
6. If new bond funds become available and are appropriated for this purpose, the contributions by The Projects for agency staff and administrative costs shall be reduced accordingly.

Attachment 11

Planning Agreement

regarding the

Bay Delta Conservation Plan

October 6, 2006

TABLE OF CONTENTS

BAY DELTA CONSERVATION PLAN
Planning Agreement

This agreement (Planning Agreement) regarding the planning and preparation of the Bay Delta Conservation Plan (BDCP) is entered into as of the Effective Date by and among the California Resources Agency, the Fishery Agencies, the Potential Regulated Entities, and the Non-Governmental Organizations, as listed in Exhibit A.

1. Definitions

The following terms as used in this Planning Agreement will have the meanings set forth below.

1.1. "BDCP" means the Bay Delta Conservation Plan, a conservation plan prepared to meet the requirements of Federal Endangered Species Act (FESA), California Endangered Species Act (CESA) and/or the Natural Community Conservation Plan Act (NCCPA).

1.2. "Biological Assessment" or "BA" means the information prepared by or under the direction of a Federal Action Agency for the purpose of identifying the potential effects of the agency action within the Planning Area on species which are listed or proposed to be listed and critical habitat which has been designated or proposed, and submitted to the United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Service (NMFS) pursuant to section 7(c)(1) of FESA.

1.3. "CEQA" means the California Environmental Quality Act, Public Resources Code, section 21000, *et seq.*

1.4. "CESA" means the California Endangered Species Act, California Fish and Game Code, section 2050, *et seq.*

1.5. "Covered Activities" means those certain activities that will be addressed in the BDCP and for which the Potential Regulated Entities may seek take authorizations pursuant to the California Fish and Game Code (section 2080.1, section 2081, and/or section 2835) and FESA.

1.6. "Covered Species" means those certain species that may be identified in the BDCP, both listed and non-listed, whose conservation and management are provided for in the BDCP, and which may be authorized for take under State and/or federal law once the BDCP is approved.

1.7. "CVP" means the Central Valley Project.

1.8. "Effective Date" means the date on which this Planning Agreement has been executed by the Parties, as listed in Exhibit A.

1.9. "Federal Action Agency" means a federal agency that authorizes, funds, or carries out actions that may require consultation with USFWS and/or NMFS pursuant to FESA section 7(a)(2).

1.10. "FESA" means the federal Endangered Species Act, 16 United States Code section 1530, *et seq.*

1.11. "Fishery Agencies" means Department of Fish and Game (DFG), USFWS and NMFS.

1.12. "Habitat Conservation Plan" or "HCP" means a conservation plan prepared pursuant to section 10(a) (1) (B) of FESA.

1.13. "Implementing Agreement" or "IA" means an agreement that defines the terms for implementing the BDCP.

1.14. "Statutory Delta" means the Sacramento-San Joaquin Delta as defined by section 12220 of the California Water Code.

1.15. "Listed Species" means those species designated as candidate, threatened or endangered pursuant to CESA and/or listed as threatened or endangered under FESA.

1.16. "MOA Projects" means those projects identified in Attachment B (water supply projects), Attachment C (water quality projects), Attachment D (ecosystem projects", Attachment E, (levees and other work in the waterways), and Attachment F (project schedules) to the "Memorandum of Agreement for Supplemental Funding for Certain Ecosystem Actions and Support for Implementation of Near-Term Water Supply, Water Quality, Ecosystem, and Levee Actions."

1.17. "Natural Community Conservation Plan" or "NCCP" means a conservation plan created to meet the requirements of Fish and Game Code, section 2800, *et seq.*

1.18. "Natural Community Conservation Planning Act" or "NCCPA" means Fish and Game Code, section 2800, *et seq.*

1.19. "NEPA" means the National Environmental Policy Act, United States Code section 4321, *et seq.*

1.20. "Non-Governmental Organizations" or "NGOs" means the Non-Governmental Organizations identified in Exhibit A. As of the Effective Date, the Non-Governmental Organizations are American Rivers, Environmental Defense, the Natural Heritage Institute, and The Nature Conservancy. Additional NGOs may be added as Parties in accordance with Section 9.6 of this Planning Agreement.

1.21. "Other Delta Water Users" means the Other Delta Water Users identified in Exhibit A. As of the Effective Date, Mirant Delta is the sole Other Delta Water User. Additional Other Delta Water Users may be added as Parties in accordance with Section 9.6 of this Planning Agreement.

1.22. "Party" means an entity that is a signatory to this Planning Agreement. Such entities may be referred to individually as "Party" or collectively as "Parties." Additional Parties may be added in accordance with Section 9.6 of this Planning Agreement. The Parties are identified on Exhibit A.

1.23. "Planning Area" means the geographic area proposed to be addressed in the BDCP as described in section 5 and Exhibit B.

1.24. "Potential Regulated Entities" means certain federal and non-federal entities that export, divert or otherwise benefit from diversion of water from the Delta and/or its tributaries within the Planning Area, which may seek take authorizations pursuant to the California Fish and Game Code (section 2080.1, section 2081, and/or section 2835) and/or FESA. The Potential Regulated Entities are identified in Exhibit A. As of the Effective Date, Reclamation, Department of Water Resources (DWR), the Water Contractors, and Other Delta Water Users are the Potential Regulated Entities. Additional Potential Regulated Entities (i.e., Water Contractors and Other Delta Water Users) may be added as Parties in accordance with Section 9.6 of this Planning Agreement.

1.25. "Section 7" means 16 United States Code section 1536.

1.26. "Section 10" means 16 United States Code section 1539.

1.27. "Steering Committee" means the committee established in accordance with Section 7.4.1 of this Planning Agreement.

1.28. "SWP" means the State Water Project.

1.29. "Water Contractors" means the Water Contractors identified in Exhibit A. As of the Effective Date, the Water Contractors are Metropolitan Water District (MWD), Kern County Water Agency (KCWA), Santa Clara Valley Water District (SCVWD), Zone 7, San Luis Delta Mendota Water Agency (SLDMWA) and Westlands Water District (WWD). Additional Water Contractors may be added as Parties in accordance with Section 9.6 of this Planning Agreement.

2. Purposes of this Agreement

The purposes of this Planning Agreement are to:

- Define the Parties' goals and commitments with regard to development of the BDCP;
- Define the initial geographic scope of the Planning Area;
- Identify a preliminary list of natural communities and species known or reasonably expected to be found in those communities that are intended to be the initial focus of the BDCP;
- Identify preliminary conservation objectives for the Planning Area;
- Establish a process for the inclusion of independent scientific input into the planning process;
- Ensure coordination among the Fishery Agencies, particularly with respect to FESA;
- Establish a process to review certain interim projects within the Planning Area that will help achieve the preliminary conservation objectives and maintain viable conservation opportunities and alternatives for the BDCP; and
- Ensure public participation and outreach throughout the planning process.

The Potential Regulated Entities have not yet determined whether it would be feasible or practicable to implement the BDCP, if it is developed, to meet the substantive requirements of the NCCPA. However, to enable the BDCP to serve as an NCCP, should that be feasible and practicable, the Parties intend that this Planning Agreement will fulfill the NCCPA's requirements for planning agreements and will establish a mutually agreeable planning process for the BDCP that meets the procedural requirements of the NCCPA, CESA and FESA.

3. Planning Goals

The planning goals for the BDCP include the following:

- Provide for the conservation and management of Covered Species within the Planning Area;
- Preserve, restore and enhance aquatic, riparian and associated terrestrial natural communities and ecosystems that support Covered Species within the Planning Area through conservation partnerships;
- Allow for projects to proceed that restore and protect water supply, water quality, and ecosystem health within a stable regulatory framework;
- Provide a means to implement Covered Activities in a manner that complies with applicable State and federal fish and wildlife protection laws, including CESA and FESA, and other environmental laws, including CEQA and NEPA;
- Provide a basis for permits necessary to lawfully take Covered Species;
- Provide a comprehensive means to coordinate and standardize mitigation and compensation requirements for Covered Activities within the Planning Area;

- Provide a less costly, more efficient project review process which results in greater conservation values than project-by-project, species-by-species review; and
- Provide clear expectations and regulatory assurances regarding Covered Activities occurring within the Planning Area.

These BDCP planning goals are consistent with the objectives of the CALFED Bay-Delta Program as set forth in the CALFED Record of Decision (ROD). (August 28, 2000, ROD, at pp. 9, 10.) While the Parties have developed specific decision-making protocols for the BDCP in section 7.4.1, they anticipate exchanging information and cooperating with participants in other public processes, such as the proposed Delta Vision Process.

The goal of the BDCP to "provide for the conservation and management of Covered Species" means that the plan will ensure the implementation of measures that will contribute to the recovery of Covered Species, taking into consideration the scope of the BDCP Planning Area in relation to the geographic range of the Covered Species, and the effect of Covered Activities on these species in relation to other activities not addressed by the BDCP. The Parties acknowledge that this planning goal is intended to reflect the constraints inherent to the BDCP that may limit its capacity to ensure the recovery of Covered Species.

The Parties further recognize that, until conservation strategies are developed for the Covered Species and their habitats, and conservation partnerships formed, the cost and feasibility of achieving these goals will not be known. During the development of the BDCP, the BDCP goals, preliminary conservation objectives, Covered Species, Covered Activities, and Planning Area may be modified to ensure that implementation of the BDCP will be practicable. The Parties recognize that, regardless of any such modifications, the BDCP must meet applicable State and federal regulatory requirements to support the issuance of permits or authorizations for Covered Activities.

4. Compliance with Federal and State Fish and Wildlife Protection Laws

The Planning Area contains valuable biological resources, including native species of fish and wildlife and their habitats. Among the species within the Planning Area are certain species that are protected, or may be protected in the future, under CESA and/or FESA. The Parties intend for the BDCP to meet the requirements of State and federal fish and wildlife protection laws that apply to Covered Activities and to provide a basis for State and federal authorizations for the take of Covered Species that may be caused by Covered Activities.

Under State law, take of species listed pursuant to CESA may be authorized under Fish and Game Code section 2080.1, section 2081, (both provisions of CESA) or section 2835 (a provision of the NCCPA). The NCCPA provides that after the approval of an NCCP, DFG may permit the taking of any identified species, listed or non-listed, whose conservation and management is provided for in the NCCP. Take of listed species may also be authorized pursuant to CESA. Non-listed species may be included as covered species in a conservation plan prepared pursuant to CESA, but a CESA take authorization would become effective with regard to non-listed species only if and when such species were listed.

The Parties intend for the BDCP to be sufficient to support the issuance of take authorizations for Covered Activities under CESA or the NCCPA. Alternatively, the BDCP may be developed to support the issuance of take authorizations under both CESA and the NCCPA, in which case, at DFG's discretion, take authorizations may be provided under CESA for some Covered Activities and Covered Species and under the NCCPA for those species whose conservation and management are provided for under the BDCP.

The Parties also intend for the BDCP to serve as a Habitat Conservation Plan that meets the requirements of section 10(a)(2)(A) of FESA, and to serve as a Biological Assessment that provides the basis for consultations between Reclamation and the USFWS and/or NMFS under section 7(a)(2) of FESA, to support the issuance of take authorizations for Covered Activities. The Parties acknowledge that the BDCP may be used to address compliance with other applicable federal and State statutes.

FESA provides that after the approval of an HCP, USFWS and/or NMFS may permit the taking of fish and wildlife species covered in the HCP if the HCP and permit application meet the requirements of section 10(a)(2)(A) and (B) of FESA. Take authorization for FESA-listed fish and wildlife species covered in the HCP are generally effective upon approval of the HCP and issuance of an incidental take permit. Take authorization for any non-listed species covered in the HCP becomes effective if and when the species is listed pursuant to FESA.

For actions authorized, funded or carried out by a Federal Action Agency, take of listed species may be authorized under section 7 of FESA based on a biological opinion prepared by the USFWS and/or NMFS. Take of non-listed species cannot be authorized under section 7 of FESA.

4.1. Potential Regulated Entities' Obligation to Implement the BDCP

The Potential Regulated Entities recognize that they will be obligated to implement and/or fund implementation of measures in the BDCP that are required to appropriately minimize and mitigate (including, in certain instances, to avoid destruction or adverse modification of critical habitat pursuant to section 7 of FESA) the impacts of Covered Activities on Covered Species and their habitat within the Planning Area in accordance with applicable federal and State fish and wildlife protection laws. However, the Parties may elect to include in the BDCP additional measures that exceed what is necessary to appropriately minimize or mitigate Covered Activities. For example, the BDCP may include measures that are necessary to provide for the conservation and management of Covered Species, but are not necessary to minimize and mitigate the impacts of Covered Activities. The Parties acknowledge that the Potential Regulated Entities' execution of this Planning Agreement and participation in the BDCP planning process does not reflect a commitment on the part of the Potential Regulated Entities to assume the obligation to implement conservation measures that exceed minimization and mitigation requirements. Rather, the Parties expect that the obligation to fund and/or to implement any such conservation measures would be shared by the Parties and that the Potentially Regulated Entities' share would be roughly proportional to the impact of their Covered Activities on Covered Species and their habitats. The shared obligation would be defined by mutual agreement and set forth in the Implementing Agreement. Nothing in this Planning Agreement obligates the Potentially Regulated Entities to fund or implement measures to minimize and mitigate impacts to Covered Species resulting from the activities of individuals or entities that do not participate in the implementation of the BDCP or to fund and/or implement conservation measures required as a result of such activities.

4.2. Future FESA Section 7 Consultations

To the extent allowed under law, the Parties intend that the measures adopted to meet regulatory standards included in the BDCP, once approved by the USFWS and NMFS and included as a condition of federal incidental take authorizations to any Potential Regulated Entity, will serve as the range of measures to be incorporated into biological opinions associated with future section 7 consultations between the USFWS and/or NMFS and a Federal Action Agency regarding Covered Activities that may adversely affect listed Covered Species and/or that may result in the destruction or adverse modification of critical habitat.

4.3. Other Fish and Wildlife Protection Laws

Based on the BDCP, the Potential Regulated Entities may seek approval or authorization under other State and federal fish and wildlife protection laws, including, but not necessarily limited to, the Magnuson-Stevens Fishery Act, the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and various provisions of the Water Code and Fish and Game Code. The Parties agree to collaborate to explore the feasibility of developing the BDCP to serve as the means by which Covered Activities may comply with these additional laws.

4.4. Concurrent Planning for Wetlands and Waters of the United States

Based on the BDCP, the Potential Regulated Entities may seek future programmatic permits or other forms of authorization under the Clean Water Act, section 1600 *et seq.* of the Fish and Game Code, and the Rivers and Harbors Act, as necessary for Covered Activities. The Parties agree to work together to explore the feasibility of undertaking concurrent but separate planning regarding these permits. However, such programmatic permits or other forms of authorization are not necessary for approval of the BDCP or for issuances of take permits.

4.5. Regulatory Assurances Under FESA

Upon approval of the BDCP and issuance of incidental take permits for Covered Activities, USFWS and NMFS will provide assurances to those Potential Regulated Entities that receive coverage under FESA Section 10(a) that neither the USFWS nor NMFS will require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for Covered Species, without the consent of the affected Potential Regulated Entities, in accordance with 50 C.F.R. section 17.22(b)(5), section 17.32(b)(5), and section 222.307(g).

4.6. Regulatory Assurances Under the NCCPA

If the BDCP meets the criteria for issuance of NCCP permits under section 2835 of the Fish and Game Code, DFG will approve the BDCP and provide assurances consistent with its statutory authority upon issuance of NCCP permits. Under section 2820(f) of the Fish and Game Code, DFG may provide assurances for the Covered Activities commensurate with the level of long-term conservation and associated implementation measures provided in the BDCP, including the assurance that, if unforeseen circumstances arise during implementation of the BDCP, DFG will not require additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources without the consent of the affected Potential Regulated Entities, as long as the BDCP is being implemented consistent with the terms of the Implementation Agreement and associated take permit.

5. Planning Area

Because the Parties expect that the BDCP's Covered Activities will be situated within the Statutory Delta, the Planning Area for the BDCP will consist of the Statutory Delta. The Parties anticipate, however, that it may be necessary for the BDCP to include conservation actions outside of the Statutory Delta that advance the goals and objectives of the BDCP, including as appropriate, conservation actions in the Suisun Marsh, Suisun Bay, and areas upstream of the Delta. The Parties intend that conservation actions will be implemented pursuant to cooperative agreements or similar mechanisms with local agencies, interested non-governmental organizations, landowners, and others. A map of the Planning Area is attached hereto as Exhibit B.

6. Preliminary Conservation Objectives

The preliminary conservation objectives the Parties intend to achieve through the BDCP are to:

- Provide for the protection of Covered Species and associated natural communities and ecosystems that occur within the Planning Area;
- Preserve the diversity of fish, wildlife, plant and natural communities within the Planning Area;
- Minimize and mitigate, as appropriate, the take of proposed Covered Species;
- Preserve and restore habitat and contribute to the recovery of Covered Species;
- Reduce the need to list additional species;
- Set forth species-specific goals and objectives;
- Set forth specific habitat-based goals and objectives; and
- Implement an adaptive management and monitoring program to respond to changing ecological conditions;

- Avoid actions that are likely to jeopardize the continued existence of Covered Species or result in the destruction or adverse modification of critical habitat.

6.1. Conservation Elements

6.1.1. Ecosystems, Natural Communities, and Covered Species List

The BDCP will employ a strategy that focuses on the conservation of ecosystems, natural communities, and ecological processes in the Planning Area. In addition, the BDCP will establish species-specific minimization, mitigation, conservation and management measures where appropriate.

The BDCP will focus primarily on aquatic ecosystems and natural communities. The BDCP may also cover adjacent riparian and floodplain natural communities, as appropriate, to fully address the impacts of Covered Activities and to provide for the conservation of Covered Species. Natural Communities that are likely to be addressed by the BDCP include: riverine aquatic, lacustrine, tidal sloughs, tidal perennial aquatic, nontidal perennial aquatic, saline emergent wetland, freshwater emergent wetland, and riverine natural communities.

Species that are intended to be the initial focus of the BDCP include aquatic species such as Central Valley steelhead, Central Valley Chinook salmon (spring run and fall/late-fall runs), Sacramento River Chinook salmon (winter run), Delta smelt, green sturgeon, white sturgeon, splittail, and longfin smelt. Other species that will be considered for inclusion in the BDCP include Swainson's hawk, bank swallow, giant garter snake and valley elderberry longhorn beetle.

This list identifies the species that will be evaluated for inclusion in the BDCP as proposed Covered Species and is not necessarily the BDCP's final Covered Species list. The Parties anticipate that species may be added or removed from the list once more is learned about the nature of the Covered Activities and the impact of Covered Activities on native species within the Planning Area. Issuance of State and federal take authorizations for any particular Covered Species will require an individual determination by the applicable Fishery Agency that the BDCP meets applicable State and/or federal permit issuance requirements.

6.1.2. Conservation Areas and Viable Habitat Linkages

The BDCP will protect, enhance, or restore aquatic, and associated riparian and floodplain habitat throughout the Planning Area and provide or enhance habitat linkages, where appropriate within the Planning Area. The BDCP will also identify where linkages between important habitat areas inside and outside the Planning Area should occur. The BDCP conservation strategy will address a range of environmental gradients and ecological functions, and will address appropriate principles of ecosystem management, ecosystem restoration, and population biology.

6.1.3. Project Design

The BDCP will ensure that each Covered Activity is appropriately designed to avoid and/or minimize direct and indirect impacts to Covered Species and their habitats.

7. Preparing the BDCP

The Parties intend that this Planning Agreement will establish a mutually agreeable process for preparing the BDCP that meets the procedural requirements of the NCCPA, CESA and FESA. The process used to develop the BDCP will incorporate independent scientific input and analysis and include extensive public participation with ample opportunity for comment from the general public and from key groups of stakeholders, as described below.

7.1. Best Available Scientific Information

The BDCP will be based on the best available scientific information, including, but not limited to:

- Principles of conservation biology, community ecology, aquatic ecology, individual species' ecology, and other appropriate scientific data and information;
- Thorough information about all natural communities and proposed Covered Species within the Planning Area; and
- Advice from well-qualified, independent scientists.

7.2. Data Collection

The Parties agree that the BDCP will be based on the best available scientific information, and that the Parties will collaborate to ensure that such information is obtained through a range of credible governmental and non-governmental sources. Data collection efforts for preparation of the BDCP will be coordinated with existing efforts, including the CALFED Science Program. Preference should be given to collecting data essential to address the needs of natural communities and proposed Covered Species for purposes of developing conservation measures and strategies for the BDCP. The science advisory process and analysis of existing information may reveal data gaps currently not known that are necessary for the full and accurate development of the BDCP. Data needed for preparation of the BDCP may not be known at this time nor identified herein. Therefore, the Parties anticipate that data collection priorities may be adjusted from time to time during the planning process. All data collected for the preparation and implementation of the BDCP will be made available to the Fishery Agencies in hard and digital formats, as requested.

7.2.1. Types of Data

Data will be gathered to establish baseline conditions, evaluate impacts of Covered Activities on Covered Species, and develop conservation strategies and measures for Covered Species. Data needed to accomplish these tasks may include, but will not necessarily be limited to: species life histories, species occurrence, population abundance and distribution, population trends, population genetics, habitat locations and conditions, hydrologic regime, hydrodynamics, salinity, temperature, flow patterns, water quality, barrier and hazard types and locations, habitat connectivity, ecological threats and stressors, and riverine processes.

7.3. Independent Scientific Input

The Parties intend to include independent scientific input and analysis to assist in the preparation of the BDCP. For that purpose, independent scientists representing a broad range of disciplines, including conservation biology and locally-relevant ecological knowledge, will, at a minimum:

- Recommend scientifically sound conservation strategies for species and natural communities proposed to be covered by the BDCP;
- Recommend a range of conservation actions that would address the needs of species, ecosystems, and ecological processes in the Planning Area proposed to be addressed by the BDCP;
- Recommend management principles and conservation goals that can be used in developing a framework for the monitoring and adaptive management component of the BDCP; and
- Identify data gaps and uncertainties so that risk factors can be evaluated.

The independent scientists may be asked to provide additional feedback on key issues during preparation of the BDCP, and may prepare reports regarding specific scientific issues throughout the process, as deemed necessary by the Parties.

The Parties will design and implement the science advisory process, in consultation with the Steering Committee and the CALFED Science Program, and will ask the CALFED Science Program's Independent Science Board to recommend potential science advisors. The Parties will develop a detailed scope of work for the independent science advisory process and establish funding and payment procedures. The independent science advisory process will include the use of a professional facilitator, input from technical experts, and production of a report by the scientists. The Parties will make the report available to the public during the planning process.

7.4. Public Participation

The Parties will ensure an open and transparent process with an emphasis on obtaining input from a balanced variety of public and private interests. The planning process will provide for thorough public review and comment.

7.4.1. Steering Committee and Interested Observers

To assist in the development of the BDCP, the Parties have formed a Steering Committee. The Steering Committee consists of representatives of the Parties, with the USFWS and NMFS participating as ex officio members. The Parties expect that Steering Committee will be the principal forum within which key policy and strategy issues pertaining to the BDCP will be discussed and considered. The Parties intend that the meaningful exchange of ideas and viewpoints during Steering Committee meetings will help guide the development of the plan.

7.4.1.1. Process

The Steering Committee will convene in regularly scheduled public meetings, and its proceedings will be facilitated by the Secretary's Office of the California Resources Agency. The Steering Committee may elect to form subcommittees and workgroups as it may deem appropriate to analyze issues in greater detail and to report back to the full Steering Committee. Members of the Steering Committee are encouraged to caucus between such meetings. Staff and consultants from the Parties will work with the Steering Committee to provide technical expertise and share information for the development and implementation of the BDCP. Technical documents, draft agreements, and other information or documents will be provided to members of the Steering Committee at a stage early enough to allow for meaningful participation in deliberations.

With respect to those matters that are considered by the Steering Committee, the Parties agree that every reasonable effort should be made to have each such matter approved by a consensus of the members. Consensus is reached when a position reflects the predominant opinion of the Steering Committee members. In the event that a Steering Committee member opposes a proposal that has predominant support, that member will propose for further discussion an alternative that it would support. The Parties will make all reasonable efforts to prevent disputes and resolve matters by consensus in the Steering Committee. However, the Parties acknowledge that if consensus about a given matter is not reached in the Steering Committee, the Potential Regulated Entities, in consultation with the Fishery Agencies, will decide how to address the matter and maintain progress in the development of the BDCP.

7.4.1.2. Reserved Authority

The Parties recognize that decisions made by the Steering Committee in the course of preparing the BDCP are preliminary and are not legally binding. The Parties further recognize that several Parties have statutory or legal responsibilities that cannot be delegated, and that no action of the Steering Committee or provision of this Agreement shall be construed to delegate or abrogate any of those responsibilities.

7.4.1.3 Interested Observers

The Parties recognize the involvement of "Interested Observers," representing other stakeholder interests. Interested Observers will be provided notice of Steering Committee meetings and invited to attend. At each Steering Committee meeting, Interested Observers and other members of the public will have an opportunity to provide comments. A list of Interested Observers will be maintained on the BDCP website.

7.4.2. Outreach

Parties will provide access to information for persons interested in the BDCP, including interested tribes and people of all races, cultures and socio-economic status. The Parties expect and intend that public outreach regarding preparation of the BDCP will be conducted largely by and through the Steering Committee meetings. In addition, Parties will hold public meetings to present key decisions regarding the preparation of the BDCP to allow the public the opportunity to comment on and inquire about the decisions. The Parties may use Bay Delta Public Advisory Committee or its successor as a venue for public meetings. Other outreach efforts will include a BDCP website and informational mass mailings.

7.4.3. Availability of Public Review Drafts

The Parties will designate and make available for public review in a reasonable and timely manner "public review drafts" of pertinent planning documents including, but not limited to, plans, memoranda of understanding, maps, conservation guidelines, and species coverage lists. Such documents will be made available by the Parties at least ten working days prior to any public hearing addressing these documents. In addition, the Parties will make available all reports and formal memoranda prepared by the Steering Committee. Not all documents drafted during preparation of the BDCP will be distributed for public review. However, the Parties will periodically designate various pertinent documents drafted during preparation of the BDCP as "public review drafts", and will make these documents available to the public. The Parties agree the Internet will be the principal means of making documents available for public review, but that more traditional means such as distribution and display of hard copies of such documents will be used where practicable.

7.4.4. Public Hearings

Public hearings regarding development of the BDCP will be planned and conducted in a manner that satisfies the requirements of CEQA, NEPA, and any other applicable State or federal laws.

7.4.5. Public Review and Comment Period Prior to Adoption

The Potential Regulated Entities will make the draft BDCP and Implementing Agreement available for public review and comment a minimum of 60 days before adoption. The draft BDCP and Implementing Agreement will be distributed with the draft environmental impact report prepared for the BDCP pursuant to CEQA and/or the draft environmental impact statement prepared for the BDCP pursuant to NEPA.

7.5. Covered Activities

The BDCP will identify and address the Covered Activities carried out by the Potential Regulated Entities that may result in take of Covered Species within the Planning Area. Covered Activities may include, but are not necessarily limited to, existing or new activities related to:

- Conveyance elements of the State Water Project (SWP) and Central Valley Project (CVP)
- Operational activities, including emergency preparedness, of the SWP and CVP
- Operational activities related to water transfers involving Water Contractors or to serve environmental programs
- Maintenance of the SWP, CVP, and other Potential Regulated Entities' facilities

- Facility improvements of the SWP and CVP
- Ongoing operation of, and recurrent and future projects related to Other Delta Water Users
- Projects designed to improve salinity conditions
- Conservation measures included in the BDCP, including, but not limited to, adaptive habitat management, restoration, enhancement and monitoring activities

The Parties intend that the BDCP will allow Covered Activities in the Planning Area to be carried out in compliance with FESA and applicable provisions of the Fish and Game Code, and potentially with other laws as described in Section 4.

7.6. Interim Project Processing

The Parties recognize that before the Fishery Agencies approve the BDCP, certain projects and activities associated with Potential Regulated Entities may be proposed within the Planning Area. The Parties agree to the following interim project process to: (1) help ensure that new major discretionary projects approved or initiated in the Planning Area before completion of the Plan are consistent with the preliminary conservation objectives (section 6) and do not compromise successful completion and implementation of the Plan; (2) facilitate CEQA, CESA, and FESA compliance for such interim projects that require it; and (3) ensure that processing of such interim projects is not unduly delayed during preparation of the Plan.

The Parties acknowledge and agree that MOA Projects will not require separate or additional review pursuant to the interim project process set forth in this section. The Parties recognize that the MOA Projects will be required to comply with all applicable State and federal wildlife protection laws and environmental review processes. Other projects or activities within the Planning Area that are proposed by the Potential Regulated Entities that require discretionary approvals will be subject to the interim project process. The Parties agree that the development of the BDCP shall not delay the implementation of any of the MOA Projects or interim projects.

7.6.1. Notification Process for Interim Projects

The PRE proposing to undertake or approve an interim project will notify the Fishery Agencies of the project prior to the time, or as soon as possible after, the project description or application is deemed complete. The PRE will notify the particular individuals designated by the Fishery Agencies to be notified of interim projects, and will provide these designated individuals with (1) a depiction of the project location on a United States Geological Survey 7.5 minute quadrangle map with the quadrangle name and section, township, and range identified; (2) copy of the project description or application, including a description of the project along with the land cover types present on the project site using the most current land cover data available to the PRE; and (3) any other biological information available to the PRE about the project area.

7.6.2. Fishery Agency Review of Interim Projects

Information concerning interim projects will be presented to the Fishery Agencies in a complete and timely manner, and the Fishery Agencies will use reasonable efforts to review and provide any comments on the projects to the referring PRE within the legally prescribed comment periods. The Fishery Agencies will recommend mitigation measures or project alternatives that would help achieve the preliminary conservation objectives and will not preclude important conservation planning options or connectivity between areas of high habitat values. Any take of listed or candidate species arising out of an interim project will be authorized in accordance with applicable federal and/or state law. In providing any such authorizations, the Fishery Agencies acknowledge that they may not impose mitigation measures or project alternatives that result in regulatory obligations that exceed the requirements of applicable State and federal wildlife protection laws.

7.6.3. Coordinating Interim Process with BDCP Preparation

The Parties will meet as needed to discuss interim projects and to coordinate with development of the BDCP. Independent scientific input will be considered by the Parties during interim project review.

7.7. Protection of Habitat and Other Resources During Planning Process

7.7.1. Conservation Actions

The Parties may elect to preserve, enhance or restore, either by acquisition or other means, aquatic and associated riparian and floodplain habitat in the Planning Area that support native species of fish, wildlife or natural communities prior to approval of the BDCP. The Parties will confer with the Fishery Agencies regarding potential resources to be protected. The Fishery Agencies agree to credit such resources toward the land and water acquisition or habitat protection, enhancement, and restoration requirements of the BDCP, as appropriate, provided these resources are appropriately conserved, restored or enhanced, and managed and contribute to the BDCP's conservation strategy.

7.7.2. Mitigation

Actions to protect, enhance, or restore habitat that are undertaken solely to mitigate the impacts of specific projects, actions, or activities approved prior to BDCP approval will only be considered as mitigation for those projects, actions or activities. Such measures will be considered during the BDCP analysis, but will not count toward future mitigation obligations of the BDCP.

7.8. Implementing Agreement

An Implementing Agreement that includes specific provisions and procedures for the implementation, monitoring and funding of the BDCP will be developed for the BDCP. A draft of the Implementing Agreement will be made available for public review and comment with the final public review draft of the BDCP. The Implementing Agreement will contain provisions for:

- Conditions of species coverage;

- The long-term protection of any habitat reserves or other measures that provide equivalent conservation;
- Implementation of mitigation and conservation measures;
- Adequate funding to implement the plan;
- Terms for suspension or revocation of the take permit;
- Procedures for amendment of the BDCP, Implementing Agreement, and take authorizations;
- Implementation of monitoring and adaptive management;
- Oversight of BDCP effectiveness and funding; and
- Periodic reporting.

8. Commitment of Resources

8.1. Funding

The Parties agree that they will work together to bring available funding to the planning effort.

8.1.1. Funding of Fishery Agencies' Costs

As set forth in Section III(A) of the "Memorandum of Agreement for Supplemental Funding for Certain Ecosystem Actions and Support for Implementation of Near-Term Water Supply, Water Quality, Ecosystem and Levee Actions," (see Exhibit C) for calendar years 2006 and 2007, Reclamation and DWR on behalf of the SWP shall contribute an aggregate of approximately $3 million annually for the collective use of DFG, USFWS, and NMFS staff and for administrative costs related to the development of the BDCP. The Fishery Agencies shall use the contributed funds to provide technical and scientific information, analyses, and advice to assist in the timely and efficient development of the BDCP. Reclamation and DWR may be reimbursed in whole or in part in the event that Other Delta Water Users become Parties to this Agreement.

8.1.2. DFG and DWR Assistance with Funding

DFG and DWR agree to cooperate with the other Parties in identifying and securing, where appropriate, federal and State funds that may be used to support the development and implementation of the BDCP. DFG and DWR's commitments and obligations under this Planning Agreement are subject to the availability of appropriated funds and the written commitment of funds by an authorized DFG or DWR representative.

8.1.3. USFWS, NMFS, and Reclamation Assistance with Funding

The USFWS, NMFS, and Reclamation agree to cooperate with the other Parties in identifying and securing, where appropriate, federal and State funds earmarked for habitat conservation planning purposes. Potential federal funding sources may include: the USFWS' Cooperative Endangered Species Conservation Fund, Land and Water Conservation Fund, and land acquisition grants or loans through other federal agencies such as the Environmental Protection Agency, the Army Corps of Engineers, or the Departments of Agriculture or Transportation. The commitments of the USFWS, NMFS and Reclamation under this Planning Agreement are subject to the requirements of the federal Anti-Deficiency Act (31 U.S.C. section 1341) and the availability of appropriated funds. The Parties acknowledge that this Planning Agreement does not require any federal agency to expend its appropriated funds unless and until an authorized officer of that agency provides for such expenditures in writing.

9. Miscellaneous Provisions

9.1. Public Officials Not to Benefit

No member of or delegate to Congress will be entitled to any share or part of this Planning Agreement, or to any benefit that may arise from it.

9.2. Statutory Authority

The Planning Agreement is not intended, nor will it be construed, to modify any authority granted by statute, rule or regulation, or to make applicable to the CVP any State law that, in the absence of this Planning Agreement, would not apply to the CVP.

9.3. Multiple Originals

This Planning Agreement may be executed by the Parties in multiple originals, each of which will be deemed to be an official original copy.

9.4. Effective Date

The Effective Date of this Planning Agreement will be the date on which it is fully executed by the Parties.

9.5. Duration

This Planning Agreement will be in effect until the BDCP is approved and permitted by the Fishery Agencies, but shall not be in effect for more than three years following the Effective Date, unless extended by amendment. This Planning Agreement may be terminated pursuant to Section 9.7 below.

9.6. Amendments

This Planning Agreement can be amended only by written agreement of all Parties; provided, however, that without amending this Planning Agreement, new Potential Regulated Entities and other Parties may be added pursuant to the process described in Section 7.4.1.

9.7. Termination and Withdrawal

Subject to the requirement in Section 9.7.1 of the Planning Agreement, any Party may withdraw from this Planning Agreement upon 30 days' written notice to the other Parties, after which time the withdrawing Party shall no longer be a Party. The Planning Agreement will remain in effect as to all non-withdrawing Parties unless the remaining Parties determine that the withdrawal requires termination of the Planning Agreement. This Planning Agreement can be terminated only by written agreement of all non-withdrawing Parties.

9.7.1. Funding

In the event that federal, State or local funds have been provided to assist with BDCP preparation or implementation, any Party withdrawing from this Planning Agreement shall return to the granting agency unspent funds awarded to that Party prior to withdrawal. A withdrawing Party shall also provide the remaining Parties with a complete accounting of the use of any federal, State or local funds it received regardless of whether unspent funds remain at the time of withdrawal. In the event of termination of this Planning Agreement, all Parties who received funds shall return any unspent funds to the grantor prior to termination.

9.8. No Precedence

This Planning Agreement is not intended, and shall not be construed, to modify any existing or subsequently amended law, rule, regulation or other legal authority, or requirements established thereunder.

The Parties' execution of this Planning Agreement and participation in the development of the BDCP is voluntary and does not ensure that any of said Parties will participate in later planning phases of the BDCP or related agreements or actions. As provided in Section 9.7, above, any Party may withdraw from this Planning Agreement. In addition, participation in this Planning Agreement shall not be deemed acquiescence to the development of an NCCP. The Potential Regulated Entities shall decide whether to seek approval of the BDCP under the NCCPA or to apply for a section 2081 permit at or before the time that the BDCP is finalized.

The Parties recognize that participation in this Planning Agreement or in the BDCP planning process does not constitute, expressly or implicitly, an authorization by any of the Fishery Agencies to take any species listed under CESA and/or FESA. The Parties further recognize that such participation does not reflect or represent an acknowledgement by any Party that its activities or projects are not in compliance with any State or federal law or that the BDCP is necessary to comply with any such law.

SIGNATURES:

Dated: NOV 1 3 2006, 20__

APPROVED AS TO LEGAL FORM AND SUFFICIENCY

OFFICE OF REGIONAL SOLICITOR DEPARTMENT OF THE INTERIOR

THE U.S. BUREAU OF RECLAMATION

By: ______________________

Title: Deputy Regional Director

Dated: 11-2, 2006

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

By: ______________________

Title: GENERAL MANAGER

Dated: 12/6, 2006

THE KERN COUNTY WATER AGENCY

By: ______________________

Title: General Manager

Dated: Nov. 14, 2006

THE NATIONAL MARINE FISHERIES SERVICE

By: Rodney R McInnis

Title: Regional Administrator

Dated: 11/14, 2006

Approved as to legal form and sufficiency:

acting ~~Asst~~ Chief Counsel, DWR

THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

By: ______________________

Title: Director

SIGNATURES:

Dated: October 24, 2006

THE CALIFORNIA RESOURCES AGENCY

By: Mike Chrisman

Title: Secretary for Resources

Dated: 6 NOV., 2006

U.S. FISH AND WILDLIFE SERVICE

By: Steve Thompson

Title: CNO MANAGER

Dated: 10/24, 2006

CALIFORNIA DEPARTMENT OF FISH AND GAME

By:

Title: DIRECTOR

Dated: 11/20, 2006

THE SANTA CLARA VALLEY WATER DISTRICT

By: Walter L Wad

Title: Chief Operating Officer
Water Utility Enterprise

SIGNATURES:

Dated: Oct. 26, 2006

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, ZONE 7

By: Dale Myers

Title: General Manager

Dated: 12/6, 2006

THE SAN LUIS & DELTA MENDOTA WATER AUTHORITY

By:

Title: Executive Director

Dated: 12.6., 2006

THE WESTLANDS WATER DISTRICT

By: Thomas W. Birmingham

Title: General Manager

Dated: 12/6, 2006

MIRANT DELTA

By: Jeffrey D. Russell

Title: PRESIDENT

Dated: 11/8, 2006

AMERICAN RIVERS

By: Rebecca R. Wodder

Title: President

SIGNATURES:

Dated: October 30, 2006

ENVIRONMENTAL DEFENSE

By: Ann Hayden

Title: Water Resource Analyst

Dated: 25 Oct, 2006

THE NATURAL HERITAGE INSTITUTE

GREGORY A. THOMAS

By: [signature]

Title: President

Dated: 11-14, 2006

THE NATURE CONSERVANCY

By: Anthony Saracino

Title: Director of CA Water Policy

SIGNATURES:

Dated: 26 July, 2007

THE BAY INSTITUTE

By: ______

Title: Program Director

Dated: August 3, 2007

CONTRA COSTA WATER DISTRICT

By: ______

Title: Asst General Manager

Dated: March 15, 2007

DEFENDERS OF WILDLIFE

By: ______

Title: CA Program Director

Dated: March 30, 2007

CALIFORNIA FARM BUREAU FEDERATION

By: ______

Title: President

SIGNATURES:

Dated: March 9, 2009

FRIANT WATER AUTHORITY

By: [signature]

Title: General Manager

Dated: March 12, 2009

NORTH DELTA WATER AGENCY

By: [signature]

Title: Manager

EXHIBIT A

The Parties to the Planning Agreement are as follows:

The California Resources Agency
The Resources Agency mission statement is to restore, protect and manage the state's natural, historical and cultural resources for current and future generations using creative approaches and solutions based on science, collaboration and respect for all the communities and interests involved. The Resources Agency is home to all California's natural resources policies and programs. It operates on a $4.1 billion budget, employs over 14,500 people in 24 departments, commissions, boards and conservancies on conservation, water, fish and game, forestry, parks, energy, coastal, marine and landscape.

Fishery Agencies

The California Department of Fish and Game
DFG is the agency of the State of California authorized to act as trustee for the fish and wildlife of the State, designated rare and endangered plants, game refuges, ecological reserves, and other areas administered by the Department. DFG also administers and enforces the provisions of the Fish and Game Code and is authorized to enter into agreements with federal and local governments and other entities for the conservation of species and habitats. Take of threatened or endangered species which is incidental to an otherwise lawful activity may be authorized by DFG under CESA. DFG may also permit taking and provide regulatory assurances under the NCCPA for identified species whose conservation and management is provided for in a DFG-approved NCCP.

The United States Fish & Wildlife Service
The USFWS is an agency of the United States Department of the Interior authorized by Congress to administer and enforce FESA with respect to terrestrial wildlife, certain fish species, insects and plants, to enter into agreements with states, local governments, and other entities to conserve threatened, endangered, and other species of concern, to authorize incidental take under FESA, and to provide regulatory assurances in accordance with 50 C.F.R. section 17.22(b)(5) and section 17.32(b)(5).

The National Marine Fisheries Service
NMFS is an agency of the United States Department of Commerce authorized by Congress to administer and enforce FESA with respect to marine mammals and certain fish species (including anadromous fish), to enter into agreements with states, local governments, and other entities to conserve federally threatened, endangered, and other species of concern, to authorize incidental take under FESA, and to provide regulatory assurances in accordance with 50 C.F.R. section 222.307(g).

Potential Regulated Entities

The California Department of Water Resources
DWR operates and maintains the State Water Project, including the California Aqueduct. The Department also provides dam safety and flood control services, assists local water districts in water management and conservation activities, promotes recreational opportunities, and plans for future statewide water needs.

The U.S. Bureau of Reclamation
The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner. Originally conceived under the Reclamation Act of 1902 as a means to help settle the West by providing infrastructure for agricultural development, the Reclamation program focused on the construction of dams and facilities to store and convey water. As the potential for additional project purposes was identified by the states and local entities, Congress supplemented the Reclamation Act to add hydropower production, flood control, municipal and industrial water, recreation, and fish and wildlife enhancement to the list of authorized project purposes.

Water Contractors

The Metropolitan Water District of Southern California
MWD is a special water district organized and existing under California Water Code Appendix, Chapter 109. MWD acquires and develops water for delivery to 26 public agencies who in turn deliver water directly to homes and businesses, or to other water agencies who ultimately deliver the water to retail customers. The water acquired and developed by MWD, which includes water from the State Water Project, serves approximately 18 million people in portions of six southern California counties (Ventura, Los Angeles, Orange, San Bernardino, Riverside, and San Diego).

The Kern County Water Agency
KCWA is a special water district organized and existing under California Water Code Appendix, Chapter 99. KCWA is a contractor for water from the State Water Project. The State Water Project water is diverted to 15 member units and is used to irrigate, in whole or in part, more than 500,000 acres of prime farmland and to serve municipal water throughout Kern County, including the City of Bakersfield.

The Santa Clara Valley Water District
SCVWD is a special district organized and existing under California Water Code Appendix, Chapter 60. SCVWD's water supply includes water developed by both the Central Valley Project and the State Water Project. SCVWD's water supply serves approximately 1.7 million people in homes and businesses located throughout Santa Clara County, including the vital high technology industry in the area known as "Silicon Valley." SCVWD is a member agency of the SLDMWA.

Alameda County Flood Control and Water Conservation District, Zone 7
Zone 7 Water Agency is one of the 10 active zones of the Alameda County Flood Control and Water Conservation District. Zone 7 receives up to 75% of its water from the State Water Project. Along with flood protection, Zone 7 manages the local ground water basins and is the wholesale water supplier to all of eastern Alameda County and a population of more than 190,000. Treated water is sold to local retailers,including the cities of Livermore and Pleasanton, the Dublin San Ramon Services District, and the California Water Service Company. Zone 7 also distributes untreated water to local agriculture operations and golf courses.

The San Luis & Delta Mendota Water Authority
The SLDMWA is a joint powers authority formed pursuant to California Government Code section 6500 *et seq.* The SLDMWA consists of 32 member public agencies that contract with Reclamation for water supply from the CVP for distribution and use within areas of San Joaquin, Stanislaus, Merced, Fresno, Kings, San Benito, and Santa Clara Counties, California.

The Westlands Water District
WWD, a member of the SLDMWA, is a California water district formed pursuant to California Water Code section 34000 *et seq.* WWD holds contractual rights to receive water from Reclamation, through the Central Valley Project, for distribution and consumption within the areas of Fresno County and Kings County. WWD provides water for municipal and industrial uses, and for the irrigation of approximately 500,000 acres on the west side of the San Joaquin Valley in Fresno County and Kings County. WWD's farmers produce more than 60 high quality commercial food and fiber crops sold for the fresh, dry, canned and frozen food markets, both domestic and export. More than 50,000 people live and work in the communities, dependant on WWD's agricultural economy

<u>Other Delta Water Users</u>

Mirant Delta
Mirant Corporation owns and operates two natural-gas fired power generation plants on the Delta, one in Pittsburg and one in an unincorporated area of Contra Costa County east of Antioch. Both plants use water from the adjacent Sacramento River for power generation operations.

<u>Non-Governmental Organizations</u>

American Rivers
American Rivers is a national non-profit conservation organization founded in 1973 dedicated to protecting and restoring healthy natural rivers and the variety of life they sustain for people, fish, and wildlife. We deliver innovative solutions to improve river health; raise awareness among decision-makers and the public; serve and mobilize the river conservation movement; and collaborate with our partners to develop the Citizens' Agenda for Rivers which creates a unified vision for improving river health across the country. We have a membership of approximately 40,000. Our national office is located in

Washington, DC and we operate a regional office in the Northwest with locations in Seattle and Portland. In addition, we have six field offices in California, Connecticut, Nebraska, Pennsylvania and South Dakota.

The Bay Institute
The Bay Institute was founded in 1981 by pioneers of a new advocacy approach which viewed the entire Bay-Delta ecosystem as a single, interdependent watershed. They claimed that environmental reform benefiting the Bay must recognize the importance of events in the farthest reaches of the watershed just as urgently as those along the Bay shoreline, and that reduced freshwater flow was the biggest factor in the decline of the estuary's fish and wildlife resources.

Today, this approach is accepted wisdom. Tragically, it is also widely recognized that the water quality of the Bay and its river Delta is unacceptable, and that species and habitats are in danger.

The Bay Institute uses a combination of scientific research, political advocacy, and public education to work toward the environmental restoration of the entire watershed which drains into San Francisco Bay. This watershed includes the Sacramento River and the San Joaquin Rivers as well as their tributaries, Suisan Marsh, San Pablo Bay, and San Francisco Bay. The land area covers 40 percent of California. Nearly half of the surface water in California starts as rain or snow that falls in this area, and about half of that is diverted for use on farms, in homes, and in factories. The remaining water flows downstream through the largest inland delta, the largest brackish water marsh, and the largest estuary on the west coast of the Americas.

The Bay Institute's work encompasses the centers of political and economic power, from Sacramento to Los Angeles to Washington DC., where it fights to place long-term environmental needs on equal footing with other priorities in the formation of the area's environmental and economic policies.

California Farm Bureau Federation
The California Farm Bureau Federation is a non-governmental, non-profit, voluntary membership California corporation whose purpose is to protect and promote agricultural interests throughout the state of California and to find solutions to the problems of the farm, the farm home and the rural community. Farm Bureau is California's largest farm organization, consisting of 53 county Farm Bureaus currently representing approximately 91,000 members in 56 counties.

The Farm Bureau strives to protect and improve the ability of farmers and ranchers engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of California's resources.

Contra Costa Water
The Contra Costa Water District (CCWD) was formed in 1936 to provide water for irrigation and industry and is now one of the largest urban water districts in California and a leader in drinking-water treatment technology and the protection of the Sacramento-San Joaquin Delta (Delta). CCWD provides treated and untreated water to approximately 550,000

people in Central and Eastern Contra Costa County in Northern California. CCWD receives water under contract from the Central Valley Project and under its own water rights. All of CCWD's water supply is delivered through the Delta to the Contra Costa Canal or for storage in Los Vaqueros Reservoir, which is used for water quality control and emergency storage.

Defenders of Wildlife
Defenders of Wildlife is a national non-profit organization, with more than half a million members nationwide, of which more than 125,000 members reside in California. Defenders is dedicated to the protection of all native wild animals and plants in their natural communities. Defenders focuses its programs on addressing the accelerating rate of species extinction, loss of biological diversity, and habitat alteration and destruction. Defenders' California Program office is located in Sacramento, California, with additional offices in Bodega Bay, Monterey, Stockton, and Joshua Tree.

Environmental Defense
Environmental Defense is a national non-profit organization, with over 50,000 members residing in California. The organization seeks to link science, economics and law to create innovative, equitable and cost-effective solutions to today's most important environmental problems. For more than three decades, Environmental Defense has used technical, legal and political expertise to advocate for the protection and restoration of the San Francisco Bay-Delta ecosystem through water policy reform and market-based incentives to encourage efficient and equitable water use.

The Friant Water Authority
FWA is a joint powers authority formed pursuant to California Government Code section 6500 et seq. FWA, consisting of twenty water, irrigation and public utility districts in the southern San Joaquin Valley, operates and maintains the Friant-Kern Canal, which is a conveyance feature of the Friant Division of the Central Valley Project. Friant Division water supplies are made available pursuant to an exchange of San Joaquin River water rights that involves exports from the Delta. The Friant Division service area includes approximately one million acres and 15,000 mostly small family farms on the east side of the southern San Joaquin Valley (Merced, Madera, Fresno, Tulare and Kern Counties). Friant Division water supplies are also relied upon by several cities and towns, including the City of Fresno, as a major portion of their municipal and industrial water supplies. FWA also represents the interests of the four largest Cross Valley Canal contractors.

The Nature Conservancy
The Nature Conservancy is an international nonprofit membership organization, whose mission is to preserve plants, animals, and natural communities by protecting the lands and waters they need to survive. Founded in 1951, The Nature Conservancy and its more than one million embers have safeguarded more than 12 million acres in all 50 states and Canada. The Conservancy has also worked with like-minded partner organizations to preserve more than 100 million acres in Canada, Latin America, the Caribbean, the Pacific, and Asia. In California, The Nature Conservancy has protected more than 1.2 million acres, including over 10,000 acres in the Delta.

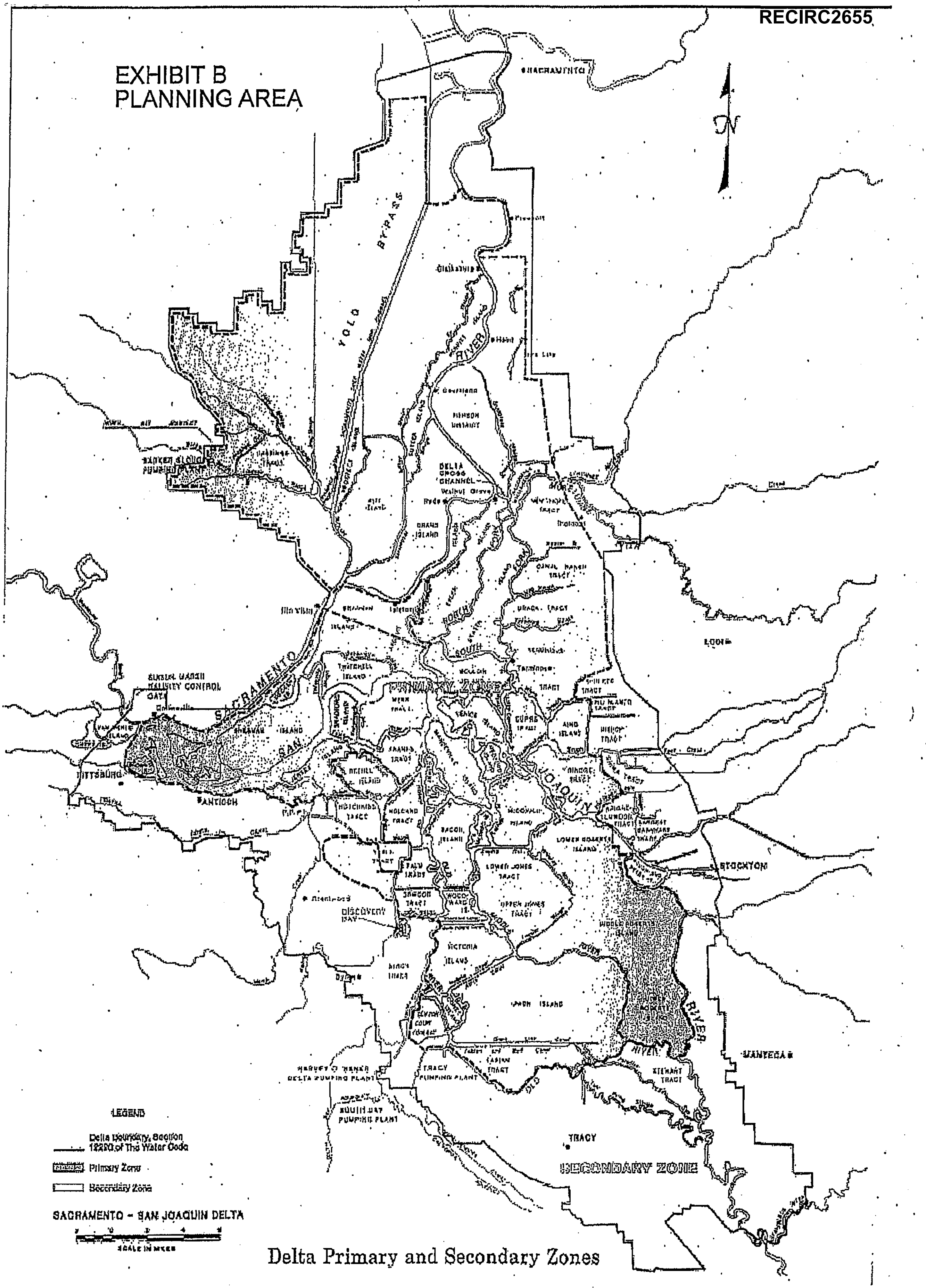
The Natural Heritage Institute

Natural Heritage Institute is a non-profit corporation organized under the laws of the State of California. Natural Heritage Institute's mission is to restore and protect rivers and other aquatic ecosystems in California, other states, and world-wide. It acts in two capacities: as a law firm which represents other conservation organizations and public agencies, and also independently on its own behalf. In these several capacities, since 1989 it has actively participated in regulatory proceedings to establish or modify water rights, water quality standards, and other requirements for the protection and restoration of the Bay-Delta.

North Delta Water Agency

The North Delta Water Agency (NDWA) was formed by a special act of the Legislature in 1973. Its boundaries encompass approximately 277,000 acres, including portions of Sacramento, San Joaquin, Solano, and Yolo counties. The NDWA administers a water rights settlement contract, entered into in 1981, with the Department of Water Resources for the protection of water rights and water quality for farmers and municipal water users in the North Delta. The 1981 Contract is essentially a guarantee by the State of California that, on an ongoing basis, suitable water will be available in the North Delta for agriculture and other beneficial uses. To that end, the Contract requires DWR to operate the State Water Project to meet specific water quality criteria for the Delta channels within NDWA boundaries while guaranteeing the water rights of NDWA water users against any challenge by the State of California. In return, NDWA makes an annual payment to DWR. In addition, the NDWA has assessment authority and collects assessments from property owners in the North Delta to fund the expenses and obligations of the Agency, including its annual payment to DWR. The NDWA is managed by a board of directors consisting of five members, each of whom is elected from one of the five divisions defined in the act forming the Agency.

EXHIBIT B
PLANNING AREA



Delta Primary and Secondary Zones

EXHIBIT C

III. Near-Term Funding

Subject to Section V, this MOA proposes to provide, over the next two years, $60 million in contributions for the BDCP, Species Recovery Capital Fund, Ecosystem Restoration Program, POD Studies, and the 100-Year Vision for the Future of the Delta. This $60 million does not include the value of the commitments made pursuant to Section III.E for the Environmental Water Account.

In order to provide sufficient supplemental funds, which when combined with state, federal and other funding that will enable implementation of priority ecosystem restoration projects for Delta pelagic and anadromous fish through the end of Stage 1 (December 31, 2007), the following near-term funding is proposed:

A. BDCP

1. For calendar years 2006 and 2007, the USBR and DWR on behalf of the State Water Project (hereinafter referred to as The Projects) shall contribute an aggregate of $3 million annually for the collective use of DFG, USFWS, and NOAA Fisheries for staff and administrative costs related to the development of the BDCP. The budget in Attachment A details how these funds are anticipated to be spent.
2. The Projects and/or other applicants who have activities that will be covered by the BDCP will develop a cost-share agreement as part of the application process for the BDCP, which may provide for reimbursement of the The Projects and/or other applicants if new parties are able to utilize work for which The Projects and/or other applicants paid.
3. DFG, USFWS, and NOAA Fisheries will expend contributions made under this section consistent Attachment A.
4. DFG, USFWS, and NOAA Fisheries shall seek additional contributions for agency costs from other BDCP participants.
5. DFG, USFWS, and NOAA Fisheries will apply for additional funding through a Federal Endangered Species Act (FESA) Section 6 application.
6. If new bond funds become available and are appropriated for this purpose, the contributions by The Projects for agency staff and administrative costs shall be reduced accordingly.

RECIRC2655

Attachment 12

Suisun Marsh Salinity Control Gates Salmon Passage Evaluation Report 2003

Department of Water Resources
And
Department of Fish and Game

May 2004

Adult Salmon Migration Monitoring, Suisun Marsh Salinity Control Gates, September – November 2003

Introduction

The 2003 adult salmon passage study is the third year of a planned three-year program to monitor the passage rate and passage time of migrating Chinook salmon (*Oncorhynchus tshawytscha*) past the Suisun Marsh Salinity Control Gates (SMSCG) in Montezuma Slough. Telemetry studies were begun in 1993 (Tillman *et al* 1996; Edwards *et al* 1996) to monitor and assess the effects of the SMSCG on migrating adult Chinook salmon, particularly federally listed winter-run which may be present in Montezuma Slough during the peak operating times of the gates, October – May. These studies showed that the gates did have a negative effect on salmon passage and recommended making modifications to the structure. In 1998, modifications were made to the flashboards to include 2 horizontal openings to increase passge rate and decrease passage time through the gates for migrating adult salmon Results from the 1998 and 1999 studies indicated that the modified flashboards did not improve salmon passage at the SMSCG (Vincik *et al* 2003).

Studies began in 2001 focused on the use of the existing boat lock as a fish passageway that was already a part of the SMSCG structure and could be held open during gate operations to allow salmon passge during periods when the flashboards were installed and the gates tidally operated (*2001 Suisun Marsh Salinity Control Gates Salmon Passge Evaluation Report. http://iep.water.ca.gov/suisun/dataReport/index.html)*. Fish passage through the gates was monitored during three operational configurations (phases) of the SMSCG including: flashboards installed, gates tidally operated, boat lock closed (Full Operation Phase), flashboards out, gates held open, boat lock closed (Full Open Phase), and flashboards installed, gates tidally operated, boat lock open (Modified Phase) (Figure 1).

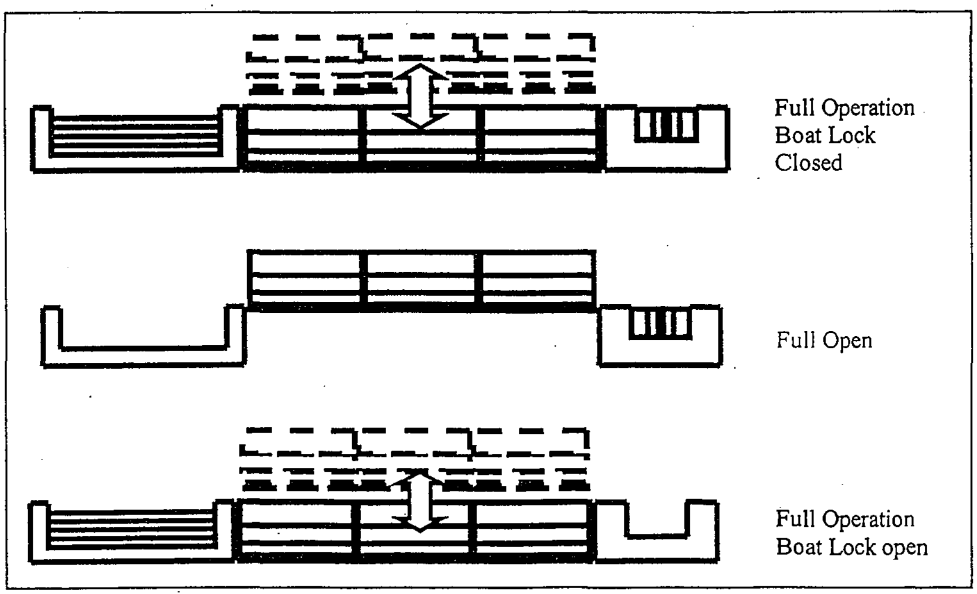


Figure 1. Three Operational configurations of the SMSCG.

These configurations were used in the 2001 – 2003 studies with the order of the operations changed per study year to determine if timing of the adult salmon migration had any affect on passage.

During the 2003 study a total of 163 adult salmon were captured using a large mesh gill net, measured to the nearest mm fork length, visually sexed and internally implanted with an ultrasonic transmitter. A Floy tag was attached externally just behind and below the dorsal fin the help identify any tagged fish that might be recaptured by the tagging crew. The address of the Stockton Fish and Game office was printed on each Floy tag to aid in the recovery of information from recreational anglers if the fish were caught. Salmon were tagged and monitored during September 30 – November 10:

Phase	Gate Configuration	Date	# of Tagged Salmon
I	Full Operation, Boat Lock Closed	9/30 – 10/13	54
II	Full Operation, Boat Lock Open	10/14 – 10/27	44
III	Full Open	10/28 – 11/10	65

Adult fall-run Chinook salmon were used as a surrogate for the federally listed winter-run with tagging being completed by October 31 which did not overlap with the time designated for the presence of winter-run in Montezuma Slough.

For the 2001 and 2002 studies, Sonotronics telemetry equipment was used to track and monitor tagged salmon. In 2003, due to equipment problems, Sonotronics equipment was replaced with Vemco brand products which required less maintenance and were easier to deploy in and around the SMSCG. Each ultrasonic tag was coded with a unique signal to identify individual tagged fish. The signals were recorded at stationary monitoring sites located upstream and downstream of, and on the SMSCG (Figure 2).

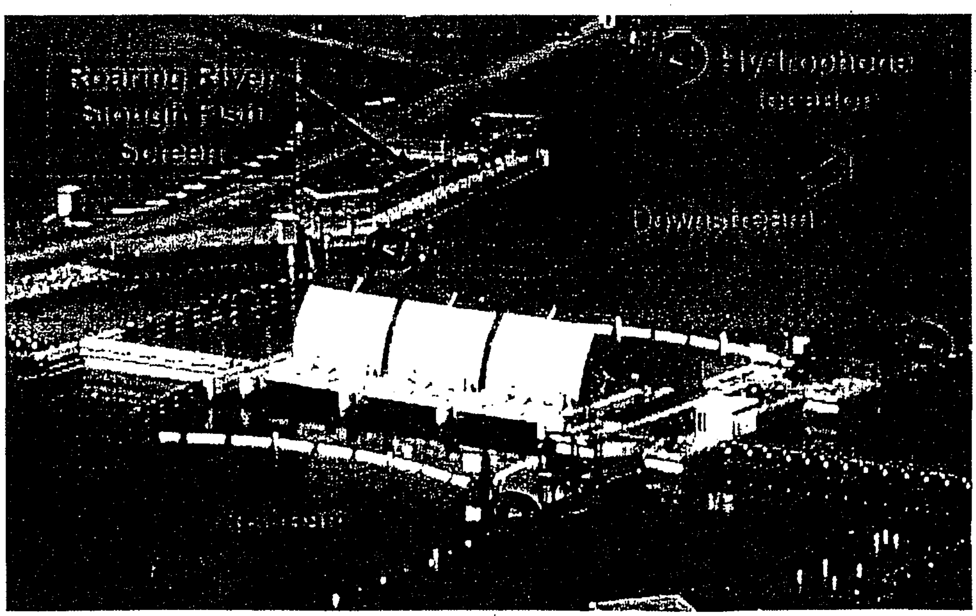


Figure 2. Location of hydrophones at the SMSCG Sept – Nov 2003

2003 Results

One hundred and three tagged salmon passed through the SMSCG during the 2003 tagging study representing 63% of the 163 total tagged adult fish. Fifty-two tagged salmon did not pass the gates(32%) having exited Montezuma Slough by going back downstream after tagging and 8 salmon were removed from the sample population due to non-detection or having died after tagging (5%). The highest percentage of tagged salmon passed the gates during the full open configuration (Phase III) and the lowest percentage of passage was during the full operation with boat lock closed configuration (Phase I) (Figure 3.)

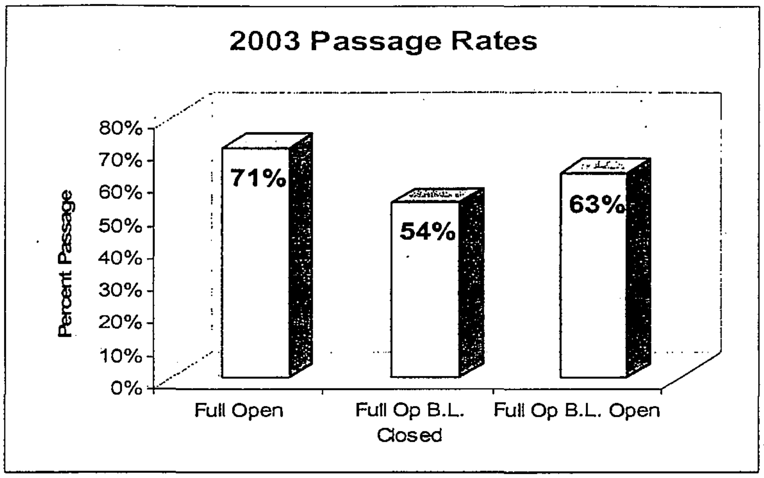


Figure 3. Passage rates by phase at the SMSCG, Sept – Nov 2003

The average passage time for tagged fish ranged from 1.2 to 229 hours with the full operational, boat lock closed configuration (Phase I) having the longest mean passage time, although there was no significant difference between each operational phase (Figure 4).

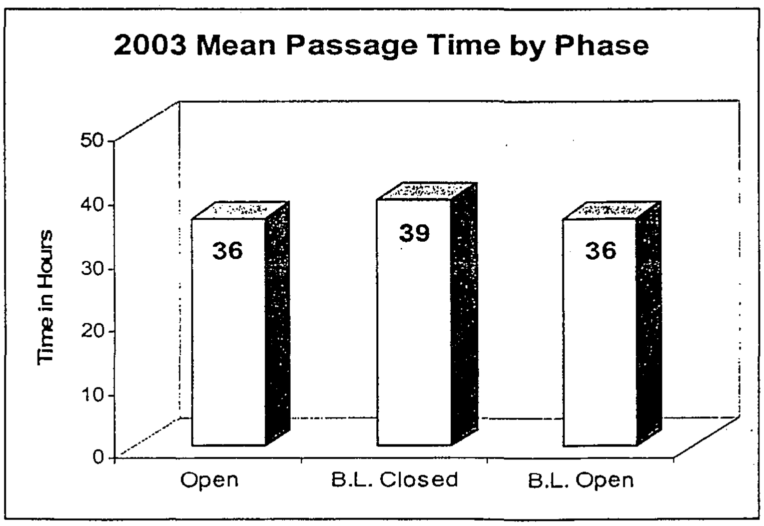


Figure 4. Mean passage time by phase at the SMSCG, Sept – Nov 2003

Tagged fish ranged in size from 600 to 1120 mm fork length and were evenly distributed between males and females.

Passage by Phase

Phase I (Full operation, boat lock closed) - 54% passed the gates with a mean passage time of 39 hours (1.5 to 211.0). During this phase, there were no tagged fish that moved back downstream after passing the gates. There were 2 tagged fish (4%) that had no records or were mortalities.

Phase II (Full operation, boat lock open) – 63% passed the gates with a mean passage time of 36 hours (1.9 to 229.0). During this phase, two tagged fish (5%) moved back downstream after tagging and three fish (7%) had no records or were mortalities.

Phase III (Full open) – 71% passed the gates with a mean passage time of 36 hours (1.2 to 209.0). During this phase, six tagged fish (9%) moved back downstream after tagging and three fish (4%) had no records or were mortalities.

The full open configuration had the best passage rate and was not significantly different from the boat lock open phase. There was a significant difference between the open phase and the boat lock closed phase. There was no significant difference in the passage times between each phase (Table 1).

Table 1.
Chi-square and probability for passage rates

2003

Phase I vs. Phase II: $\chi^2 = 1.51$, $P = 0.219$

Phase I vs. Phase III: $\chi^2 = 4.28$, $P = 0.039$*

Phase II vs. Phase III: $\chi^2 = 0.42$, $P = 0.517$

Kruskal-Wallis Analysis of Variance for passage times

Phase I vs. Phase II vs. Phase III: $P = 0.726$

* = Significant difference

Salmon Usage of the Boat Lock

During the phase II configuration (full operation, boat lock open), of the 29 tagged fish to pass through the gates eight (29%) used the boat lock for passage. One half (4) of the

2003 denotes the third year of a planned three-year study of the effectiveness of the boat lock for adult salmon passage at the SMSCG. Two out of the three years of the study show improvement in passage rates and passage time for tagged adult salmon, but the results from the 2002 study cannot be ignored. Further analysis and comparison of all three years and a possible forth year of the study in 2004 may help to validate the effectiveness of using the boat lock as a permanent means to facilitate fish passage in Montezuma Slough.

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Vincik, R.F., G.W. Edwards, G.A. Aasen, and R.W. Fujimura. 2003. *Suisun Marsh Salinity Control Gates adult salmon passge monitoring, 1998-1999.* Technical Report (unpublished), Interagency Ecological Program for the San Francisco Bay/Delta Estuary. 27pp.

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March 18, 2015

VIA EMAIL

Jacob McQuirk
Supervising Engineer
Bay-Delta Office
California Department of Water Resources
PO Box 94236
Sacramento, CA 94236

Re: Comments on Emergency Drought Barriers Mitigated Negative Declaration

Dear Mr. McQuirk:

These comments are submitted on behalf of Save the California Delta Alliance ("STCDA"). STCDA is headquartered in Discovery Bay, California. STCDA represents the interests of individuals who live and work in the Delta, including those with waterfront homes located in Discovery Bay, Delta-related businesses, and many who engage in all kinds of water-related recreation in the Delta. STCDA regularly turns out several hundred enthusiastic members at its town-hall-style meetings held in Discovery Bay.

Particularly relevant to these comments, STCDA represents the interests of thousands of boaters who regularly ply the waters where the proposed Drought Barriers ("Barriers") would be located.

We thank you for the opportunity to submit these comments and for considering the information we provide and for considering our views.

In short, we believe that the Mitigated Negative Declaration ("MND") is legally inadequate and request that the Department of Water Resources ("DWR") prepare an Environmental Impact Report ("EIR") before making any decisions about the proposed project.

STCDA is not necessarily opposed to installation of barriers or other measures to repel salinity if and when such barriers are actually needed and no other less drastic alternative is available. Indeed, hundreds of STCDA members are deep-water homeowners in Discovery Bay. Discovery Bay is vulnerable to salt water intrusion and it is of paramount importance to the Discovery Bay community to maintain Discovery Bay's freshwater habitat and recreational character. Boaters, in particular, do not want to see the mooring bays of Discovery Bay turn to salt water. Boaters who live and dock their boats in Discovery Bay have invested tens of millions of dollars in docks and other marine equipment designed for fresh water. They do not want to see their investments ruined by salt water intrusion.

However, we are concerned that the Project Description and other project documents would allow the Barriers to be installed and operated in order to facilitate inappropriate export levels at times of scarcity. The Project is designed to most efficiently channel reservoir releases to Jones and Banks, not to generally address salinity in the

Delta from a broader perspective. Looking at the ten-year duration of the Barrier Project, it is our position that in the near term combined SWP and CVP exports must be strictly limited to no more than 1,500 cfs at any time the Barriers are in place. We believe alternatives should be considered so that in the medium term exports could be further reduced at times of scarcity and with the long-term goal to eliminate exports during critical dry periods. We are also concerned that there are no quantified measures of what constitutes "critical levels" of reservoir storage that would justify erection of the Barriers and no explanation of how anticipated export levels would figure in the determination of "critical levels."

We also believe that the Barrier Project, as currently proposed, is not consistent with the Delta Plan (Attachment 1).[1] Delta Plan Policy WR-P1 requires those water agencies that contract for delivery of water through the CVP and SWP ("Water Contractors") include elements in their water management plans commencing in 2015 designed to achieve "measurable reduction in Delta reliance." Policy WR-P1 also requires that Water Contractors shall report the decrease in Delta water used. Delta Plan Policy WR-P1(c)(C). The Water Contractors have taken the position that they are not obligated to comply with Policy WR-P1. *See Delta Stewardship Council Cases,* Judicial Council Coordination Proceeding No. 4758, State and Federal Contractor Petitioners' Joint Opening Brief 12–24 (filed in Sacramento County Superior Court, October 15, 2014) (Attachment 2). However, the Water Contractors have *not* sought to enjoin enforcement of Policy WR-P1 during the pendency of the Delta Plan litigation. Therefore, the Delta Stewardship Council ("Council") is bound to enforce policy WR-P1 with regard to any covered action that comes before it during the pendency of the Delta Plan litigation. The Barrier Project is a covered action within the meaning of Water Code section 85057.5(a)(1)–(4). Non-compliant Water Contractors would receive otherwise unavailable Delta water as a result of the Barrier Project. Therefore, the Barrier Project is not consistent with the Delta Plan. *See* WR-P1 (a)(1).

The Barrier Project constitutes a ten-year plan for management of exports at times of critical drought. It is the policy of the State of California, directly binding on DWR, to "reduce reliance on the Delta" through "improve[d] regional self-reliance." Water Code § 85021. Through the planning tool of an EIR, DWR should consider the feasibility of reducing reliance on the Delta by reducing exports at times of critical drought to below 1,500 cfs. This is perhaps not feasible in year one or year two, but should be feasible in later years as the Water Contractors develop capacity for regional self-reliance as required by law. STCDA does not suggest that the health or safety of any resident of California be put in jeopardy by reducing exports below 1,500 cfs. We do suggest that by increasing regional self-reliance, exports at times of critical drought can be reduced, in the medium term, to less than 1,500 cfs and further significantly reduced (or perhaps eliminated entirely) in the long term without jeopardizing health and safety. Only a fully considered alternatives analysis will provide the information needed for informed decision-making and allow for project-specific measures reducing reliance on the Delta (such as requiring provisions for south-of-Delta storage of "drought reserves") in order to achieve substantial compliance with the Delta Plan and Water Code § 85021.

In documents issued after the completion of the MND, DWR itself has conceded that—with all proposed mitigation measures in place–the Barriers "would likely degrade water quality conditions for some areas in the western Delta, adversely affecting Delta fisheries and interfering with Delta boating and recreation." DWR, Emergency Drought Barriers Planning Update, February 2015, *available at http://www.water.ca.gov/waterconditions/docs/DWR_Emergency_Drought_Barrier_Factsheet_020615.pdf* (last visited March 13, 2015) (Attachment 3). Water quality and

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[1] Due to file size concerns, numbered attachments are submitted in separate consecutive emails and labeled as part of this submission.

navigational impacts degrade paramount public trust values. These, and other, significant unmitigated adverse environmental impacts require preparation of an EIR.

In the context of preparing a legally adequate EIR, we urge DWR to: 1) revise the Project Description to restrict exports to no more than 1,500 cfs at any time the Barriers are in place in the near term; 2) revise the Project Description to include quantified measures of what constitutes critical levels of reservoir storage, taking account of quantified anticipated export levels as part of the calculation; 3) evaluate an alternative, or alternatives, that consider reducing maximum exports during times of critical drought to below 1,500 cfs and progressively eliminating exports during such times; and 4) identify all significant adverse environmental impacts and adopt all feasible mitigation measures.

False, Unstable, Inadequate, and Misleading Project Description.

The Project Description states that the "purpose of the proposed project is to reduce the intrusion of saltwater into the Delta during drought conditions when stored water in upstream reservoirs is insufficient to meet Delta outflow required to repel San Francisco Bay salinity." MND 2-2. However, Delta "outflow … is largely determined by the difference between the total inflow from the Sacramento and San Joaquin Rivers and the total amount of water exported through the Banks and Jones pumping stations." *San Luis & Delta-Mendota Water Auth. v. Jewell,* 747 F.3d 581, 616 (9th Cir. 2014), *cert denied*. The project is designed to counteract decreases in Delta outflow and concomitant increases in salinity *caused by export pumping* at times of critical low flow. DWR has acknowledged in connection with Barriers (but not in the Project Description) that salinity is increased in the interior Delta as export pumping increases during times of low flow: the "reduction in EC [with Barriers in place] at exports varies with flows in the Sacramento River and combined SWP and CVP exports." Draft Emergency Barriers Report 12 (DWR 2009) ("Barriers Report") (Attachment 4). *See also* Description of Department of Water Resources Compliance with State Water Resources Control Board Water Right Decision 1641 1 (DWR 2006) (A "principal tool" for controlling salinity in the Delta is "reduction in Project exports") (Attachment 5). Larger releases from upstream reservoirs are needed to counteract the effects of pumping and the Barriers are designed to most efficiently direct upstream releases to reduce salinity at the pumping stations. However, one would not understand these dynamics from reading the Project Description.

As acknowledged by the MND, the Barrier Project is based on the Barriers Report. The Barriers Report's goal was to analyze measures to reduce salinity at export locations. The Barriers Report identified and analyzed "all possible locations where barriers could be installed to reduce sea water intrusion at the Banks Pumping Plant (SWP), Jones Pumping Plant (CVP), and the Contra Costa Water District Old River Los Vaqueros Intake (CCWD).[2] Barriers Report 2. The Barriers Report expressly did not

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[2] CCWD is not a water exporter but rather an area of origin user with superior appropriative water rights. Water Contractors have no water rights to Delta water, but only water supply contracts, and receive water as an act of administrative discretion under the terms of those contracts. CCWD's intake should be protected from salt water intrusion by appropriate reservoir releases and other measures. Such measures should be analyzed separately and not lumped in with exporters because CCWD's withdrawal rate is a small fraction of the SWP/CVP rate. As used herein, reducing and eliminating exports does not apply to CCWD and other indigenous water agencies although, of course, these agencies are obligated to take all reasonable steps to conserve water during times of drought.

evaluate "benefits [to] the environment, fishery resources, navigation, recreation," and other Delta values. Barriers Report 3. The MND considers *only* barrier locations identified in the Barrier Report. It does not consider locations or measures other than barriers that would prioritize in-Delta agriculture and Delta habitat. It is inaccurate to state that the objectives of the Project are to benefit in-Delta uses and the Delta environment. MND 2-3.

The Project Description states that the "project seeks to protect the quality of water for users that rely on Delta water." However, it appears that the Project Description equates mitigating salinity with water quality. Degradation of water quality from constituents other than salinity "could result from a reduction in the proportion of Sacramento River flow entering Sutter Slough and Steamboat Slough, coupled with reduced tidal action upstream from the EDB in these sloughs. This could lead to degraded water quality in portions of these sloughs." MND 3-41. No analysis of impacts on, or mitigations for, other constituents of water quality, such as dissolved oxygen and turbidity,[3] has been provided.

The Project Description is unstable as to whether the intent is to allow human health and safety levels of export or to allow increased levels of export. *Compare* MND 2-3 (The project purpose is to "maintain [CVP/SWP] access to water supplies for human health and safety."); MND 2-2 (With respect to CVP and SWP exports, the "barriers [are] necessary to protect water quality to meet health and safety *and other critical water supply needs*.") (emphasis added).

The Project Description is purposely vague as to what constitutes "reduced SWP water storage to critical levels such that projected Delta outflow could not control increased salinity in the Delta" triggering erection of the Barriers. MND 2-2. The Project proponents anticipate changing SWP/CVP operations and export levels to take advantage of the ability to export more water with less in-Delta flow but avoid defining even a range within which such changes would be implemented. The MND does not consider "changes in CVP/SWP operations that could result from implementing the proposed project." MND C-1. *See also* MND C-7.

<u>Failure to Identify Significant Adverse Impacts and Adopt Feasible Mitigation Measures.</u>

Impacts on Recreational Boating

Recreational boating is an important public trust use of navigable waters. The California Environmental Quality Act ("CEQA") requires consideration of, and mitigation for, a project's impacts on recreational boating. *See, e.g., Citizens for East Shore Parks v. Cal. State Lands Com.,* 202 Cal. App. 4th 549, 578 (2011). CEQA and the Public Trust Doctrine's protection of recreational boating is reinforced by express federal preemption prohibiting the State of California from interfering with the navigability of the Sacramento River and its associated sloughs. *See* An Act for the Admission of the State of California into the Union, Ch. 50, 9 Stat. 453 (1850) (Admitting California into

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[3] The MND analyzes effects of construction on turbidity. However *operation* of the Barriers may have significant impacts on turbidity and fish behavior. *See*, *e.g.,* Independent Review of the 2-Gates Fish Protection Demonstration Project (CalFed Science Program 2009), *available at* *http://www.science.calwater.ca.gov/events/reviews/review_2gates.html.* The 2-Gates related documents on the above website are incorporated by reference into these comments.

the Union only on condition that "all navigable waters within the said State shall be common highways, and forever free").

The MND concludes that Barrier impact on recreational boating would "be less than significant." MND 3-121. However, those impacted, recreational boaters, disagree. Please see a small sampling of comments from boaters submitted to DWR: Captain Frank Morgan (Barriers "would have a huge negative impact on my ability as a boat tour operator to travel the Delta waterways."); tournament bass fisher Roger Difate ("As a fisherman I must have the freedom to move freely through the Delta and as a tournament fisherman quickly moving from one area to another is essential … . The barriers will have a significant ADVERSE impact on the fishing and boating community"); Hank Andreotti (placement of Barriers "makes the Delta no longer free"); Mike Chase (The "dams will block routes that are popular for me and my family to use for recreation. We … want to have access and be able to travel freely throughout the delta."); Peter and JoAnn Sustarich ("ramps with boat trailers with State employees pulling boats up and down is now both sad and hilarious" and won't mitigate impact of Barriers); Charles W. Helfrick ("The proposed dams will chop up the Delta water ways causing much longer (using more fuel) trip time and will significantly ruin my boating experience" and noting that the "dams will impede my ability to move freely about the Delta."); Louis Erickson ("These dams will stop my ability to get to my anchorages and fishing grounds."); James Hall ("We have a trawler with a mast that would require hours rerouting to travel the same route."); Jan and Bob Rix ("[W]e are distressed to understand that we would not be able to take our favorite routes any longer due to the dams."); Timothy P. Hamm ("My family and I can't take our favorite route anymore and it will ruin our boating experience because the Delta is no longer free … please don't do this."); Blyth and David Bruntz ("[I]f the rock barriers were installed in the proposed locations, it would have a very adverse impact on our ability to navigate through the Delta waterways. Our cruiser (Damn Lucky) is 40' in length and 13' wide, therefore we would be unable to pass even the rock barrier that will have an accommodation to move smaller boats around it."); Rich Dooley (Barriers "mean we can't take our favorite route anymore and it ruins our boating experience because the Delta is no longer free."); Vinny DiNicola (opposing Barriers because "of the severe adverse impact this will have on our boating experience which has not been mitigated" and noting that "[i]t's unimaginable to no longer be able to use False River and freely pass through … Sutter Slough and Steamboat Slough to access Grand Island Mansion and the marinas south of the proposed barriers which will all be effectively cut off upon our return from Sacramento [back downriver to Discovery Bay]."); Robert A. Lee ("I was insulted that you thought recreational boating worth less than three pages [because] … the boating public would still be cut off from reasonable access to the South Delta and Bethel Island" and noting temporary ramps "would be of no use to me" and that Fisherman's Cut and Old River (suggested as alternative routes around the False River Barrier) "is not a safe place to navigate"); Scoutmaster William R. Richardson ("The rock dams will be detrimental to boating [and] in False River will cut off access to and from the San Joaquin River [and] will be devastating to those involved … with False River and Bethel Island."); Keith Ryan (noting that "it will take my 87 year old Grandfather 2 more hours when he motors his sailboat through this area [False River] and it will cost me an additional $130 of fuel when I take my cruiser through this area."); Chuck and Mary Niessen (noting "the dams would block our access to the boating waterways on the Delta."). The full text of the above-excerpted boaters' comments (as well as other boaters' comments) are attached hereto as Boaters' Comments Attachment and are worth reading in their entirety.

The Barriers will have a significant adverse impact on boating safety and the response time of emergency vessels. Currently, a Coast Guard or sheriff's vessel patrolling the Sacramento River near the heads of Steamboat and Sutter Sloughs can quickly travel down either of those sloughs to reach an emergency situation anywhere on those sloughs. With Barriers in place, those vessels would have to transit all the way down the Sacramento River and back up Sutter or Steamboat, delaying response time by *hours*. The same is true for vessels patrolling Steamboat or Sutter and needing to reach an emergency on the Sacramento River. At a minimum, DWR would need to provide funding to the Coast Guard, Sacramento County Sherriff, and Contra Costa County Sherriff to deploy at least three additional patrol boats during the time the Barriers are up in order to mitigate this public safety impact.

The MND observation that the Barriers will be in place only during the summer and fall months is of little solace: the overwhelming majority of recreational boating takes place during those months. The "opening day" of boating season is celebrated each year close to May 1. *See* California Delta Chambers and Visitor's Bureau website (Opening Day, April 26, 2015), *available at http://californiadelta.org/opening-day-on-the-bay* (last visited March 14, 2015). Recreational boat traffic in the Delta from November to May (when the Barriers are down) is minimal.

The MND fails to recognize and analyze the cumulative impact on recreational boating of the Barriers with *other* seasonal barriers that are already placed each season as part of the South Delta Temporary Barriers Project, which blocks recreational boating on four Delta waterways. Nor does the MND analyze the cumulative impact of the Barriers with other seasonal and non-seasonal barriers that are planned for various locations in the Delta, such as the Three Mile Slough Barrier Project. *See* Water Code section 85085. There are very few regulatory boating signs in the Delta prohibiting access or directing traffic. Boaters like it that way. At some point too many barriers in various locations around the Delta changes the character of the entire Delta. The free-spirited, free-roaming boating experience becomes confined, regulated, signalized, and ruined by too many barriers blocking navigation. Three more are three too many, especially where there has not been adequate analysis to demonstrate the infeasibility of other alternatives.

Impacts on Water Quality, Habitat, and Native Species; Unlawful Deferral of Mitigation

The MND does not analyze effects on water quality other than salinity and turbidity. Analysis of turbidity is limited to the construction and removal periods and does not take account of changes to turbidity brought by Barrier operation. Water quality is more than salinity. Water quality constituents for the Delta include Secchi depth, nutrient series (inorganic and organic N-P), water temperature, dissolved oxygen, turbidity, chlorophyll a, pH, phytoplankton, zooplankton, and benthos. *See* California State Water Resources Control Board Water Rights Decision 1641, as amended March 15, 2000, Table 5 at 192–193 ("D-1641") (Attachment 6).

For everything except salinity, the MND promises future undefined monitoring and mitigation measures. *See* MND Mitigation Measure BIO-6 at 3-45–46 ("BIO-6"). BIO-6 does not specify what constituents will be monitored and does not specify what levels will trigger action. BIO-6 provides only one possible response to undefined "water quality issues," which is to "open the slide gates of additional culverts." Each Barrier has four culverts. Figure C-9a shows very little difference in flow between having one culvert open and four culverts open. Peak flow of Steamboat Slough is about 4,000 cfs with no Barrier. With the Barrier in place, peak flow appears to be a few hundred cfs with four culverts open, giving DWR the ability to allow perhaps 10% of unrestricted flow by opening all culverts. *See* Figure C-9a at C-17. There is no evidence this would be adequate to mitigate water quality issues and degradation of habitat that results from decreased flows.

It is settled science that "water flow through the Delta is one of the primary drivers of ecosystem function." California Department of Fish and Game, Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta iii (2010) (Attachment 7). For "many species, more water flow translates into greater species production or abundance." *Id.* at 95. The Barriers will dramatically stabilize flow downstream of the Barriers. "Water flow stabilization harms native species and encourages non-native species." *Id. See also* California State Water Resources Control Board and California Environmental Protection Agency, Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem 5 (2010) (Attachment 8) ("Recent Delta flows are insufficient to support native Delta fishes for today's habitats.") (concluding that 60%–75% of unimpaired flow is required to support native fishes); Delta Stewardship Council, The Delta Plan ES-8 (2013) (noting that "guaranteeing adequate flows from the rivers feeding into and through the Delta channels" is vital); *see also id.* at ES-3 (noting that "we must provide adequate seaward flows in Delta channels, on a schedule more closely mirroring historical rhythms"). The above-cited references were written in the context of long-term Delta ecology. However, given the paramount importance of flow, and fluctuation in flow, scientific reasoning dictates that eliminating 90% of the high-quality Sacramento River flow from already heavily impacted Steamboat and Sutter Sloughs and making those sloughs static will cause severe water quality issues. Whatever levels of pollutants are present will be dramatically increased in concentration by cutting off the only source of dilution.

Preparation of an EIR with full analysis of water quality impacts is required because the Project may have a significant adverse impact on water quality parameters and the MND provides no evidence that it will not have such an impact. BIO-6 is an unlawful deferred mitigation and cannot be relied on to establish that water quality impacts will be less than significant.

"Generally, CEQA requires mitigation measures to be formulated in an EIR and not deferred to the development of future plans or measures" that are promised to mitigate impacts. *Center for Biological Diversity v. Dept. of Fish and Wildlife*, 183 Cal. Rptr. 3d 736, 754 (2015). The only exception allowed is where the deferred mitigation measure provides a performance standard that will be met and demonstrates that the impact can be mitigated in the manner described. *Id*. The deferred measures must "satisfy specific performance criteria *articulated at the time of project approval*." *Sacramento Old City Assn. v. City Council*, 229 Cal. App. 3d 1011, 1028–1029 (1991) (emphasis added).

DWR has not specified performance standards for water quality constituents other than salinity and construction period turbidity and has not demonstrated that water quality impacts could be mitigated by opening four culverts. With respect to salinity, DWR has provided a performance standard but has not demonstrated how that standard would be met.

Possible mitigation measures that should be evaluated in the context of an EIR include measures to offset water quality impacts of the project by reducing other sources of pollution. For example, DWR could provide grants and other financial and technical assistance to local farmers to allow them to reduce contaminants in agricultural return flows. Replacing aging irrigation systems with micro-irrigation is viable on some crops to reduce agricultural return flows and also produces superior crops. The operable gate barge design may also be shown to be superior to rock barriers when water quality impacts are properly analyzed.

<u>The Project Does Not Comply with the Delta Plan and Does Not Comply with Water Code Section 85021.</u>

In 2009, the Legislature found that the "Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis and existing Delta policies are not sustainable." The legislature responded to the crisis by enacting the Sacramento-San Joaquin Delta Reform Act of 2009, Water Code §§ 85000–85350 ("Delta Reform Act"). Underpinning the Delta Reform Act is the new policy of the State of California to "reduce reliance on the Delta" through "improve[d] regional self-reliance." Water Code § 85021. Reducing reliance on the Delta as a source of water exports is essential to the legislative directive to "[r]estore Delta flows and channels to support a healthy estuary and other ecosystem." Water Code § 85302(e)(4).

The drought barrier response of 1976, which the current project relies on as precedent, is out of step with current Delta policy. It does not reduce reliance on the Delta and degrades Delta flows in critical channels. The Drought Barriers may be necessary at some point to protect health and safety, but they are not an appropriate long-term policy response to the increasing likelihood of prolonged and severe drought in coming years.

The appropriate response is to plan ahead to *reduce or eliminate* exports at times of critical drought. Only if reduction or elimination of exports during times of critical low flow is inadequate to repel salinity should barriers be considered. And then barriers should be designed to benefit the Delta in a broader context, not as the most efficient way to deliver reservoir releases to Jones and Banks. It may be possible to adequately repel salinity from the south and central Delta by re-operating the Delta Cross Channel if exports are appropriately reduced in conjunction with re-operation.

In the context of EIR preparation, appropriate modeling should be conducted with ranges of reduced exports and re-operation of the Delta Cross Channel, rather than the static assumption of export levels of at least 1,500 cfs.

The modeling for the Drought Barriers assumes approximately 1500 cfs of exports for approximately five months each year that the Barriers are in place. That yields approximately 450,000 acre-feet in each drought year.

Water Code section 85021 requires a reduction in reliance on the Delta and Delta Plan Policy WR-P1 requires the Water Contractor beneficiaries of the Drought Barriers to demonstrate that they have taken steps to reduce reliance on the Delta or face the Barrier Project being held inconsistent with the Delta Plan and thus prohibited.

One reasonable starting point for reducing reliance on the Delta is to build a system of regional reserves to ride out periods of critical drought when exports from the Delta are most harmful. Providing new south-of-Delta storage to store drought reserves of 450,000 acre-feet is a difficult but manageable task. It could be accomplished within a ten-year time frame. Storage could be accomplished through groundwater banking, several small regional reservoirs, or some combination of both. These kinds of "soft," regional, small projects are the future of water planning in California. The Madera Irrigation District Water Supply Enhancement Project provides an example of groundwater banking CVP-delivered water for later use at times of scarcity. *See* Madera Irrigation District Water Supply Enhancement Project: Final Environmental Impact Statement and Record of Decision (Attachment 9). Our suggestion here does not ask Water Contractors to forego delivery of Delta water. It asks them to take water delivery at times of surplus and store it for use at times of scarcity, which was the original (now abandoned) premise of the BDCP's big gulp, little sip justification for new infrastructure. *See also* Delta Plan ES 6–7, titled "A Better System: Storing Floods to Ride Out Droughts (and Give the Delta a Break) (noting that the "Delta Plan calls for a rededication to the conservation idea of using aquifers like bank accounts; to be filled up in wet times, in order that they might be drawn from in dry.").

As a part of the EIR process, we encourage DWR to consider alternatives that include drought reserve storage in order to reduce and/or phase out exports at times of critical low flow.

The Barriers are also inconsistent with the Delta Plan because the change the character of the Delta as place by altering the fundamental character of recreational boating.

Conclusion

"And it never failed that during the dry years the people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way." John Steinbeck, *East of Eden*.

At this time of severe drought crisis, it is hard to think about providing for storage and storing water available at times of relative abundance for use at times of scarcity because for now there is simply no water available to store for prudent future drought reserves. But it is precisely at these times that we must break the cycle by thinking ahead to the next set of wet years and then dry years that will follow. The fact that we are perhaps facing the most prolonged drought in memory makes the task that much harder. In an era of severe droughts, the sources of "new water" to allow for storage of prudent drought reserves may include efficiency, reuse, and stormwater. *See* The Untapped Potential of California's Water Supply: Efficiency, Reuse, and Stormwater (Pacific Institute, June 2014) (Attachment 10). The Pacific Institute's suggestions (and the other approaches suggested in these comments) are in line with State policy expressed in the California Water Plan. *See, e.g.,* California Water Plan, Vol. 1, Ch. 2, Imperative to Invest in Innovation and Infrastructure (2013), *available at http://www.waterplan.water.ca.gov/cwpu2013/final/index.cfm*. The California Water Plan is incorporated by reference in its entirety in these comments.

If the problem statement is in the form of the question "How do we continue pumping at 1,500 cfs (or more) during times of critical low flow?" then the set of solutions is narrow. If the question is framed more broadly as "How, over the next decade, do we assure adequate health and safety supplies for users currently dependent on project exports and most effectively repel salinity from the central and south Delta?" then the range of possible solutions becomes broad and in line with current water law and policy.

We thank you for taking the time to read our comments and consider our views and the information provided.

We respectfully urge you to prepare an EIR and undertake the studies suggested herein.

Sincerely,

s/Michael A. Brodsky
Michael A. Brodsky

Boaters' Comments Attachment

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Three emergency barriers
Date: March 16, 2015 at 8:58 AM
To: Mike Brodsky michael@brodskylaw.net

People are sending in comments. This is short but to the point

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: Hank Andreotti <hankandreotti@gmail.com>
Subject: Three emergency barriers
Date: March 15, 2015 at 8:41:05 PM PDT
To: "DWREDBCOMMENTS@water.ca.gov" <DWREDBCOMMENTS@water.ca.gov>

I HAVE BEEN BOATING THERE FOR FORTY YEARS A I AM NOT READY FOR YOU TO TAKE MY RIGHTS AWAY AND BLOCK OUR ROUTES AND LIMIT OUR USE OF THE DELTA THIS MAKES THE DELTA NO LONGER FREE

Sent from my iPhone

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Opposition to Delta Dams
Date: March 16, 2015 at 8:58 AM
To: Mike Brodsky michael@brodskylaw.net

Another

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

On Mar 15, 2015, at 8:56 PM, Mike Chase <gmcraider@gmail.com> wrote:

Jacob McQuirk, Supervising Engineer, Bay-Delta Office -

I am opposed to the dams being proposed in the CA Delta without further study and appropriate impact analysis. As a boater, the dams will block routes that are popular for me and my family to use for recreation. We spend many weekends on the water and want to have access to be able to travel freely throughout the delta.

Please re-consider this effort.

--
Mike Chase
Walnut Creek, CA

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Re: Delta Dams
Date: March 16, 2015 at 11:18 AM
To: Mike Brodsky michael@brodskylaw.net

Jan

Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

On Mar 16, 2015, at 10:55 AM, Bill Helfrick <bhelfrick@mhtb.com> wrote:

I am a 25 year resident of Discovery Bay. The proposed dams will chop up the Delta water ways causing much longer (using more fuel) trip time and will significantly ruin my boating experience. The real beauty of the Delta is the ability to move freely from point to point. Right now I can leave my dock and go to Sacramento, San Francisco, Stockton and many other great destination in the Delta. The proposed dams will impede my ability to more freely about the Delta.

This proposal is not good for the Delta and those who use it. I respectfully request that you do not allow the dams to be installed.

Charles W. Helfrick, C.P.A.

bhelfrick@mhtb.com

661 Beaver Ct.
Discovery Bay, CA 94505
408-284-9925

.

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Delta rock dams
Date: March 16, 2015 at 11:19 AM
To: Mike Brodsky michael@brodskylaw.net

From: Louis Erickson <loueloue@pacbell.net>
Date: March 16, 2015, 10:56:01 AM PDT
To: "DWREDBCOMMENTS@water.ca.gov" <DWREDBCOMMENTS@water.ca.gov>
Subject: Delta rock dams

You people have no idea the severity of this blockage on or economy, lifestyle, and life in general.
I am a senior citizen and have been using the delta as my main travel conveyance since I was sixteen years old. These dams will stop my ability to get to my anchorages and fishing grounds. This will have a significant negative impact on my personal economics also as going way out of my way nearly every week will cost excessive fuel and ecological use. Do not put in these dams and block our use of the delta to facilitate sending our water south to Southern California water conglomerates. Do not even think about putting in the bypass tunnels. Please do not ruin my lifestyle I have had for over sixty years.
Louis Erickson
5647 Schooner loop
Discovery Bay Ca.
94505

Sent from my iPhone

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: TEMORARY BARRIER DAMS
Date: March 16, 2015 at 12:13 PM
To: Michael Brodsky michael@brodskylaw.net

Sent from my iPhone

Begin forwarded message:

> **From:** JAMES HALL <thecoldduck@sbcglobal.net>
> **Date:** March 16, 2015 at 12:08:22 PM PDT
> **To:** "stcda@nodeltagates.com" <stcda@nodeltagates.com>
> **Subject: Fw: TEMORARY BARRIER DAMS**
> **Reply-To:** JAMES HALL <thecoldduck@sbcglobal.net>
>
> On Monday, March 16, 2015 9:35 AM, JAMES HALL <thecoldduck@sbcglobal.net> wrote:
>
> I live in Discovery Bay and own property in Bethel Island. The dam project as proposed is hasty and not well thought out. We have commented before and the same comments are applicable to the current proposals.
>
> 1. The blockage of False river will cause many issues other than just make it significantly longer for us to travel. We have a trawler with a mast that would require hours rerouting to travel the same route.
> 2. Flows will be increased along Sandmound Sl and Dutch Sl that will cause damage to the levees and place docking vessels in more dangerous conditions.
> 3. Flows will increase through Fisherman's cut. This area has been studied by your own organization with results drawing the same conclusions.
> 4. The environment (fish) will be impacted in ways that have not been studied. This is a case of government "do gooders" trying to fix one problem and creating 2 more.
> 5. The delta is a fragile ecosystem that includes socioeconomic issues that out way getting water to the southern part of the San Joaquin valley to the big agrocorporations trying to turn desert into viable farmland at the cost of rich Delta farmland and the economics of the delta businesses and residents.
>
> Jim Hall
> 4657 Discovery Point
> Discovery Bay, Ca. 94505

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Delta dams
Date: March 16, 2015 at 1:44 PM
To: Michael Brodsky michael@brodskylaw.net

Sent from my iPhone

Begin forwarded message:

> **From:** "Jan Rix" <janrix@sbcglobal.net>
> **Date:** March 16, 2015 at 1:03:20 PM PDT
> **To:** <stcda@nodeltagates.com>
> **Subject: Delta dams**
>
> COPY
>
> **I oppose installing any dams in the Delta without a complete environmental review.**
>
> The DWR admits these dams will be detrimental to boating. An environmental review is needed to determine what the effect on migrating fish, impacts to the levees, boating and other environmental and economic problems.
>
> These new dams need a complete environmental analysis before approval, to determine if they will be harmful to migrating fish/
>
> If the plan is to remove the rock after the dams are removed, how will that be funded and how done.
>
> How will Antioch's water supply and western farms be affected if salt water is allowed to intrude nearly to Franks Tract and as far North as Steamboat and Sutter Sloughs?
>
> Why were LA's reservoirs and the Kern Water Bank "topped off" in 2013 during the 2nd year of a drought allowing the Northern California reservoirs to be at too low a level to support adhering to the legislative-directed salinity controls in the Delta?
>
> Aren't these dams really to continue to provide expanded water to the Central Valley farmers for almonds?
>
> As Discovery Bay Boaters, we are distressed to understand that we would not be able to take our favorite routes any longer due to the dams. We are most unhappy about this. The Delta has always been a great source of joy to us as we have been able to use our boats for different types of recreation and it has been an open and free environment.
>
> Jan and Bob Rix

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Re: Three “Emergency Barriers” (Delta Dams)
Date: March 16, 2015 at 1:45 PM
To: Michael Brodsky michael@brodskylaw.net

Sent from my iPhone

On Mar 16, 2015, at 1:31 PM, Tim Hamm <hamm@google.com> wrote:

> **To whom it many concern:**
> As a proud owner in Discovery Bay and avid boater...please don't do this.
>
> My family and I can't take our favorite route anymore and it will ruin our boating experience because the Delta is no longer free.
>
> Thank you for your time and consideration.
>
> Timothy P. Hamm
> Sr. Dir., Operations Mgr.
> *** Google Inc. ***
> US 925.548.8046 ---> I am here
> CH 159.0040.8031

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Three Delta Emergency Barriers (Rock Dams)
Date: March 16, 2015 at 1:48 PM
To: Michael Brodsky michael@brodskylaw.net

Sent from my iPhone

Begin forwarded message:

> **From:** Blythe Bruntz <blythe@dbruntz.com>
> **Date:** March 16, 2015 at 1:17:49 PM PDT
> **To:** DWREDBCOMMENTS@water.ca.gov
> **Subject: Three Delta Emergency Barriers (Rock Dams)**
>
> Jacob McQuirk, Supervising Engineer,
> Bay-Delta Office California Department of Water Resources
> PO Box 942836 Sacramento, CA 94236
>
> **Via E-Mail: DWREDBCOMMENTS@water.ca.gov Re: Three Delta Emergency Barriers (Rock Dams)**
>
> These are my comments in response to the Initial Study/Proposed Mitigated Negative Declaration Emergency Drought Barriers Project.
>
> The public deserves to have the complete analysis and alternatives studied that is part of a formal EIR/EIS process. **I am hereby requesting a full Environmental Impact Report be conducted before any dams are installed.** I believe the current declaration is not adequate and does not fully disclose significant unmitigated adverse environmental impacts. **An environmental review is necessary** to determine what the effect will be for local and migrating fish, impacts to the levees, impacts to water quality, as well as impacts to boating and other environmental and economic problems such as real estate values in the area. Another large concern is that the dams are not planned to be fully removed. What will that do to the water flow during high tides? Will it be safe to boat through?
>
> I have lived in Discovery Bay, CA on the water for almost 15 years. We also own a rental property in Discovery Bay. My husband and I own several boats which we use almost daily when weather permits (which is the reason we moved here in the first place). We own a wakeboard boat and wakeboard frequently, and we also own a cruiser. Whenever there is an option to go out to a restaurant located on the water, we prefer (and do) go by boat. We boat from Discovery Bay to: Bethel Island, Antioch, Pittsburg, Benecia, San Francisco, Petaluma, Tracy, Rio Vista, Tower Park, Stockton, Sacramento, and surrounding areas. In addition to patronizing the delta restaurants, we join cruise outs with the Discovery Bay Yacht Club spanning from overnight to weeks at a time.
>
> Regarding the False River site: the IS states that mitigation is the trailers they will use to haul boats around the dams. This is NOT at option for our cruiser boat as it is too large to be towed (we would also not be inclined to use a "universal trailer" for our smaller, although expensive wakeboard boat which requires a specific type of trailer to avoid damage).
>
> We believe that if the three rock barriers were installed in the proposed locations, it would have a very adverse impact on our ability to navigate through the Delta waterways. Our cruiser (Damn Lucky) is 40' in length and 13' wide, therefore we would be unable to pass even the rock barrier that will have an accommodation to move smaller boats around it.
>
> I am also extremely concerned about the effect that blocking water flow anywhere on the delta will have on our dire aquatic weed situation (i.e., water hyacinth, egeria densa, etc.). Will the weeds just become worse? **An environmental review is necessary.**
>
> Additionally, I'm concerned about what happens to everything south of the barriers. How will the barriers help the Delta as a whole? or does it just provide more "clean" water to the pumps so it can be pumped down south? I fully understand and recognize the water issues surrounding the Delta are complex and maintaining a delicate balance of the Delta system is difficult, however, I believe it would be irresponsible to move forward with any rock barriers anywhere on the Delta without fully understanding the potential impacts to "all" stakeholders involved. **An environmental review is necessary.**
>
> **For all of the reasons above, I implore you to require a full EIR/EIS before any action is taken to put dams (barriers) in the Delta.**
>
> Thank you for your consideration,
>
> Blythe and David Bruntz
> Residents and tax payers
> Discovery Bay, CA
>
>

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: DELTA DAMS
Date: March 16, 2015 at 2:11 PM
To: Michael Brodsky michael@brodskylaw.net

Sent from my iPhone

Begin forwarded message:

> **From:** rid57@comcast.net
> **Date:** March 16, 2015 at 1:57:25 PM PDT
> **To:** DWREDBCOMMENTS@water.ca.gov
> **Subject: DELTA DAMS**
>
> **I strongly appose the Delta Dams and water way restrictions you are trying to impose on Discovery Bay and South Delta Boaters. This will cause a significant economic impact to Bethel Island where I belong to a Yacht Club and use the boat Haul out and repair services of Bethel Harbor. If the the Dams are erected I will have to stop doing business with these two company's not to mention the restaurants and Marinas I frequent often on Bethel Island and Isleton. This would also mean we can't take our favorite route anymore and it ruins our boating experience because the Delta is no longer free.**
>
> **Regards,**
>
> **Rich Dooley**
> **791 Beaver CT.**
> **Discovery Bay, CA**

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Comments on Emergency Drought Barriers Mitigated Negative Declaration
Date: March 16, 2015 at 3:21 PM
To: Michael Brodsky michael@brodskylaw.net

This is a good one

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: Vinny DiNicola <vdinicola@hotmail.com>
Subject: Comments on Emergency Drought Barriers Mitigated Negative Declaration
Date: March 16, 2015 at 3:07:51 PM PDT
To: "DWREDBCOMMENTS@water.ca.gov" <dwredbcomments@water.ca.gov>

To: Jacob McQuirk, Supervising Engineer, Bay-Delta Office
California Department of Water Resources

The mitigated negative declaration is inadequate and does not disclose significant unmitigated adverse environmental impacts. I request that you prepare a full Environmental Impact Report.

My wife and I reside at 4437 Clipper Drive Discovery Bay, CA. We've been boaters on the California Delta since 1995 and have lived in Discovery Bay on the water since 2003.

I oppose a proposal to install drought barriers in the Sacramento Delta because of the severe adverse impact this will have on our boating experience which has not been mitigated. False River is a regular passage we take on our way to San Francisco, and Rio Vista and it's been our regularly traveled route to those destinations and others located west of the proposed barrier. Before moving to Discovery Bay, we docked our boat for years in a rented slip on Bethel Island, so we know the area very well and use the False River passage often. It's unimaginable to no longer be able to use False River and freely pass through as in the past. Sutter Slough and Steamboat Slough are also navigable waterways we use on our way up to Sacramento and into the American River and back down to Grand Island Mansion and the marina's south of the proposed barriers which will all be effectively cut-off upon our return from Sacramento.

My contact information is:

Vinny DiNicola
4437 Clipper Dr.
Discovery Bay, CA 94505
925-550-6743

RECIRC2655

mbrodsky@cruzio.com: **INBOX** **Sign Out**

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Subject: Fwd: Opposition to Dam installation without an EIR
From: "Janet McCleery" <janmccleery@yahoo.com>
Date: Mon, 16 March, 2015 8:58 am
To: "Michael Brodsky" <mbrodsky@aya.yale.edu>
Priority: Normal
Preferences: View Full Header | View Printable Version | Download this as a file | Spam | Bounce | Add to Address Book

This is from Pete - it's very good

Jan

Janet McCleery I janmccleery@yahoo.com

Begin forwarded message:

From: Peter Sustarich <capnpete@yahoo.com>
Subject: Opposition to Dam installation without an EIR
Date: March 16, 2015 at 7:26:52 AM PDT
To: DWREDBCOMMENTS@water.ca.gov

Attention: Jacob McQuirk, Supervising Enginerr, Bay-Delta Office
California Department of Water Resources

Overall I oppose installing any dams in the Delta without a complete environmental review (EIR). An environmental review is needed to determine what the effect will be for local and migrating fish, impacts to the levees, impacts to water quality, impacts to boating and other environmental and economic problems. Another huge concern would be the adverse effect it may have on the value of Real Estate in the area.

1) These DAMS will have an adverse effect on boating, but it is difficult to quantify this without an EIR. Just as the installation of these DAMS are designed to restrict the water flow, they will also restrict the flow of fish and other things that use the water for transportation, like boating.

RECIRC2655

Boating is a critical part of the Delta and SF Bay, and boaters like ourselves, use these "open waterways" for a variety of recreational and sporting activities both around the Delta and to and from SF Bay. As it relates to boating, when you start to DAM portions of these open waterways, you will inhibit boat travel which at best will result in more fuel used to get from point A to point B and at the worst will close off parts of the Delta to boat traffic. And the "solution" for mitigating boating traffic on Steamboat Slough that is outlined in your document 3.15.5 b) made me laugh at 1st. Now the thought of ramps with boat trailers with State employees pulling boats up and down is now both sad and hilarious. I have told this to friends and family and they thought I was making it up. This restriction on boating will effect communities and local economies. But of course this can not be quantified because the EIR process is not being followed. **An EIR is warranted!**

2) It is an unknown what effect these DAMS while have on migrating fish? It is my understanding that the old 2-Gates Fish Protection Project which employed another scheme of dams and gates that were proposed for salinity control, were withdrawn due to the likely negative effect on fish. These new dams need a complete environmental analysis before approval. **An EIR is warranted!**

3) The recent hyacinth problem in the DELTA, I understand, is worse this year due to the lack of water flow and these DAMS will only have the probable chance of exacerbating this and with an UNKNOWN environmental impact. These DAMS could also restrict the flow so adversely that it could permanently block the areas around the DAMS with the buildup of plants like hyacinth with no place to go. **An EIR is warranted**

Although our concerns about theses DAMS focuses on the Delta itself, it must be pointed out that the Delta is only part of a delicate system connecting to the San Francisco Bay. So the risk of any unintended
consequence of these DAMS " could" not only have an adverse effect of the Delta environment and economy but the the environment of the entire SF Bay and surrounding communities. At this stage I don't think you could say with certainty that it won't because the EIR process was bypassed. **So again this should be evaluated with a proper EIR.**

Sincerely

Pete and JoAnn Sustarich
Residents and tax payers

RECIRC2655

Harold & Patricia Whitlow
4831 Cabrillo Point
Discovery Bay, CA 94505

March 16, 2015

Jacob McQuirk
Supervising Engineer
Bay Delta Office, California Department of Water Resources
P. O. Box 92836
Sacramento, CA 94236

Comments on Emergency Drought Barriers Mitigated Negative Declaration

The mitigated negative declaration is inadequate and does not disclose significant unmitigated adverse environmental impacts. We request that you prepare a full Environmental Impact Report particularly since the project covers a period of ten years. Further as suggested by PICYA and others: funds be provided and set aside at the beginning to remove these barriers immediately if there is no longer a need for them. What are your plans for dealing with the large volume of "water weeds" that will accumulate near the dams and make navigation impossible?

Our contacts with the Delta began near the end of WWII when Hal visited his grandparents who were living on a houseboat anchored at Bethel Island. Later as members of the Berkeley Water Ski Club we boated from their 2 locations in the Delta near Old River. Then we joined the Golden Anchor Boat Club in Tracy and visited the Delta from that location. In the early 70's we bought our first lot in Discovery Bay, moving here full time in 1976. We are members of the Discovery Bay Yacht Club (which has 499 members) and the Weber Point Yacht Club. We boat regularly in the Delta and San Francisco Bay.

We do not normally boat in the area of Sutter Slough and Steamboat Slough so will limit our comments to False River. For the past 10 plus years we have personally led fleets of boats from both Weber Point and Discovery Bay via False River on our annual trip to marinas in the Bay Area. This year the DBYC cruise was oversubscribed and attendees were selected at a drawing in January. At present, in addition to the attendees, there are a large number of cruisers on the wait list in the hope an opening occurs. Discovery Bay also has an active small boat program cruising out each Wednesday night in the summer to local marinas, including those on Bethel Island. Our boat is too large and too heavy to be transported across the barriers as are almost all cruisers.

Hal Whitlow, Past Commodore DBYC 1983
Patricia Whitlow, Past Commodore DBYC 1989, Past Commodore Weber Point 2013

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: COMMENTS ON EMERGENCY DROUGHT BARRIERS MITIGATED NEGATIVE DECLATION
Date: March 16, 2015 at 4:38 PM
To: Michael Brodsky michael@brodskylaw.net

This ones really good - cites from the IS

Sent from my iPhone

Begin forwarded message:

> **From:** Robert Lee <boblee388@yahoo.com>
> **Date:** March 16, 2015 at 3:38:01 PM PDT
> **To:** "DWREDBCOMMENTS@water.ca.gov" <DWREDBCOMMENTS@water.ca.gov>
> **Subject: COMMENTS ON EMERGENCY DROUGHT BARRIERS MITIGATED NEGATIVE DECLATION**
> **Reply-To:** Robert Lee <boblee388@yahoo.com>
>
> Dear Mr. McQuirk:
>
> I have recreationally boated on San Francisco bay and the Delta since 1958 - that's 57 years! I currently have a 34-foot trawler type power boat and belong to several yacht clubs or associations. Two of these, Coyote Point Yacht Club and the San Francisco Bay Area Nordic Tug Association, are based on San Francisco Bay. I cruise from the Delta (where I have lived for the past 15 years) to San Francisco Bay many times a year, and always use False River, as do many Bay and Delta boats.
>
> The mitigated negative declaration is inadequate and does not disclose significant adverse environmental impacts. I request that you prepare a full Environmental Impact Report.
>
> I was insulted that you thought recreational boating worth less than three pages in the Mitigated Negative Declaration. After spending few paragraphs discussing marinas, boating and 6.4 million boating-related Delta visitor days, how can you conclude tha*t "the proposed project will not have a substantial adverse effect on recreation because:"*
> *1) "public notices would be posted"* The fact is the boating public would still be cut-off from reasonable access to the South Delta and Bethel Island and its recreational boating business.
> 2) "*temporary boat transfer ramps would be provided to facilitate navigation"* Those facilities would be of no use to me with a 34 foot boat displacing over seven tons.
> *3) "alternative routes would be available" One,* Fishermen's Cut is not a safe place to navigate, for a boat of my size, except at slack before ebb, which occurs only twice in 24 hours. The other is to use Old River (incorrectly called "East False River") to connect to the San Joaquin River. This passage has a very narrow usable channel and has no proper aids to navigation. Further it would double my transit time to Pittsburg Marina (a frequent destination)
> and significantly increase exposure to large commercial ship traffic. I would be unable to use False River to safely avoid the often dangerously high winds and resultant "fetch" in the area .
> 4) *"the proposed project would be a limited size and of short duration."* Meaning we should be pleased the proposal is not for more dams! The timing is at the peak of our season and I understand the source of funds for the removal of the dams has not been approved, possibly making the dams permanent?
>
> The analysis of the impacts of the three dams is woefully incomplete and based on outdated data. The "Mitigated Negative Declaration" shows an overwhelming need for a full Environmental Impact Report to assess the true impacts, to Bay and Delta boaters, and the environment.
>
> Thank you.
>
> Sincerely,

RECIRC2655

Robert A. Lee
2225 Cypress Pt.
Discovery Bay, CA 94505

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd:
Date: March 16, 2015 at 4:42 PM
To: Michael Brodsky michael@brodskylaw.net

Sent from my iPhone

Begin forwarded message:

> **From:** "William R. Richardson" <wrrichardson@earthlink.net>
> **Date:** March 16, 2015 at 4:14:26 PM PDT
> **To:** "Jacob McQuirk" <DWREDBCOMMENTS@water.ca.gov>

Mr. McQuirk:

Following are my comments in opposition to DWR's proposal to install rock dams in three Delta locations: 1) In False River west of Franks Tract, 2) in Sutter Slough and 3) in Steamboat Slough, and also wherever DWR unilaterally wants to place dams over the next ten years, also doing so without a proper EIR/EIS process. I object to giving DWR carte blanche on such crucial decisions today without any knowledge of what the greatly variable circumstances might be in the future, especially when the circumstances existent today have not even been affirmatively shown by DWR to be favorable to the Delta, and not harmful, for installation of the three rock dams proposed.

In addition, the state's mismanagement of California's water system, the flagship being the BDCP project and its complete disregard for the existing statutes and processes which are intended to protect the Delta, offers no assurance that DWR will make decisions on behalf of the Delta, rather than on behalf of continuing water grabs for interests south of us.

As just one example of the bias and ineptitude in the state's decision-making process, in 2013 USBR and DWR approved releases of water from Northern California dams to completely fill Los Angeles reservoirs and the privately-held Kern Water Bank. That action was totally irresponsible and made Northern California's drought water crisis worse than if it had been managed by competent, unbiased engineering judgment, rather than by politics accompanied with money, which talks. Are these rock dams being guided by the 2013 principles? What principles will prevail when it comes time to remove them?

The rock dams are reminiscent of other state water plans, because they divert the fresh water supply through the Delta to the east side so it arrives at the Clinton Forebay, signed, sealed and ready for delivery south.

That diversion appears to be your real objective with the rock dams, and you appear not to want a proper EIR/EIS process because that might upset your pre-determined plans, timetable and commitments. The impacts of the rock dams are so extensive that they cannot be predicted without a thorough environmental review, done honestly, which will show whether the benefits outweigh the negative impacts.

These three rock dams are nothing like, for example, filling in a lone empty lot in downtown Sacramento with a building where all of the impacts, such as traffic, parking, pedestrians, public transportation, utilities, shading, etc., have previously been addressed in a master plan. Those are circumstances where a negative declaration might be appropriate. There is nothing equivalent in three rock dams around the Delta, Mr. McQuirk. Tampering with the Delta is nothing like that vacant lot.

DWR has already admitted the obvious. The rock dams will be detrimental to boating. It will also be harmful to California's boating economy as well. DWR does not state whether or not the rock dams cause issues with migrating fish; water flow and erosion of levees; invasive aquatic weed infestations; and much more. Informed, scientific/engineering statements must be made on all of those pertinent subjects. The Delta does not need to regret another mistake in the future, like emptying our water reservoirs in 2013, when such a mistake can easily be avoided by just doing the right thing now.

I have boated in the lower part of the Delta for over 45 years, primarily in the area from above Rio Vista through San Francisco Bay. As a scoutmaster for nine years, my troop spent many summers boating and water skiing from Brannan Island SRA and I still boat in that vicinity. For the past twenty years I have lived on deep water in Discovery Bay, with my boat at my own dock in the bay behind my home. The rock dam in False River will cut off access to and from the San Joaquin River. It will be devastating to those involved in any "way" with False River and Bethel Island. Those "ways" must first be thoroughly evaluated.

I rely on businesses located on Bethel Island. I purchased my boat there from Carter's Marine. The boat traffic, stopped by the False River rock dam, will obviously have a negative financial impact on Bethel Island businesses. It is imperative that DWR also reveal the impact of water currents on Bethel Island's levees, the water coverage of Franks Tract and all other aspects an EIR/EIS will study.

One of many loose ends in your cursory analysis of this serious problem is, what happened to protection of Antioch's salt-free domestic water intake, and western farms, by keeping the salinity line west of Pittsburg? Is it your intent to just ignore that criteria?

Other circumstances that a proper EIR/EIS must address are:

- Your suggestion, surely tongue-in-cheek, to portage boats around the rock dams without any consideration at all of boat size, type or feasibility. Are you aware that the trailer's supporting rails must be fitted to the boat's hull to prevent damage?

- The position of Bethel Island as the boating hub of the Delta, which has led to the only fire boat for East Contra Costa County being located there, and one of two Vessel Assists in the Delta (the other is in San Francisco) being located there. These emergency services are on Bethel Island for an important reason. Doesn't your False River rock dam seriously and negatively impact their ability to perform successfully?

- The Initial Study appears incomplete, because the impacts of rock dams at Sutter Slough and Steamboat Slough on intakes for adjacent communities and farm houses have not yet been analyzed. How can that be?

Please abort your activities on these three rock dams and, instead, prepare a proper and complete environmental analysis under the law so that everyone involved will have the information needed to make intelligent and informed decisions on behalf of the Delta about all rock dams. Thank you.

William R. Richardson

1774 Seal Way

Discovery Bay, CA 94505

(925)516-9500

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Delta Dam comments
Date: March 16, 2015 at 4:43 PM
To: Michael Brodsky michael@brodskylaw.net

Sent from my iPhone

Begin forwarded message:

> **From:** "Keith Ryan" <keith-ryan@comcast.net>
> **Date:** March 16, 2015 at 4:32:00 PM PDT
> **To:** "'Janet McCleery'" <jmccleery@duckpondsoftware.com>
> **Subject: FW: Delta Dam comments**
>
> sorry, forgot to blind cc you.
>
> **From:** Keith Ryan [mailto:keith-ryan@comcast.net]
> **Sent:** Monday, March 16, 2015 4:30 PM
> **To:** 'DWREDBCOMMENTS@water.ca.gov'
> **Subject:** Delta Dam comments
>
> **Attention Jacob McQuirk**
>
> **I am opposed to the proposed dams. I live in Discovery Bay for close to 30 years. The following are my concerns;**
>
> **1. No EIR report completed**
> **2. more fuel cost and wasted time due to longer route to Antioch and beyond for all boaters that travel this route. Does not sound like much but for example it will take my 87 year old Grandfather 2 more hours when he motors his sailboat through this area and it will cost be an additional $130 dollars of fuel when I take my cruiser through this area.**
> **3. Safety; will take longer for emergency services that have to travel through this area; for example yesterday I heard there was a high speed motorcycle chase that ended at the Antioch bridge with the suspect threatening to jump off the bridge. The Contra Costa Sheriff departments Marine division was called to assist below the bridge in case the suspect jumped or fell. The boats top speed is about 45 MPH and if this barrier had been in place it would take up to an additional 20 Minutes to arrive at the scene.(Fortunately the officers on the top of the bridge were able to apprehend the suspect.)**
>
> **Best to wait until an EIR report is complete. Thanks for letting me comment.**
>
> **Keith Ryan**

From: **Jan McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: dams in Delta
Date: March 16, 2015 at 4:43 PM
To: Michael Brodsky michael@brodskylaw.net

Sent from my iPhone

Begin forwarded message:

> **From:** Chuck & Mary Niessen <niessen@sbcglobal.net>
> **Date:** March 16, 2015 at 4:35:17 PM PDT
> **To:** "dwredbcomments@water.ca.gov" <dwredbcomments@water.ca.gov>
> **Cc:** "stcda@nodeltagates.com" <stcda@nodeltagates.com>
> **Subject: dams in Delta**
> **Reply-To:** Chuck & Mary Niessen <niessen@sbcglobal.net>
>
> We are writing to you in regards to the building of the three "Emergency Barriers" or Delta Dams.
>
> We are opposed to installing any dams in the Delta. A complete Environmental and Economic Impact review should be done on the impact of the dams. The dams would be detrimental to the fish, recreational boating and the businesses on the Delta.
>
> We live in Discovery Bay the dams would block our access to the boating waterways on the Delta.
>
> Sincerely,
> Chuck & Mary Niessen
> 281 Discovery Bay
> Discovery Bay CA 94505
> 925-240-8281

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: emergency drought barrier sent my comment letter heres copy for you
Date: March 17, 2015 at 5:07 PM
To: Michael Brodsky michael@brodskylaw.net

This is good - it's from the rancher on Bradford Island.

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: fivepalmscattle@yahoo.com <fivepalmscattle@yahoo.com>;
To: DWREDBCOMMENTS@water.ca.gov <DWREDBCOMMENTS@water.ca.gov>;
Subject: emergency drought barrier
Sent: Tue, Mar 17, 2015 10:18:13 PM

Mr Jacob Mcquirck

The emergency drought barriers project and the installation of three dams in the Delta needs a complete and full EIR. The mitigated negative declaration is full of inaccuracies and mis information. And a lack of extremely important information.

Such as..section 3.15.2 States minimal impact to recreation. Do you really think that closing down a major water way during the prime boating season is a minimal impact . West False River is the main route boaters use when they're heading out towards the bay or coming in to Franks tract and points beyond for a day of fishing, boating ,water sports, dining, camping etc. This would not be a minimal impact,this would be HUGE. E conomic losses to businesses east of the barrier should be addressed, they are not.

Section 3.14 emergency response...sheriff's Marine Patrol is despatched from the base of the Antioch bridge. Having to go all the way around Bradford island would add additional response time to any water emergencies east of the barrier. This is a HUGE impact.

Section 2.7.3. ..encouraging boaters to use the narrow and already overcrowded Fishermans Cut as an alternative route, is an invitation to disaster. Advising more boaters to use a very narrow cut, that is favored by water skiers and wake boarders, is simply bad planning. You are putting all the pieces in place for some horrific water accidents. Also having many more boats zooming in and out of Fishermans cut makes an extremely dangerous situation for our ferry and the public that's riding on it.

Section 3.1.1. Have you looked at the site Mr Mcquirk ? This section says there are row crops and orchards on either side of the West false River barrier. There are no row crops and orchards and there haven't been for at least 20 years that I know of.

Section 3.4. Your report says nothing about the protected Pacific Flyway and interfering with migratory wildlife corridors in the West False River area. There is no mention of the threatened greater sandhill cranes that spend every winter on my property. How will the construction disturb them? The only mammal you mention is a bat. How about my cattle, my livelihood, what are the impacts to them? W ill there be large concentrations of salt west of the barrier, where I draw drinking water for the cattle ?
Extremes of noise ,dust, vibration, strange equipment, and strange people are worrisome to cattle.They aren't calmly grazing, they are on the move because they are worried. THis can be a HUGE economic impact to me.

I didn't see anything about water hyacinth in the MND. What happens when the hyacinth backs up against the barrier and moves all the way up to Franks tract and blocks off the ferry passage ? This is our only access to our properties.

Additionally, the expected increase in velocity of the water in Fishermans cut, along with the extra boat traffic will thrash private landowners boat docks and boats that are tied. Swimming with our grandchildren and floating on a raft will be dangerous and next to impossible.You will have ruined our quiet enjoyment of our property. Besides thrashing our docks the additional boat traffic will cause waves and wash that will damage the levee. This is a HUGE impact.

On the north end, several landowners, including myself are protected by a large tule berm.Will the expected increased flows cause the tule berm to erode, thereby exposing the levee to more damage in that area ? Many tule berm in the Delta are protected and managed by various agencies due to the unique habitats they provide to several species of water fowl, reptiles and mammals The MND does not address this at all.

Taking into account a 60 day installation and a sixty day removal, the West false River barrier will be in place for approximately 75 days. How much salinity intrusion can be reduced in that short period of time ? it's my belief that the whole purpose of the emergency drought barriers at West False River is to get the permanent abutments in so you can hang a permanent gate there in the near future, perhaps an Obermeyer gate. Wonder where the next gate is going to go, maybe 3 Mile Slough, near the bridge. No impact to recreation, you say, I strongly disagree.

I also would like to take this opportunity to thank you for building a wonderful bridge from Jersey island to Bradford island. Bradford island has never had the pleasure of hosting the levee destroying, hole digging, disease carrying, burrowing vermin, the ground squirrel. Bradford island has never had any ground squirrels but, thanks to this lovely new barrier we will have thousands.

I am requesting a public meeting in our area to go over the many impacts not addressed in your mitigated negative declaration.Dont just send out a badly flawed report, step up to the plate and and face the impacted people of the Delta who have relevant questions and want real answers.
This comment letter barely scratches the surface of all the impacts that I personally and the people of the Delta will suffer as a consequence of this barrier .

Karen Cunningham
Bradford Island

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Re: Delta Emergency Barriers (Rock Dams)
Date: March 17, 2015 at 5:02 PM
To: Michael Brodsky michael@brodskylaw.net

Jan

Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

On Mar 17, 2015, at 2:41 PM, Dana Matthews <dmatthews58@gmail.com> wrote:

Thank you for the opportunity to express my opinion on this issue.

Let me be clear, I oppose installing any dams on any Delta waterway without the benefit of a complete environmental review.

It is obvious that the installation of any dams which hinder free navigation will be detrimental to boating. It will clearly be at best an inconvenience and in the worst case may be dangerous. It is also readily apparent that a complete environmental review is necessary to determine the near and long term effects on native and migrating fish and wildlife and also to determine the economic impacts on the area.

We were informed during previous efforts to install dams that the inconveniences could be mitigated by adjacent boat ramps. This is not a convenient, viable or well thought out execution. We were also informed that the dams would be "temporary" and an "experiment". It is not prudent to experiment on the environment in this manner and there is no clear cut solution or time table to remove them. What will be the environmental effects of removal?

As a business owner who relies on the Delta to be an open, safe and readily accessible venue for boating, the results of dams could be devastating. Any deleterious environmental effects on fish, wildlife and water quality will also pose economic threats to the entire Delta business and residential community.

I am also a resident of Discovery Bay. I own a home on the water of the Delta, as do thousands of others. Any threats to the Delta will directly impact the value of our property.

As a business and homeowner I am constantly dealing with a myriad of permits, government regulations and oversights when trying to repair or improve my business or residence. It is unconscionable that a government agency (DWR) can attempt to unilaterally impose such an impactful project without the same type of careful research and scrutiny.

Respectfully

Dana Matthews
Owner : Cruiser Haven Marina
Discovery Bay resident.

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: DELTA BARRIERS
Date: March 17, 2015 at 4:54 PM
To: Michael Brodsky michael@brodskylaw.net

Jan

Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: <deltagromacki@yahoo.com>
Subject: DELTA BARRIERS
Date: March 17, 2015 at 12:08:01 PM PDT
To: "DWREDBCOMMENTS@water.ca.gov" <DWREDBCOMMENTS@water.ca.gov>

The negative declaration is inadequate and does not disclose significant adverse environmental impact. We boaters request a full Environmental Impact Report with full disclosure. The areas of the barriers will have significant adverse impact on recreational boating that had not been taken into account. We are long time boaters in the Delta and our choices will be very limited with your proposal. The reason we moved to Discovery Bay on the water was the freedom of the water ways. The barriers will stop boating on the Sacramento River. Edith M. Gromacki

Sent from Windows Mail

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Please DO NOT DAM-UP THE DELTA
Date: March 17, 2015 at 4:54 PM
To: Michael Brodsky michael@brodskylaw.net

Jan

Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: fabianac@aol.com
Subject: Please DO NOT DAM-UP THE DELTA
Date: March 17, 2015 at 11:41:12 AM PDT
To: DWREDBCOMMENTS@water.ca.gov

Dear Sirs:

My family and I have been avid users of the Delta Waterway for the past 25 years. From launch points in Rio Vista, Bethel Island, Discovery Bay and Stockton we have traveled up the Sacramento River to Sacramento; up the San Joaquin River to Stockton and down both waterways all the way to the entry to the Delta near the Benicia bridge.Moreover, we have chris-crossed the from Sacramento to Tracy and from Benicia to Stockton. It has always been a blessing to get out on the Delta and just go where ever the bow headed. Travelling the Delta waterway has always been one of the freedom's that we enjoyed about living in Northern California and we always enjoyed meeting other like-minded voyagers during our boating trips.

It has come to my attention that you are now considering adding dams to the Delta that will prevent free travel up and down the delta waterways. I cannot express more strongly my vehement opposition to this concept. Effectively cutting off free travel on the delta will forever ruin the freedom's that we currently enjoy, and have relied on for decades that has added to our quality of life in Northern California.

Please, please, I implore you, DO NOT DAM-UP THE DELTA! It is not a good thing for boaters and it is not a good thing for Northern California!

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: No new Dams in the Delta
Date: March 17, 2015 at 4:52 PM
To: Michael Brodsky michael@brodskylaw.net

This one is short but I like it.

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: "Leonard Sarkissian" <Lsarkissian@yahoo.com>
Subject: No new Dams in the Delta
Date: March 17, 2015 at 9:27:43 AM PDT
To: <DWREDBCOMMENTS@water.ca.gov>

To Whom it may Concern,
I understand that there is a plan to start building dams in the Delta waterways. This is being done without any environmental investigation and from what I can see – on a random basis.
My wife and I enjoy boating /jet skiing in the Delta and it would be sad for the delta to become a collection of pools and probably ponds if the practice continues as some people would like.
I would like to see a plan put in place describing the grand scheme of things that are being planned, when they go up, when they come down, who pays for it, is the budget just for putting them up or also for tearing them down. Additionally what is the environmental impact they have on the waterways/ fishing etc. It would be a sad day if the delta is riddled with dams thus making it a collection of large pools for everyone to go round in circles.
Thank you for looking into.
Leonard Sarkissian
Discovery Bay, 94505

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Another Dumb Union Project
Date: March 17, 2015 at 4:31 PM
To: DWREDBCOMMENTS@water.ca.gov

Begin forwarded message:

From: jnorris2805@comcast.net
Subject: Another Dumb Union Project
Date: March 17, 2015 at 8:44:03 AM PDT

The DELTA Dam Project .... NO better said HELL NO
This makes about as much sense as building to toy railroad train that goes from nowhere to nowhere. The only winners are the union workers... The folks paying the bills will be the ones drowning. Today I use the delta as my play ground... dinner in Stockton... weekends in old Sac... etc... You are going to force my next move to be out of a state that runs on greed.

Also I could be wrong but is this just part of another agenda to steal the Sac River and send it to LA?

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Delta dams
Date: March 17, 2015 at 4:30 PM
To: DWREDBCOMMENTS@water.ca.gov

Begin forwarded message:

From: Trudi Deleon <tfdeleon64@yahoo.com>
Subject: Delta dams
Date: March 16, 2015 at 8:06:08 PM PDT

To whom it may concern,
I was born and raised in the vicinity of the delta area. I am now 66 years old and have lived on the delta in Discovery Bay for the past 22 years. It was a life-long dream to be able to boat with my children and grandchildren in the free waterways that make up the delta system.my husband and myself saved and saved to be able to live here. Now, after all our sweat and never-ending work to finally retire here and enjoy the fruit of all our labor, we hear that unnecessary and detrimental dams are trying to be placed in our water ways! What are you thinking? Where are the environmentalists? Are they being paid off by the unlimited funds that you must have in your coffers?
Do you actually believe that the fish and wild life will not be affected by shutting off the fresh water supply to our lower delta? Not to mention the whole boating system that has provided this area with visitors that help our delta communities sustain a living at the marinas and restaurants that will be hampered and cut off!! Shame on all of you! Do what you should have done a long time ago and start looking at the ocean for your extra water supplies. These dams are just the beginning of your efforts to divert our waters to Southern Ca.!! You are not fooling any of us and you are only making our fight to preserve the Delta area and keep these dams from ever seeing the light of day! Again, shame on all of you for your selfish and unsympathetic reasons to put in dams that will not only hurt our population, but will drastically alter the birds and fish that have resided here long before any of you were even born! What in the world are you thinking!!!??? If you have any rebuttal to this, please feel free to comment.
tfdeleon64@yahoo.com

Sent from my iPhone

From: **Roger Difate** rockfish62@yahoo.com
Subject: Comments on Emergency Drought Barriers Mitigated Negative Declaration
Date: March 2, 2015 at 2:16 PM
To: DWREDBCOMMENTS@water.ca.gov

To: Jacob McQuirk
I disagree with the instillation of the barriers on False River, Sutter Slough and Steamboat Slough with out a full Environment Impact Study. The mitigated negative declaration is totally inadequate. I request you prepare a FULL Environment Impact Study.
I have been a BOATER and Fisherman for 50 years and have lived ON the DELTA for the past 20 years. As a fisherman I must have the freedom to move freely through the Delta and as a tournament fisherman Quickly moving from one area to another is Essential and Mandatory since we are on the clock to perform.

The barriers will have a significant ADVERSE impact on the fishing and boating community, who PAY Enormous amount of TAXES for this privilege.

I would like to receive a reply so I can submit it to our local fishing & boating community which I am heavily involved in.
Regards
Roger di Fate
rockfish62@yahoo.com
925-513-9295

Hello Mr. McQuirk,

I am requesting a full Environmental Impact Report be conducted with regards to the Emergency Drought Barriers. I feel the mitigated negative declaration is not adequate and does not fully disclose significant unmitigated adverse environmental impacts.

My name is Frank Morgan (Captain Morgan) and I own and operate Captain Morgan's Delta Adventures which is a charter cruise operation out of the Discovery Bay Yacht Harbor in Discovery Bay, CA.

I have personally been boating on the Delta since 1976 when I fell in love with the Delta as a water ski instructor in the Walnut Grove area. I spent the entire summer in 1976 exploring many of the sloughs, channels, and water tributaries that make up our unique Delta system. Every since that summer in 1976, I have made yearly trips to the Delta to rent house boats, ski boats, and other water recreation equipment.

In 2000 I was finally able to relocate from southern California to the Discovery Bay area. I currently have a deep water home in Discovery Bay and have resided in Discovery Bay for the past 15 years. In 2011 I started a charter cruise business in Discovery Bay called, Captain Morgan's Delta Adventures. My cruise business has grown from just 18 cruises in 2011 to 116 cruises last year (2014). Our cruises allow both local and out of town guests to experience the beauty of the California Delta water system.

On our cruises we travel as far north as Old Sacramento, as far west as Antioch, and as far east as the Port of Stockton. I feel If the three rock barriers were installed in the proposed locations, it would have a huge negative impact on my ability as a boat tour operator to travel the Delta waterways.

My vessel is called the Rosemarie and she is 55' in length and has a 14' beam, therefore I would be unable to pass even the rock barrier that will have an accommodation to move smaller boats around it. Cruising other sloughs to get around the rock barriers would make many of our trips to costly in fuel, and time for guests to afford. The current rock barrier located by Rivers End Marina already eliminated my ability to travel towards Tracy and therefore a large part of the southern Delta is already unavailable for thousands of boaters like myself and their guests to enjoy. I also worry about what happens to everything south of the barriers, does that simply become brackish water? and how do the barriers help the Delta as a whole? or does it simply provide more "clean" water to the pumps so it can be pumped down south?

I fully understand and recognize the water issues surrounding the Delta are complex and maintaining a delicate balance of the Delta system is difficult, however, I feel it would be irresponsible to move forward with any rock barriers anywhere on the Delta without fully understanding the potential impacts to "all" stakeholders involved.

Thank you for your consideration,

Captain Morgan
Discovery Bay, CA
925.383.5346

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Delta Dams Comments
Date: March 17, 2015 at 7:03 PM
To: Michael Brodsky michael@brodskylaw.net

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: Eric Item <ericitemams@gmail.com>
Subject: Delta Dams Comments
Date: March 17, 2015 at 6:46:50 PM PDT
To: DWREDBCOMMENTS@water.ca.gov

Hello Mr. McQuirk,

I am requesting a full Environmental Impact Report be conducted with regards to the Emergency Drought Barriers. I feel the mitigated negative declaration is not adequate and does not fully disclose significant unmitigated adverse environmental impacts.

My name is Eric Item and I reside in Discovery Bay, CA. Since 1995 my wife and I have been traveling to the Delta every warm weekend to ski and wake board in the sloughs near Discovery Bay. We would often day dream about how wonderful it would be to actually live where we play. In 2000 our dream came true and we purchased our home on deep water.

We are raising our children in the beautiful delta and enjoy swimming, water skiing, wake boarding and boating. Our guests love taking boat rides all year round to different restaurants on the water such as Garlic Brothers in Stockton, Orwood Marina, Union Point, and even a few destinations in Sacramento!I feel If the three rock barriers were installed in the proposed locations, it would have a huge negative impact on my ability as a boater to travel the Delta waterways.

Although a rock barrier is planned to have an accommodation to move smaller boats around it, they would be required to pass at 5 mph. That means we would need to stop, haul in our skier, pass the wall, let out our skier, and start up again. The current rock barrier located by Rivers End Marina already eliminated my ability to travel towards Tracy and therefore a large part of the southern Delta is already unavailable for thousands of boaters like myself and their guests to enjoy.

I also worry about what happens to everything south of the barriers, does that simply become brackish water? And how do the barriers help the Delta as a whole? Does it simply provide more "clean" water to the pumps so it can be pumped down south? Los Angeles already has their reservoirs filled to capacity and has enough water to last for two years without our help – yet we are in a serious drought.

I fully understand and recognize the water issues surrounding the Delta are complex and maintaining a delicate balance of the Delta system is difficult, however, I feel it would be irresponsible to move forward with any rock barriers anywhere on the Delta without fully understanding the potential impacts to all involved.

Thank you for your consideration

Eric Item

Discovery Bay Resident

--
Eric Item
Advanced Medical & Safety, Inc.

(408) 489-0908 cell

(408) 489-0908 cell
(408) 654-6000 office Bay Area
(925) 960-1900 office Tri-Valley

ericitemams@gmail.com email

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Delta Dams
Date: March 18, 2015 at 10:38 AM
To: Michael Brodsky michael@brodskylaw.net

Jan

Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: Roger Trump <rogertrump@comcast.net>
Subject: Delta Dams
Date: March 18, 2015 at 12:03:07 AM PDT
To: "DWREDBCOMMENTS@water.ca.gov" <DWREDBCOMMENTS@water.ca.gov>

To proceed without a formal EIR/EIS process with a program which could have such dire consequences economically, environmentally and recreational seem irresponsible and inviting possible legal repercussions.

Please go through the formal process.

Sincerely,

Roger and Lucy-Ann Trump
(Recreational boater from Discovery Bay)
Sent from my iPhone

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Three Delta Emergency Barriers-Rock Dams
Date: March 18, 2015 at 10:39 AM
To: Michael Brodsky michael@brodskylaw.net

This one is especially well done

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: <artis@karensleigh.com>
Subject: Three Delta Emergency Barriers-Rock Dams
Date: March 18, 2015 at 1:34:58 AM PDT
To: <DWREDBCOMMENTS@water.ca.gov>

Mr. McQuirk,

I reside in Discovery Bay and moved here, like many other residents, to enjoy all the delta has to offer. All along the delta, communities thrive on the access to the water and the fact you can pass through miles of the open waterways. The recreational sports are a huge part of the economy and draw to the area. The proposed dams will interfere with many different aspects of delta. Local economies will suffer if boaters cannot pass on the water to get to other destinations. These water communities have all sorts of events to bring in visitors into the delta. The Discovery Bay Yacht Club sponsors numerous excursions on the water and encourages other clubs to come into and out of this area easily. These dams can hinder and block some routes causing a negative impact to the area by not allowing access. Not only will they impair recreational boating and add safety issues, but there are many unanswered questions. What about piles of debris or blockage and are there funds to monitor or for clean up? Do the dams hinder migrating fish and how will it affect recreational fishing? What are the problems for farming communities along the delta? Will these these dams add more problems to our weed issues we are experiencing, causing complete blockage to certain sections? There are important issues that I am not clear on how they would be handled or funded. I also read these are temporary dams, but there are no funds or a full plan for their removal. Those funds and plan should be in place before you would consider building any of the dams. With all these concerns, I would like to request that full EIR/EIS study be completed before the dams are constructed.

The real estate market here is finally starting to recover and I would like to see that continue and have the area flourish. This is a unique area and I would not like to see waterways closing and cutting off communities from each other when it could be avoided. I am concerned about these dams overall environmental and economical impact and hope you will look at the issues brought up by residents that live and enjoy all the delta has to offer.

Thank you,
Karen Sleigh
Discovery Bay

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Three "Emergency Barriers"
Date: March 18, 2015 at 10:44 AM
To: Michael Brodsky michael@brodskylaw.net

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: Stefan Sleigh <stefan@medsolutionsllc.com>
Subject: Three "Emergency Barriers"
Date: March 18, 2015 at 8:31:24 AM PDT
To: DWREDBCOMMENTS@water.ca.gov

Mr. McQuirk,

I reside in Discovery Bay and moved here, like many other residents, to enjoy all the delta has to offer. All along the delta, communities thrive on the access to the water and the fact you can pass through miles of the open waterways. The recreational sports are a huge part of the economy and draw to the area. The proposed dams will interfere with many different aspects of delta. Local economies will suffer if boaters cannot pass on the water to get to other destinations. These water communities have all sorts of events to bring in visitors into the delta. The Discovery Bay Yacht Club sponsors numerous excursions on the water and encourages other clubs to come into and out of this area easily. These dams can hinder and block some routes causing a negative impact to the area by not allowing access. Not only will they impair recreational boating and add safety issues, but there are many unanswered questions. What about piles of debris or blockage and are there funds to monitor or for clean up? Do the dams hinder migrating fish and how will it affect recreational fishing? What are the problems for farming communities along the delta? Will these these dams add more problems to our weed issues we are experiencing, causing complete blockage to certain sections? There are important issues that I am not clear on how they would be handled or funded. I also read these are temporary dams, but there are no funds or a full plan for their removal. Those funds and plan should be in place before you would consider building any of the dams. With all these concerns, I would like to request that full EIR/EIS study be completed before the dams are constructed.

The real estate market here is finally starting to recover and I would like to see that continue and have the area flourish. This is a unique area and I would not like to see waterways closing and cutting off communities from each other when it could be avoided. I am concerned about these dams overall environmental and economical impact and hope you will look at the issues brought up by residents that live and enjoy all the delta has to offer.

Regards,

Stefan Sleigh
President, CEO
MedSolutions, LLC
925.634.7791 (w)
925.634.3597 (f)
925.216.3598 (c)

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: "Wayner" <deltawayne@comcast.net>
Subject: FW: delta dams
Date: March 18, 2015 at 9:11:01 AM PDT
To: <jmccleery@duckpondsoftware.com>

I have sent an email regarding the delta gates. Here is a copy. Hope it helps.

Best Regards,
Wayne

From: Wayner [mailto:deltawayne@comcast.net]
Sent: Wednesday, March 18, 2015 9:08 AM
To: 'DWREDBCOMMENTS@water.ca.gov'
Cc: 'members@nodeltagates.com'; Gail Lorimer (glorimer@pacbell.net)
Subject: delta dams

To Whom It May Concern,
I have been an avid boater on the delta for more than 45 years. I've been coming up to Bethel Island for the entire time, either as a weekender and now as a full time resident. To have our boating activities limited to certain routes will take away our privileges of the past. To be inconvenienced by detours of our favorite places to visit and to make it an inconvenience for navigation I feel the dams will have a huge impact on our activities. And I'm sure it will impact the fishing activities as well. Find a better ways for the people of southern California to find water (i.e. build reservoirs, perk ponds, underground storage) but don't take our water or hamper our boating on the delta.

Wayne Miller
P.O. Box 1665
3758 Stone Road
Bethel Island, CA 94511
(925) 684-0104
(925) 519-2387 (cell)
email: deltawayne@comcast.net

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Delta Dams
Date: March 18, 2015 at 10:48 AM
To: Michael Brodsky michael@brodskylaw.net

Jan

Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: Darren Goetz <dmgoetz23@gmail.com>
Subject: Delta Dams
Date: March 18, 2015 at 8:52:46 AM PDT
To: Dwredbcomments@water.ca.gov

Hello,

Thank you for this opportunity for members of the community to voice an opinion.

I oppose installing any dams in the Delta. We boat as a family recreational activity, and this would block us from boating on our favorite waterways. This is a terrible idea that would ruin our boating experience on the Delta. It is obvious to me that any and all dams will be detrimental to boating. An environmental review is needed to determine what the effect on migrating fish, impacts to the levees, boating and other environmental and economic problems.

My family and friends have a long history of boating on the Delta including multiple families who have grown up on or had multiple generations of family pass the delta enjoyment down. We would hate to take this area away from the generations to come. The dams will have a negative effect on the environment, the entire area from an economical perspective and will take away a great recreational area loved by boaters.

Dams are not the answer. At least not without a complete EIR/EIS to study the effects on Northern California fish, boating and western farms.

Thank you

Darren Goetz

Salinas, CA

From: **Janet McCleery** jmccleery@duckpondsoftware.com
Subject: Fwd: Opposition to Delta Dams
Date: March 18, 2015 at 11:49 AM
To: Michael Brodsky michael@brodskylaw.net

Jan
Janet McCleery I jmccleery@duckpondsoftware.com
www.duckpondsoftware.com I Cell: (925) 978-6563

Begin forwarded message:

From: "Larry" <larry.jasmann@sbcglobal.net>
Subject: Opposition to Delta Dams
Date: March 18, 2015 at 11:38:45 AM PDT
To: "'DWREDBCOMMENTS@water.ca.'"

As a Delta boater for several decades, I oppose installing any dams in the Delta without a complete environmental review. Without a doubt, any dams in the Delta would be detrimental to boating. And the impact on fish, levees, the Delta environment and economy, etc. should be carefully studied and evaluated through a complete EIR/EIS.

Respectfully,

Larry Jasmann
Oakley, CA

February 26, 2015

Jacob McQuirk
Supervising Engineer, Bay-Delta Office California Department of Water Resources
PO Box 942836
Sacramento, CA 94236

VIA EMAIL

I have been boating on the Delta for over forty years.

When I was a kid, my family had a 19 foot Dorset cuddy cabin named Queen Bee with a 150 horsepower gas-powered stern drive. Our favorite slough was Steamboat Slough. We liked to have Breakfast at the Point Restaurant in Rio Vista and then take a leisurely cruise up Steamboat and have lunch at the Steamboaters at the head of Steamboat Slough. The Steamboaters isn't there anymore; its been turned into a private residence. The restaurant at the Rio Vista Marina is pretty much the same as it was forty years ago.

I got my own first boat when I was eighteen, as soon as I earned enough money after graduating high school to buy it. It was a nineteen foot Marlin jet boat with a 455 Olds and a Berkeley Pump jet drive. I often made the circuit, starting at Rio Vista, then up Steamboat Slough to the Sacramento River, then upstream to Sutter Slough, and back down Sutter to Rio Vista again.

There have been a few boats, and lots of fun on the Delta since then. Today, I have a deep water vacation home in Discovery Bay where I keep my 35 foot Formula 350 SS, Diamond Girl. Diamond Girl is powered by twin 425 horsepower gas stern drives.

I was shocked to read that you think that the emergency drought barriers won't have a significant adverse impact on recreational boating. First, the portage facility on Steamboat Slough would do no good for me and many other boaters because it can handle boats only up to 24 feet. Even for smaller boats, the portage is a major headache and would discourage recreational boating on Steamboat Slough.

I will feel a great loss to my recreational boating because I can no longer make the circuit up Steamboat Slough to the Sacramento River then up the River to Sutter Slough and then back down Sutter Slough to Steamboat Slough and back to Rio Vista. The barriers will also block access to the Sacramento river by going up Cache Slough to Minor Slough, then Minor Slough to Sutter Slough and Sutter Slough to the Sacramento. This is also one of my favorite boating routes.

Steamboat Slough is also a shortcut from Rio Vista to the upper Sacramento River. That's why the steamboats of old used it and hence its name. The barriers will force travel from Rio Vista all the way up the Sacramento River. This will ad miles to any trip and for the many larger boats that make this trip, many of them diesel powered, this will cause an increase in emissions that you haven't considered either.

On a deeper level, putting up more barriers takes away from the sense of Delta as place. Boaters enjoy the freedom of being able to travel by water through the maze of sloughs without blockage. These barriers invade that sense of wonder and freedom and actually change the character of the entire Delta.

I urge you to conduct a full Environmental Impact Report so you can understand and disclose to the public the actual unmitigated negative impact these barriers will have on recreational boating, air pollution, and the sense of Delta as place.

Sincerely,
Mike Brodsky
5070 Discovery Point
Discovery Bay, CA

RECIRC2655

Attachment 14

Water Replenishment District of Southern California

Engineering Survey and Report

2015

March 5, 2015

Updated:
May 1, 2015

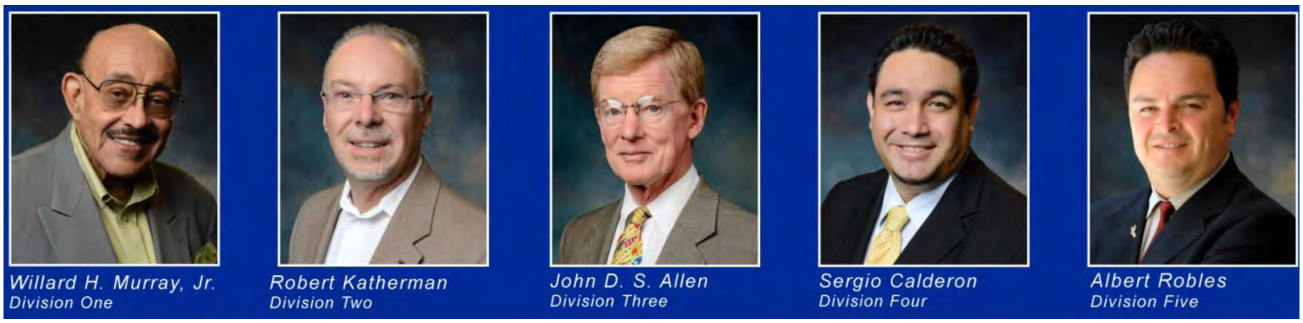
WRD
WATER REPLENISHMENT DISTRICT OF SOUTHERN CALIFORNIA

RECIRC2655

Water Replenishment District
Of Southern California

ENGINEERING SURVEY AND REPORT, 2015
Updated May 1, 2015

Board of Directors



Management Staff

Robb Whitaker, PE	General Manager
Ken Ortega, PE	Assistant General Manager
Ted Johnson, PG/CHG	Chief Hydrogeologist
Scott Ota, CPA	Chief Financial Officer
Francisco Leal	Interim District Counsel

Professional Certification

This Engineering Survey and Report has been prepared under the direct supervision of the California Professional Geologist whose signature appears below. This individual certifies that the information contained in the report has been prepared in accordance with the generally accepted principles and practices of his profession.

Theodore A. Johnson, PG, CHG
Chief Hydrogeologist

MEMORANDUM

DATE: MAY 1, 2015

TO: INTERESTED PARTIES

FROM: ROBB WHITAKER, GENERAL MANAGER

SUBJECT: UPDATED 2015 ENGINEERING SURVEY AND REPORT

The Water Replenishment District of Southern California ("WRD" or "District") is the groundwater management agency responsible for safe and reliable groundwater in the Central Basin and West Coast Basin in southern coastal Los Angeles County. Groundwater constitutes nearly 40% of the total water demand used by the 4 million residents and businesses in the 43 cities in the WRD service area.

On March 5, 2015, WRD completed an Engineering Survey and Report ("ESR") as required by the California Water Code (Section 60300) to present information on the past, current, and anticipated future conditions in the two groundwater basins. Information is presented on groundwater pumping, groundwater conditions (water levels, overdraft, changes in storage), projects related to groundwater supply and quality, and the amount, sources, and cost of replenishment water needed to replace the annual pumping overdraft.

According to Water Code Section 60305, the ESR must be completed by March of each year. However, the annual Replenishment Assessment ("RA") assessed on groundwater production is set later in April or May. During the time frame between the March ESR and the adoption of the RA, new and updated information is sometimes received that results in necessary edits to the ESR after adoption of the RA. To document any changes, the District publishes an updated ESR following adoption of the RA. This May 1, 2015 ESR updates and replaces the earlier March 5, 2015 report and contains the latest information on replenishment water sources and costs within the District.

Updated information includes the following:

- On May 1, 2015, the WRD Board of Directors adopted the 2015/2016 RA at $283 per acre foot (AF) of groundwater pumped within the WRD Service area, which is a 5.6% increase from the current rate of $268. This new RA will go into effect July 1, 2015 and will be in effect through June 30, 2016. This information was added to the report as appropriate.

- Several formatting changes to the March report were made, including Table of Contents edits and font changes.

- No other significant changes were made to the report.

My staff and I welcome any comments or questions you may have regarding this updated ESR. Additional copies are available by calling the District at (562) 921-5521 or by downloading it from our web site at http://www.wrd.org. Thank you for your interest on groundwater conditions in the WRD Service Area.

TABLE OF CONTENTS

TABLES (see Tables Section after Chapter 5)

FIGURES (see Figures Section following the Tables)

PLATES (see Plates Section following the Figures)

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GLOSSARY OF ACRONYMS

ABP	Alamitos Barrier Project
AF	Acre-Feet (equivalent to 325,851 gallons)
AFY	Acre-Feet per Year
APA	Allowed Pumping Allocation
BAC	Budget Advisory Committee
BoS	Bureau of Sanitation (City of Los Angeles Dept. of Public Works)
CB	Central Basin
CBMWD	Central Basin Municipal Water District
CDPH	California Department of Public Health (now Division of Drinking Water)
CEC	Constituents of Emerging Concern
CEQA	California Environmental Quality Act
CHG	California Certified Hydrogeologist
CIP	Capital Improvement Program
CPI	Consumer Price Index
CBWCB	Central Basin and West Coast Basin
DDW	State Water Resources Control Board – Division of Drinking Water
DGBP	Dominguez Gap Barrier Project
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ESR	Engineering Survey and Report
FY	Fiscal Year (July 1 – June 30)
GAC	Granular Activated Carbon
GIS	Geographic Information System
GRIP	Groundwater Reliability Improvement Program
IRWMP	Integrated Regional Water Management Plan
LACDHS	Los Angeles County Department of Health Services
LACDPW	Los Angeles County Department of Public Works (Flood Control)
LADWP	City of Los Angeles Department of Water and Power
LBWD	City of Long Beach Water Department
MAR	Managed Aquifer Recharge
Met	Metropolitan Water District of Southern California
MCL	Maximum Contaminant Level
MF	Microfiltration
MFI	Modified Fouling Index

mgd	Million Gallons per Day
MOU	Memorandum of Understanding
msl	Mean Sea Level
MWD	Metropolitan Water District of Southern California
NDMA	N-Nitrosodimethylamine
O&M	Operations and Maintenance
PG	California Professional Geologist
ppb	Parts Per Billion (µg/L)
ppm	Parts Per Million (mg/L)
PRC	Program Review Committee
PWRP	Pomona Water Reclamation Plant
RA	Replenishment Assessment
RO	Reverse Osmosis
RTS	Readiness-to-Serve Charge
RWQCB	Regional Water Quality Control Board (Los Angeles Region)
SAT	Soil Aquifer Treatment
SDLAC	Sanitation Districts of Los Angeles County
SDWP	Safe Drinking Water Program
SGVMWD	San Gabriel Valley Municipal Water District
SJCWRP	San Jose Creek Water Reclamation Plant
TAC	Technical Advisory Committee
TITP	Terminal Island Treatment Plant
USGS	United States Geological Survey
USGVMWD	Upper San Gabriel Valley Municipal Water District
UV	Ultraviolet Light Treatment
VOC	Volatile Organic Compound
WAS	Water Augmentation Study
WBMWD	West Basin Municipal Water District
WCB	West Coast Basin
WCBBP	West Coast Basin Barrier Project
WIN	Water Independence Now program
WNWRP	Whittier Narrows Water Reclamation Plant
WRD	Water Replenishment District of Southern California
WRP	Water Reclamation Plant
WY	Water Year (October 1 – September 30)

BOARD SUMMARY

District Staff is pleased to present the 2015 Engineering Survey and Report ("ESR"). It was prepared pursuant to the California Water Code, Section 60300 et seq. and determines the past, current, and ensuing year groundwater conditions in the Central Basin and West Coast Basin ("CBWCB"). The report contains information on groundwater production, annual and accumulated overdraft, water levels, quantity, source, and cost of replenishment water, and a discussion of necessary projects and programs to protect and preserve the groundwater resources of the basins.

The ESR provides the Board of Directors with the necessary information to justify the setting of a replenishment assessment ("RA") for the ensuing fiscal year (July 1 – June 30) to purchase replenishment water and to fund projects and programs related to groundwater replenishment and groundwater quality over the water year (October 1 – September 30).

The following is a summary of the required ESR elements from the Water Code, and **Plates 1, 2, and 3** provide illustrations of pumping and groundwater conditions for Water Year 2013/2014.

1. **Groundwater Production**
   - Adjudicated Amount: 281,835.25 acre-feet (AF)
   - Previous Water Year: 241,105 AF
   - Current Water Year: 242,400 AF (estimated)
   - Ensuing Water Year: 244,000 AF (estimated)
2. **Annual Overdraft**
   - Previous Water Year: 149,000 AF
   - Current Water Year: 97,200 AF (estimated)
   - Ensuing Water Year: 98,800 AF (estimated)
3. **Accumulated Overdraft**
   - Previous Water Year: 819,600 AF
   - Current Water Year: 813,300 AF (estimated)
4. **Groundwater Levels**

Because of the continued drought during the previous year 2013/2014 that caused below normal storm water and imported water recharge, groundwater levels over the WRD Service area dropped on average 4 feet and 62,100 AF were removed from storage. Most of this storage loss (49,200 AF or 79%) occurred in the Montebello Forebay, where water levels fell on average 11 feet, but up to 25 feet in some areas near the spreading grounds. The groundwater basins fortunately are enormous underground reservoirs that are able to accommodate large swings in storage and water level changes, so there remains plentiful groundwater in the CBWCB. However, because of the extended drought, the Water Year ended with groundwater levels near their lows in the 1960s and 1970s. WRD manages water levels in the basins utilizing an Optimum Quantity and Accumulated Overdraft approach. So far, the basins are operating within range and there should not be any problems with the groundwater supply meeting the needs of the overlying users in the current and ensuing years. Details of the groundwater levels in the CBWCB are described in Chapter 3.

5. Quantity of Replenishment Water Required in the Ensuing Year

The District determines replenishment water needs based on averages from a long-term (30 year) hydrologic record and computer models, meaning extremely wet years and extremely dry years in addition to average precipitation years are accounted for in deriving the average replenishment needs. Other considerations by the Board are also incorporated into replenishment water needs. Chapter 4 details the quantity of water that WRD plans to purchase in the ensuing water year. A summary is below:

- Spreading Water: 71,000 AF (55,000 recycled; 16,000 imported)
- Seawater Barrier Water: 32,300 AF (7,600 AF imported; 24,700 AF recycled)
- In-Lieu Program Water: 0 AF (suspended due to lack of MWD seasonal water)
- Total Water: 103,300 AF

6. Source of Replenishment Water

The sources of replenishment water to the District for the ensuing water year are detailed in Chapter 4. Discounted replenishment water from MWD has not been available for In-Lieu or spreading since October 2011. MWD has not yet adopted a new replenishment program and for now only the more expensive Tier 1 or Tier 2 water is potentially available. WRD is budgeting for Tier 1 water in the ensuing year. In the previous year, Tier 1 water was not sold to WRD due to low MWD supplies as a result of the drought. In the current water year, some Tier 1 is being sold to WRD for replenishment. For the ensuing year, it is currently assumed that Tier 1 water will be available. A summary of all of the sources of replenishment water available to WRD is as follows:

- Recycled Water: Tertiary water for spreading is available from the Sanitation Districts of Los Angeles County (SDLAC). Advanced-treated recycled water for the West Coast Basin Barrier Project (WCBBP) is available from the West Basin Municipal Water District. Advanced-treated recycled water for the Dominguez Gap Barrier Project (DGBP) is available from the City of Los Angeles. Advanced-treated recycled water for the Alamitos Barrier Project (ABP) is available from WRD.

- Imported Water: Raw river water (untreated) Tier 1 is assumed to be available for spreading from MWD and its member agencies. For the seawater barrier wells, treated potable imported water Tier 1 is assumed to be available for the WCBBP and DGBP from the West Basin Municipal Water District, and for the ABP from the City of Long Beach.

7. Cost of Replenishment Water

WRD has estimated it will need 103,300 AF of replenishment water in the ensuing year to help overcome the annual overdraft. WRD purchases replenishment water from MWD member agencies and recycled water providers. These agencies set the price for the replenishment water that WRD buys for the spreading grounds, seawater barrier injection wells, and In-Lieu water when available. The cost for replenishment water is a direct pass-through from WRD to the water suppliers on WRD's replenishment assessment.

Using currently available information and estimates for the cost of replenishment water to WRD in the ensuing year, the estimated cost of water for the ensuing year is $42,125,595. **Tables 1 and 2** provide a detailed breakdown of these costs.

These estimated costs are for water purchases only and do not include the additional costs for water replenishment and water quality projects and programs. These projects and programs are discussed in detail in Chapter 5. The anticipated costs of these projects and programs will be further discussed in

District budget workshops, Budget Advisory Committee (BAC) meetings, and other public meetings before the Board of Directors adopts the 2015/2016 Replenishment Assessment in May.

8. Projects and Programs

A list of the projects and programs in which WRD is involved related to groundwater replenishment and the protection and preservation of water quality is shown on **Table 3**. Funds are required to finance these projects and programs. Sections 60221, 60230 and 60224 of the Water Code authorize the WRD to undertake a wide range of capital projects and other programs aimed at enhancing groundwater replenishment and improving groundwater quality.

These projects and programs address any existing or potential problems related to the basin's groundwater, and may extend beyond the District's boundaries if the threat of contamination is outside those boundaries. The programs span all phases of planning, design, and construction and are financed by the collection of a replenishment assessment. A more detailed description of each project and program is presented in Chapter 5 of the report.

9. Conclusions

Based upon the information presented in the ESR, a replenishment assessment is necessary in the ensuing year to purchase replenishment water and to finance projects and programs to perform replenishment and water quality activities. These actions will ensure sufficient supplies of high quality groundwater within the District for the benefit of the residents and businesses in the Central Basin and West Coast Basin.

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CHAPTER 1 - INTRODUCTION

Purpose of the Engineering Survey & Report

To facilitate the Board of Directors' decisions and actions, the Water Replenishment District Act requires that an engineering survey and report ("ESR") be prepared each year. This *Engineering Survey and Report 2015* is in conformity with the requirements of Section 60300 et seq. Water Replenishment District Act and presents the necessary information on which the Board of Directors can declare whether funds shall be raised to purchase water for replenishment during the ensuing year, as well as to finance projects and programs aimed at accomplishing groundwater replenishment. With the information in this ESR, the Board can also declare whether funds shall be collected to remove contaminants from the groundwater supplies or to exercise any other power under Section 60224 of the California Water Code. The information presented in this report along with the District's strategic planning and budget preparation presents the necessary information on which the Board of Directors can base the establishment of a replenishment assessment for the ensuing fiscal year effective July 1, 2015 through June 30, 2016.

Scope of Engineering Survey & Report

This report contains specific information outlined in Chapter I, Part 6 of Division 18 of the Water Code (the Water Replenishment District Act, § 60300 and § 60301). The following is a brief description of the contents of this report:

1) *a discussion of groundwater production within the District (Chapter 2);*

2) *an evaluation of groundwater conditions within the District, including estimates of the annual overdraft, the accumulated overdraft, changes in water levels, and the effects of water level fluctuations on the groundwater resources (Chapter 3);*

3) *an appraisal of the quantity, availability, and cost of replenishment water required for the ensuing water year (Chapter 4); and*

4) *a description of current and proposed programs and projects to accomplish replenishment goals and to protect and preserve high quality groundwater supplies within the District (Chapter 5).*

Schedule for Setting the Replenishment Assessment

The following actions are required by the Water Code to set the Replenishment Assessment:

1) *The Board shall order the preparation of the ESR no later than the second Tuesday in February each year (see Section 60300).*
2) *The Board shall declare by resolution whether funds shall be collected to purchase replenishment water and to fund projects and programs related to replenishment and/or water quality activities on or before the second Tuesday in March each year and after the ESR has been completed (see Section 60305).*
3) *A Public Hearing will be held for the purpose of determining whether District costs will be paid for by a replenishment assessment. The Public Hearing will be opened on the second Tuesday in April and may be adjourned from time to time but will be completed by the first Tuesday in May (see Sections 60306 and 60307).*
4) *The Board by resolution shall levy a replenishment assessment for the ensuing fiscal year no later than the second Tuesday in May (see Sections 60315, 60316 and 60317).*

Although dates specified in the code refer generally to 'on or before certain Tuesdays', the Water Code (Section 60043) also states that "*Whenever any act is required to be done or proceeding taken on or set for a particular day or day of the week in any month, the act may be done or proceeding set for and acted upon a day of the month otherwise specified for a regular meeting of the board*". Therefore, there is flexibility as to the actual dates when Board actions are taken regarding the ESR, adopting resolutions, conducting public hearings, and the setting the replenishment assessment.

The ESR is generally completed in March of each year to comply with the Water Code and to provide the Board with the necessary information to determine whether a replenishment assessment will be needed in the ensuing year to purchase replenishment water and to fund projects and programs related to water quality and replenishment activities. However, in the subsequent months leading up to the adoption of the replenishment assessment, new information is normally received that affects the findings presented in the March ESR. This new information is typically related to the amount of water and price that WRD expects to pay for replenishment water in the ensuing water year. The final information used by the Board when they adopt the replenishment assessment is reflected in an updated ESR that is published after adoption of the replenishment assessment.

CHAPTER 2 - GROUNDWATER PRODUCTION

Adjudication and Demand

Prior to the adjudication of groundwater rights in the early 1960s, annual production (pumping) reached levels as high as 259,400 AF in the Central Basin ("CB") and 94,100 AF in the West Coast Basin ("WCB"). This total of 353,500 AF was more than double the natural safe yield of the basins as determined by the California Department of Water Resources in 1962 (173,400 AF). Due to this serious overdraft, water levels declined, groundwater was lost from storage, and seawater intruded into the coastal aquifers. To remedy this problem, the courts adjudicated the two basins to put a limit on pumping. The West Coast Basin adjudication was set at 64,468.25 acre-feet per year ("AFY"). The Central Basin "Allowed Pumping Allocation" ("APA") was set at 217,367 AFY. Therefore, the current amount allowed to be pumped from both basins is 281,835.25 AFY, plus any carryover or other provisions as described at the end of this Section.

The adjudicated pumping amounts were set higher than the natural replenishment amounts, creating an annual deficit known as the "Annual Overdraft". WRD is enabled under the California Water Code to purchase and recharge additional water to make up this overdraft, which is known as artificial replenishment or managed aquifer recharge (MAR). WRD has the authority to levy a replenishment assessment on all pumping within the District to raise the monies necessary to purchase the artificial replenishment water and to fund projects and programs necessary for replenishment and groundwater quality activities.

Groundwater Production

Under the terms of Section 60326.1 of the Water Replenishment District Act, each groundwater producer must submit a report to the District summarizing their monthly production activities (quarterly for smaller producers). The information from these reports is the basis by which each producer pays the replenishment assessment.

<u>Previous Water Year:</u>

Per the Water Code, WRD tracks and reports on groundwater production (pumping) on a Water Year ("WY") basis covering the time frame of October 1 - September 30 of each year. For the previous WY (2013/2014), groundwater production in both basins totaled 241,105 AF, or which 198,585 AF was pumped from the CB and 42,520 AF was pumped from the WCB. Because the adjudicated rights are 281,835.25 AF, there were about 40,730 AF of available rights that were not pumped in the previous year.

Plate 1 illustrates the groundwater production in the CBWCB during the previous water year and **Table A-5** presents historical pumping amounts.

<u>Current Water Year:</u>

For the first two months of the current WY (October through November), production was 38,701 AF (32,315 AF in the CB and 6,386 AF in the WCB). This is 2,277 AF (6.2%) more than the same period of the year earlier. Because these numbers represent only 2 months of data out of 12, they are difficult to use to forecast through the rest of the year. In addition, the City of Long Beach is participating in WRD's In-Lieu program, and will not pump up to 10,000 AF between December 2014 and April 2015. Therefore, taking into account averages over the past 3 to 5 years, excluding the anomalously low year of 2010/2011 due to the special In-lieu program, and recognizing the current In-Lieu Program, plus the continued drought, the early forecast for total pumping for the entire Water Year is 242,400 AF (200,000 AF in the CB and 42,400 AF in the WCB).

Ensuing Water Year:

To estimate production for the ensuing year, recent averages are used in addition to knowledge of changing conditions that might affect pumping. Actual pumping patterns can vary considerably throughout the year based on a pumper's individual operational needs, water demands, conservation efforts and hydrology.

To estimate the ensuing year's groundwater pumping, WRD used the averages over the past 3 to 5 years, not including the anomalously low year of 2010/2011, and made adjustments based on anticipated conditions such as a continuing drought, conservation efforts, and reports by some pumpers that they plan on drilling new wells or bringing back online other wells, plus the continued recent trend of elevated pumping in the CB (not counting the effect of the In-Lieu Program). Using these methods produced a forecast for pumping in the ensuing WY of 244,000 AF (200,000 AF in the CB and 44,000 AF in the WCB).

Table 1 shows the groundwater production amounts for the previous, current, and ensuing water years.

Measurement of Production

With few exceptions, meters installed and maintained by the individual producers measure the groundwater production from their wells. Through periodic testing by Watermaster to verify the accuracy of individual meters, corrective measures are required when necessary. The production of the few wells that are not metered is estimated on the basis of electrical energy consumed by individual pump motors or other reasonable means.

Carryover and Drought Provisions

The carryover of unused pumping rights in any given year influences the actual amount of production for the ensuing year. In the 2014-2015 Administrative Year for the Central Basin Judgment (July 1 – June 30), the Central Basin carryover is 40% of the allotted pumping right, increasing to 50% in 2015-2016, 60% in 2016-2017 and each year thereafter. Beginning in the 2014-2015 Administrative Year for the West Coast Basin Judgment (July 1 – June 30) and each year thereafter, the West Coast Basin carryover is 100% of allotted pumping rights. In both the Central and West Coast Basins, the amount of carryover is reduced by the quantity of water held in a pumper's storage account, but in no event is carryover than 20% of the allotted pumping right. These provisions of the Judgments extend the flexibility with which the pumpers can operate.

During emergency or drought conditions, WRD can allow under certain conditions an additional 27,000 AF of extractions for a four-month period (17,000 for CB and 10,000 for WCB). This provision has yet to be exercised but offers the potential use of an additional 7.8% pumping in the CB and 15% in the WCB.

The Central Basin Judgment also contains an additional Drought Carryover provision available to all Central Basin water rights holders after a declaration of a Water Emergency by the WRD Board of Directors. The Drought Carryover allows water rights holders to carryover an additional 35% of their APA (or 35 AF, whichever is larger) beyond the annual carryover described above during the period the Declared Water Emergency is in effect.

The intent of the action is prevent further degradation of the groundwater basins by helping to restore groundwater levels and improving the water supply in the aquifers by providing an incentive to groundwater producers in the Central Basin to reduce pumping for a particular period of time.

A Declared Water Emergency is defined in the Central Basin Judgment as:

> *"A period commencing with the adoption of a resolution of the Board of Directors of the Central and West Basin Water Replenishment District* [renamed Water Replenishment District of Southern California] *declaring that conditions within the Central Basin relating to natural and imported supplies of water are such that, without implementation of the water emergency provisions of this Judgment, the water resources of the Central Basin risk degradation. In making such declaration, the Board of Directors shall consider any information and requests provided by water producers, purveyors and other affected entities and may, for that purpose, hold a public hearing in advance of such declaration. A Declared Water Emergency shall extend for one (1) year following such resolution, unless sooner ended by similar resolution."*

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CHAPTER 3 - GROUNDWATER CONDITIONS

Introduction

The California Water Code Section 60300 requires WRD to determine annually in the Engineering Survey and Report ("ESR") the following items related to groundwater conditions in the Central Basin and West Coast Basin ("CBWCB"):

1) Total groundwater production for the previous water year and estimates for the current and ensuing water years;

2) The Annual Overdraft for the previous water year and estimates for the current and ensuing water years;

3) The Accumulated Overdraft for previous water year and an estimate for the current water year;

4) Changes in groundwater levels (pressure levels or piezometric heights) within the District and the effects these changes have on groundwater supplies within the District; and

5) An estimate of the quantity, source, and cost of water available for replenishment during the ensuing water year;

To meet these requirements, WRD's hydrogeologists and engineers closely monitor and collect data to manage the groundwater resources of the District throughout the year. They track groundwater levels from WRD's network of specialized monitoring wells and from groundwater producers' production wells. They update and run computer models developed by the United States Geological Survey ("USGS") and others to simulate groundwater conditions and to predict future conditions. They use their geographic information system ("GIS") and database management system to store, analyze, map, and report on the information required for the ESR. They work closely with the Los Angeles County Department of Public Works ("LACDPW") on spreading grounds and seawater barrier wells to determine current and future operational impacts to groundwater supplies. They work closely with the Metropolitan Water District of Southern California ("MWD" or "Met"), the local MWD member agencies, and the Sanitation Districts of Los Angeles County ("SDLAC") on the current and future availability of replenishment water. They also work with regulators on replenishment criteria for water quality and recycled water use, and with the groundwater pumpers, the pumpers' Technical Advisory Committee ("TAC"), the Budget Advisory Committee ("BAC"), and other stakeholders to discuss the current and future groundwater conditions and beneficial projects and programs within the District and neighboring basins.

The information on Annual Overdraft, Accumulated Overdraft, water levels, and change in storage are discussed in the remainder of this chapter. Groundwater production was previously discussed in Chapter 2. The estimated quantity, source, and cost of replenishment water will be discussed in Chapter 4. Projects and programs are discussed in Chapter 5.

Annual Overdraft

Section 60022 of the Water Replenishment District Act defines Annual Overdraft as "...*the amount...by which the quantity of groundwater removed by any natural or artificial means from the groundwater supplies within such replenishment district during the water year exceeds the quantity*

of non-saline water replaced therein by the replenishment of such groundwater supplies in such water year by any natural or artificial means other than replenishment under the provisions of Part 6 of this act or by any other governmental agency or entity." (Part 6 of the Act pertains to water that WRD purchases for replenishment). Therefore, the Annual Overdraft equals the natural inflows to basins (not including WRD purchased water) minus all of the outflows (mostly pumping). There is an Annual Overdraft almost every year for the simple fact that the groundwater extractions typically exceed the natural groundwater replenishment. It has been one of the District's main responsibilities since 1959 to help make up this Annual Overdraft by purchasing artificial replenishment water to recharge the aquifers and supplement the natural recharge.

To determine the Annual Overdraft for the previous water year, WRD determines the inflows and outflows of the CBWCB. In the previous Water Year 2013/2014, natural inflows (storm water capture, areal recharge, and net groundwater underflow) totaled 92,095 AF and WRD or others contributed 86,910 AF of recharge water at the seawater barrier wells and spreading grounds. Total natural and artificial inflows, therefore, equaled 179,005 AF. Total pumping in the basins was 241,105 AF, partially reduced due to WRD's In-Lieu incentive program. The Annual Overdraft is the natural inflows minus total outflows, or 149,010 AF (rounded to 149,000 AF).

For the current and ensuing WY estimates for Annual Overdraft, the concept of "Average Annual Groundwater Deficiency" is utilized. The Average Annual Groundwater Deficiency is the long-term average of natural inflows minus total outflows and represents the long term average deficit (Annual Overdraft) in the basins. The development of the USGS/WRD computer model derived these long term average inflow and outflow terms. **Table 4** presents this information, which concluded that the Average Annual Groundwater Deficiency is 105,385 AFY. Values of the average deficiency are based on the 30-year average inflows and outflows as calculated by the computer model which ran from October 1970 through September 2000. Long-term average inflows are influenced by the amount of precipitation falling on the District as well as for storm water capture at the spreading grounds. **Table 5** and **Figure A** show the historical precipitation at LACDPW Station #107D, located in Downey near the Montebello Forebay, or alternate stations nearby if Station #107D data are not reliable or available.

The calculation of the Average Annual Groundwater Deficiency represents in general that WRD needs to replenish about 105,385 AFY assuming long-term average conditions over that 30 year period for the water balance to reach equilibrium, the overall change in storage to equal zero, and groundwater levels to remain relatively constant. As shown in **Table 6**, adjustments are made to the long term average inflows and outflows for the current and ensuing WY to reflect estimates of the Annual Overdraft for those particular years. The current year has been average to dry to date, and pumping is expected to be less than the model period average in the current and ensuing years. Therefore, the projected Annual Overdrafts for the current and ensuing years are expected to be less than the long term average. Based on these adjustments, the current year Annual Overdraft is estimated at 97,200 AF and the ensuing year is estimated at 98,800 AF.

Accumulated Overdraft

Section 60023 of the Water Replenishment District Act defines *"Accumulated Overdraft"* as "*...the aggregate amount…by which the quantity of ground water removed by any natural or artificial means from the groundwater supplies…during all preceding water years shall have exceeded the quantity of non-saline water replaced therein by the replenishment of such ground water supplies in such water years by any natural or artificial means…"*

In connection with the preparation of Bulletin No. 104-Appendix A (1961), the DWR estimated that the historically utilized storage (Accumulated Overdraft) between the high water year of 1904 and 1957[1] was 1,080,000 AF (780,000 in CB, 300,000 in WCB). Much of this storage removal was from the forebay areas (Montebello Forebay and Los Angeles Forebay), where aquifers are merged, unconfined and serve as the "headwaters" to the confined pressure aquifers. Storage loss from the

[1] DWR Bulletin 104-A did not refer to the ending year for the storage determination. WRD has assumed it to be the year 1957, as this is the end year for their detailed storage analysis presented in Bulletin 104-B – Safe Yield Determination.

confined and completely full, deeper aquifers was minimal in comparison or was replaced by seawater intrusion, which cannot be accounted for under the language of the Water Code since it is considered saline water.

The goal of groundwater basin management by WRD is to ensure a sufficient supply of safe and reliable groundwater in the basins for annual use by the pumpers, to keep a sufficient supply in storage for times of drought when imported water supplies may be curtailed for several consecutive years as well as to keep suitable room available in the basins to receive natural water replenishment in very wet years, such as an El Niño type year.

To compute the Accumulated Overdraft since this initial amount of 1,080,000 AF, WRD takes each consecutive year's Annual Overdraft and replenishment activities and determines the change in storage. It adds to or subtracts the corresponding value from the Accumulated Overdraft. Since the base level, the aggregate excess of extractions over recharge from the basins has been reduced due to the replenishment by LACDPW in the earlier years and WRD since 1959, the reduction of pumping established by the adjudications, and the replenishment from the seawater barrier well injection. The Accumulated Overdraft at the end of the previous WY was determined to be 819,600 AF. For the current year, the Accumulated Overdraft is forecast to improve to 813,300 AF due to the purchase of imported water for spreading and the average to dry precipitation to date. This could change if hydrology or pumping patterns or planned artificial replenishment activities vary considerably in the near future.

Table 7 presents information for the previous and current Accumulated Overdraft estimate. The annual changes in storage are presented on **Table 8**.

Groundwater Levels

A groundwater elevation contour map representing water levels within the District in fall 2014 (end of the water year) was prepared for this report and is presented as **Plate 2**. The data for the map were collected from wells that are screened in the deeper basin aquifers where the majority of groundwater pumping occurs. These deeper aquifers include the Upper San Pedro Formation aquifers, including the Lynwood, Silverado, and Sunnyside. Water level data was obtained from WRD’s network of monitoring wells and from groundwater production wells that are screened in the deeper aquifers.

As can be seen on **Plate 2**, groundwater elevations range from a high of about 170 feet above mean sea level (msl) in the northeast portion of the basin above the spreading grounds in the Whittier Narrows to a low of about 120 feet below mean sea level (msl) in the Gardena and Long Beach areas. With the exception of the Montebello Forebay and along the West Coast Basin Barrier Project, the majority of groundwater levels in the District are below sea level (red colored contours on **Plate 2**), which is why continued injection at the seawater barriers is needed to prevent saltwater intrusion.

Plate 2 also shows the location of the key wells used for long-term water level data. These long-term hydrographs have been presented in the ESR for years, and provide a consistent basis from which to compare changing water levels. A discussion of water levels observed in the key wells is presented below.

<u>Los Angeles Forebay</u>

The Los Angeles Forebay occupies the westerly portion of the Central Basin Non-Pressure Area. Historically a recharge area for the Los Angeles River, this forebay's natural recharge capability has been substantially reduced since the river channel was lined and open areas paved over. Recharge is now limited to deep percolation of precipitation in limited areas, In-Lieu replenishment when available, subsurface inflow from the Montebello Forebay, the northern portion of the Central Basin outside of WRD's boundary, and the San Fernando Valley through the Los Angeles Narrows.

Key well #2778 (2S/13W-10A01) represents the water level conditions of the Los Angeles Forebay (see **Figure B**). The water level high was observed in 1938 at an elevation of approximately 70 feet msl and by 1962 water levels had fallen nearly 180 feet to an elevation of -109 ft msl due to basin over-pumping and lack of sufficient natural recharge. Since then, basin adjudication and managed aquifer recharge by WRD and others have improved water levels in this area. At the end of WY 2013/2014, groundwater levels were at an elevation of -21.7 feet msl and were 2.3 feet lower than the previous year. The average water level change throughout the entire Los Angeles Forebay was a drop of 5.5 feet.

<u>Montebello Forebay</u>

The Montebello Forebay lies in the northeastern portion of the Central Basin and connects with the San Gabriel Basin to the north through the Whittier Narrows. The Rio Hondo and San Gabriel River Coastal Spreading Grounds (often called the "Montebello Forebay Spreading Grounds") provide a substantial amount of recharge water to the CBWCB since the aquifers there are unconfined and allow easy infiltration of surface water impounded at the spreading grounds to the deeper groundwater.

Three key wells help describe the groundwater level conditions in the Montebello Forebay, a northern well, a middle well, and a southeastern well (**Plate 2**). The historic water levels in these three key wells are discussed below:

- Well Pico1_4 (2S/11W-18C07) is in the northern part of the Montebello Forebay. The upper chart on **Figure C** shows the water levels for this well. Historic water levels at this well or its predecessors have ranged from a high elevation of 164.7 feet above mean sea level in April 1944 to a low of 42.8 feet msl in December 1957. At the end of WY 2013/2014, groundwater levels in this well were at an elevation of 82.7 feet msl and were 14.4 feet lower than the previous year.
- Well 1601T (2S/12W-24M08) is centrally located between the Rio Hondo and San Gabriel spreading grounds. This well is monitored weekly to assess water levels in the middle of the forebay. The center chart on **Figure C** shows the water levels for this well. The historic water level high was observed in 1942 at an elevation of 137.8 feet above mean sea level, but by 1957 it had fallen 117 feet to an all-time low elevation of 20.9 feet msl due to basin over-pumping and insufficient natural recharge. As described above for the Los Angeles Forebay, adjudication of pumping rights and managed aquifer recharge helped restore water levels in the Montebello Forebay. At the end of WY 2013/2014, groundwater levels in this well were at an elevation of 60.3 feet msl and were 12.5 feet lower than the previous year. So far in the current year, water levels have risen about 5 feet due to December rains and imported water for spreading being purchased by WRD. As of February 2015, water levels are at an elevation of 65 feet msl.
- Well 1615P (3S/12W-01A06) is located downgradient and southeast of the spreading grounds near the southern end of the Montebello Forebay. Water level responses in this well are typically less pronounced than the other two wells because it is further from the spreading grounds and the recharge that occurs there. The lower chart on **Figure C** shows the water level history for this well. The historic water level high was observed in 1947 at an elevation of 113.6 feet above mean sea level but by 1957 had dropped 102 feet to an all-time low elevation of 11.4 feet msl. Since then, water levels have recovered. At the end of WY 2013/2014, groundwater levels were at an elevation of 42.1 feet msl and were 10.8 feet lower than the previous year.

The average water level change throughout the entire Montebello Forebay during the previous water year was a decline of 11 feet due to the continued drought and lack of imported water for spreading.

<u>Central Basin Pressure Area</u>

The District monitors key wells 906D (4S/13W-12K01) and 460K (4S/12W-28H09) which represent the conditions of the pressurized groundwater levels in the Central Basin Pressure Area. The hydrographs for these two wells are shown on **Figure D**.

Groundwater highs were observed in these wells in 1935 when they began to continually drop over 110 feet until their lows in 1961 due to the over-pumping and insufficient natural recharge. Groundwater levels recovered substantially during the early 1960s as a result of replenishment operations and reduced pumping. Between 1995 and 2007 there were 100-foot swings in water levels each year between winter and summer caused by pumping pattern changes by some of the Central Basin producers who operate with more groundwater in the summer months and less groundwater in the winter months, and took advantage of the MWD and WRD In-Lieu programs. From May 2007 to March 2011 the In-Lieu water was not available, so pumping remained more constant throughout those years and water levels remain low. Since then, In-Lieu with the City of Long Beach has occurred on several occasions, with resulting water levels rising as the pumps go off, and falling when the pumps come on.

At the end of WY 2013/2014, groundwater levels in well 906D were at an elevation of -73.2 ft msl and were 11.3 feet lower than the previous year. Water levels in well 460K were at an elevation of -108.2 ft msl and were 17.3 feet lower than the previous year. The average change in water levels in the entire Central Basin Pressure Area during the previous water year was a drop of 9.2 feet.

<u>West Coast Basin</u>

The West Coast Basin is adjacent to the Central Basin along the Newport-Inglewood Uplift, which is a series of discontinuous, sub-parallel hills and faults that act as a partial barrier to groundwater flow. Groundwater moves across the uplift based on water levels on both sides and the “tightness” (permeability) of the uplift along its various reaches, both horizontally and vertically.

Figure E shows the hydrographs of key well Wilmington1_3 and well Lawndale1_4 (which replaces historic well 760C from now on since 760C does not have regular readings, and Lawndale 1_4 is a dedicated monitoring well installed by WRD in 2013 in the same zone as 760C and 3,000 feet away to represent similar water levels and trends). These two wells represent the general conditions of the water levels in the West Coast Basin. In 1955, the control of groundwater extractions in the West Coast Basin resulted in stabilizing and reversal of the declining water levels in the center of the basin whereas at the eastern end near the Dominguez Gap Barrier water levels continued to decline until about 1971, when a recovery began due mostly to the startup of the Dominguez Gap Barrier Project.

At the end of the previous WY 2013/2014, water levels in well Lawndale1_4 were at an elevation of -15.9 ft msl and were 1.3 feet higher than the previous year. Water levels in well Wilmington1_3 were at an elevation of -36.5 ft msl and were 2.2 feet higher than the previous year. Over the entire West Coast Basin, the average water level change was a drop of 1.6 feet.

Plate 3 shows the water level changes over the entire CBWCB over the previous water year. Because of the dry year and reduced replenishment water, the WRD service area saw on average a decrease in water levels of 4 feet, with specific regions having greater or lesser amounts as described above.

For the current WY, October through December saw above normal precipitation, but January and February have been below normal, producing an overall pattern or average to slightly below average precipitation so far. WRD is maximizing recycled water replenishment within regulatory limits, and is currently purchasing imported water for spreading. Therefore, the District expects water levels to stay the same or decrease somewhat in the current water year.

Because the current groundwater levels in the CBWCB are within historic ranges and the anticipated replenishment activities by WRD will continue as planned, the District anticipates that there will continue to be sufficient supplies of safe and reliable groundwater to meet the demands of the pumpers in our service area in the current and ensuing years.

Change in Storage

The District determines the annual change in groundwater storage by comparing water levels from one year to the next, and factoring in the storage coefficients of the major aquifer layers. Rising groundwater means there is an increase in the amount of groundwater in storage whereas a drop in groundwater levels means there is a decrease in storage. Using groundwater elevation data collected from WRD's monitoring well network and selected production wells, the District constructs a groundwater level change map showing water level differences from one year to the next (**Plate 3**). The data from this map are converted to grids in the District's Geographic Information System (GIS) and multiplied by the storage coefficient value grids for the aquifer layers as obtained from the USGS calibrated Modflow computer model of the District. This calculation produces the change in storage value for the previous water year.

For WY 2013/2014, there was an overall drop in water levels with a resulting loss from storage in the amount of 62,100 AF. Most of this storage loss (49,200 AF or 79%) occurred in the Montebello Forebay, which is the gateway for large amounts of recharge water to enter the aquifer systems and flow into the rest of the District. This loss from storage occurred due to the dry year resulting in reduced replenishment water from a lack of both storm water and imported water. However, the groundwater basins are operating properly as an enormous underground reservoir – accepting water and rising when replenishment water is plentiful and pumping demands are low, and draining to meet the demands when replenishment water is lacking and pumping is high. **Table 8** provides the historical groundwater storage changes in the CBWCB.

Optimum Groundwater Quantity

In response to a 2002 State audit of the District's activities, the Board of Directors adopted an Optimum Quantity for groundwater amounts in the CBWCB. The Optimum Quantity is based on the Accumulated Overdraft (AOD) concept described in the Water Code and this ESR. The historic maximum groundwater drawdown due to over pumping reported in the CBWCB between 1904 and 1957 was 1,080,000 AF. This is defined as the historic maximum AOD. As pumping eased and artificial replenishment occurred, more water was put back into the basins and the AOD was reduced resulting in rising water levels.

After considerable analysis and discussion, the Board of Directors on April 19, 2006 established an Optimum Quantity of an AOD of 612,000 AF. This value was based on an extensive review of over 70 years of water level fluctuations in the District and recognizing that at the end of WY 1999/2000 groundwater amounts were at an acceptable quantity to sustain the adjudicated pumping rights in the basins. The AOD at that time was 611,900 AF (rounded to 612,000 AF), and therefore was set by the Board of Directors as the Optimum Quantity.

The Board of Directors on April 19, 2006 also adopted a policy to make up the Optimum Quantity should it fall too low. The policy is as follows:

> *An Accumulated Overdraft greater than the Optimum Quantity is a deficit. WRD will make up the deficit within a 20 year period as decided by the Board on an annual basis. If the deficit is within 5 percent of the Optimum Quantity, then no action needs to be taken to allow for natural replenishment to makeup the deficit.*

The Accumulated Overdraft at the end of WY 2013/2014 was 819,600 AF, or 207,600 AF below the Optimum Quantity.

CHAPTER 4 - GROUNDWATER REPLENISHMENT: QUANTITIES, AVAILABILITY, AND COSTS

As discussed in the previous chapter, the Central Basin and West Coast Basin ("CBWCB") have an annual overdraft because more groundwater is pumped out than is naturally replaced. The District purchases supplemental water (artificial replenishment water) each year to help offset this overdraft through managed aquifer recharge. The purchased water enters the groundwater basins at the Montebello Forebay spreading grounds, at the seawater barrier injection wells, and through the District's In-Lieu Program. The purpose of this Chapter is to determine the quantities of water needed for purchase in the ensuing year and to determine the availability and cost of that water.

Sources of Replenishment Water

The District currently has available to it recycled and imported water sources for use as artificial replenishment water. These two sources are described below:

- **Recycled Water**: Recycled water is wastewater from the sewer systems that is reclaimed through extensive treatment at water reclamation plants ("WRP"s). The water is treated to high quality standards so that it can be reused safely, and offsets the need to use more expensive and sometimes less available imported water. Some agencies and businesses use recycled water for non-potable purposes, such as for irrigation of parks, golf courses, and street medians, or for industrial purposes (known as "purple-pipe projects"). WRD has successfully used recycled water for groundwater recharge since 1962. In semi-arid areas such as Southern California where groundwater and imported water are in short supply, recycled water has proven to be a safe and reliable additional resource to supplement the water supply. Recycled water is used at the spreading grounds and the seawater barrier wells. Although recycled water is high quality, relatively low cost, and a reliable supply all year long, the District is limited by regulatory agencies in the amount it can use for replenishment. Therefore, imported water is also used for recharge.

- **Imported Water**: Raw river water from northern California (State Water Project) and the Colorado River is imported into Southern California by the Metropolitan Water District of Southern California ("MWD" or "Met") and the City of Los Angeles Department of Water and Power (DWP). MWD sells this water as raw or treated to their member agencies for multiple uses, including potable water and groundwater recharge. WRD uses raw (untreated) imported water at the spreading grounds and uses treated potable water for injection at the seawater barrier wells and the In-Lieu program. Because of treatment and transportation costs, imported water is the most expensive type for groundwater replenishment. Prior to October 2011, MWD offered seasonally-available discounted water that could be purchased for replenishment. In turn for the discount, it was considered by MWD to be interruptible and they could stop deliveries at any time. But due to a lack of surplus supplies caused by drought and other factors, MWD has eliminated offering this type of discounted interruptible water. Instead, replenishment agencies such as WRD must now purchase what is known as "Tier 1" or "Tier 2" water from MWD member agencies for spreading and In-Lieu. This water is at a higher price and relies on available allocation from the member agency, but supposed to be firm delivery water (not interruptible); although during extreme droughts MWD can reduce or halt sales to replenishment agencies, as it did in 2014/2015. The seawater barrier injection water has been Tier 1 treated water for decades and has to date not been interrupted by MWD.

Recommended Quantities of Replenishment Water

With the information presented in the preceding chapters regarding the pumping demands in the CBWCB and the overall condition of the groundwater basins, WRD can estimate its projected need for replenishment water in the ensuing year.

Spreading

Groundwater recharge through surface spreading occurs in the Montebello Forebay Spreading Grounds adjacent to the Rio Hondo and the San Gabriel River, within the unlined portion of the San Gabriel River, and behind the Whittier Narrows Dam in the Whittier Narrows Reservoir. Owned and operated by the Los Angeles County Department of Public Works ("LACDPW"), they were originally constructed in 1938 for flood control and conservation of local storm water, but have been used since the 1950s to replenish the basins with imported water and since 1962 with recycled water.

Since recycled water is a high quality, less expensive, and available year-round source of replenishment water, the District maximizes its use within established regulatory limits. These limits are discussed below under "Expected Availability of Replenishment Water". The District has historically targeted 50,000 AFY of recycled water for spreading to meet regulatory limits. However, with the recent modifications to the District's permit to allow 45% recycled water over a running 10-year average (see below under Expected Availability of Replenishment Water), the District can now target 55,000 AFY of recycled water as long as sufficient dilution water is available from storm water and imported water.

Additional replenishment water is needed beyond the 55,000 AFY of recycled water and will have to come from imported water. In 2003, the WRD Board adopted the long term average of 27,600 AFY of imported water to purchase for spreading. This value was based on long-term (30 year) averages of the overall water budget of the basins using the USGS computer model. The 2003 ESR discusses the derivation of this value in more detail.

Since that time, the District has invested in cooperative projects with the LACDPW to capture more storm water and to lessen the need for imported water as part of WRD's Water Independence Now program, or WIN. Improvements to the Whittier Narrows Conservation Pool are expected to conserve an additional 3,000 AFY of storm water on average. Two new rubber dams were built in the San Gabriel River near Valley Boulevard and are expected to conserve an additional 3,600 AFY on average. And with the revisions to the recycled water permit discussed in the previous paragraph, 5,000 additional AF of recycled water can be planned thus lowering imported water by 5,000 AFY. Therefore, the new Long Term Average for imported spreading demands is 16,000 AFY, which is the targeted amount for the ensuing year.

Table 9 presents the anticipated imported water replenishment needs at the spreading grounds.

Injection

Another way of replenishing the groundwater supply is to inject water at the three seawater intrusion barriers owned and operated by the LACDPW, including the West Coast Basin Barrier, Dominguez Gap Barrier, and Alamitos Barrier. Although the primary purpose of the barriers is for seawater intrusion control, groundwater replenishment also occurs as the freshwater is injected into the CBWCB aquifers and then moves inland towards pumping wells.

To determine the amount of barrier water estimated for the ensuing year, WRD under an Agreement with LACDPW gets annual estimates from the expected demand at the barriers. WRD reviews these estimates; reviews recent 5-year averages of actual injection amounts, and makes adjustments as necessary. For the ensuing year, WRD estimates the West Coast Basin Barrier Project will require 19,000 AF, of which the majority (14,300 AF) will be recycled water from WBMWD's Edward C.

Little Water Recycling Facility and the remaining 14,300 AF will be imported water. For the Dominguez Gap Barrier Project, a total of 8,000 AF is expected to be needed, of which 5,600 AF will be recycled water from the City of Los Angeles' Terminal Island Treatment Plant (maximum amount currently allowed by permit) and 2,400 of imported water. For the Alamitos Barrier Project, a total of 5,300 AF will be required by WRD (does not include barrier water purchased by Orange County Water District for their side of the barrier), which includes 4,800 AF of recycled water from the expanded Leo J. Vander Lans Water Treatment Facility plant and 500 AF of imported water.

The total barrier demand for WRD in the ensuing year is estimated at 32,300 AF, including 7,600 AF imported water (24%) and 24,700 AF of recycled water (76%) (see **Table 9)**.

In-Lieu Replenishment Water

The basic premise of WRD's In-Lieu Program is to offset the pumping in the basin to lower the annual overdraft and reduce the artificial replenishment needs. It helps provide an alternate means of replenishing the groundwater supply by encouraging basin pumpers to purchase imported water when available instead of pumping groundwater. This can help raise water levels in areas that are otherwise more difficult to address. MWD has ceased providing seasonally discounted water for the In-Lieu program since 2011, so WRD's program has been put on hold with the exception of a few localized projects with the City of Long Beach. For the previous year, WRD had an In-Lieu Program with Long Beach for 4,371 AF, which helped keep groundwater in the CBWCB. For the ensuing year, WRD is not budgeting for the In-Lieu program, although may consider new programs if opportunities arise.

Expected Availability of Replenishment Water

The availability of water supplies for the ensuing water year has been taken into account when determining how funds should be raised. If a particular resource is expected to be unavailable during a given year, money can still be raised to fund the purchase of that quantity of water in a succeeding year.

Recycled Water

Recycled water is reliable all year round but its use for recharge is capped by regulatory limits. The current limits for recycled water spreading in the Montebello Forebay are established by the Los Angeles Regional Water Quality Control Board ("RWQCB") and are detailed in Order No. 91-100 adopted on September 9, 1991 with amendments on April 2, 2009 under Order No. R4-2009-0048 and June 4, 2013 (letter approval from RWQCB Executive Officer). On April 10, 2014, under Order No. R4-2009-0048-A-01, the RWQCB approved a request by WRD to increase the allowable percentage of recycled water to be recharged at the Montebello Forebay spreading grounds from 35% to 45% over a 10-year running average as a drought relief measure. This major action will allow continued use of historic amounts of recycled water for longer periods of time should the dry conditions continue, and might allow for additional recycled water for recharge should normal to wet hydrologic conditions return. This will allow WRD to continue to maximize use of recycled water for groundwater recharge as part of its Water Independence Now, or WIN, initiative.

The Sanitation Districts of Los Angeles County ("SDLAC") provides the recycled water to WRD for spreading by LACDPW. This water comes from the Whittier Narrows Water Reclamation Plant ("WNWRP"), San Jose Creek Water Reclamation Plant ("SJCWRP"), and Pomona Water Reclamation Plant ("PWRP"). For planning purposes, the District assumes purchasing 55,000 AFY of recycled water in the ensuing year, although this amount can vary based on percentage limits and availability of the recycled water and the spreading grounds.

Recycled water for injection into the seawater barrier wells comes from different agencies depending on the specific barrier. At the WCBBP, the water is provided by WBMWD's Edward C. Little Water Recycling Facility. Per regulatory limits, this resource can provide up to 100% recycled water to the Barrier under their Phase V construction activities, although the volumes produced from the plant have not reached 100%, partially due to the barrier requiring more water than the plant can produce and partially due to the continued ramping up of deliveries from the Phase V plant and conditions imposed by the barrier's owner/operator, the LACDPW.

Recycled water for the DGBP is typically available from the City of Los Angeles' Terminal Island Treatment Plant (Harbor Recycled Water Project). The plant is permitted to provide the barrier with a maximum of 5 million gallons per day (mgd), averaged daily (equivalent to 5,600 AFY if running at 5 mgd for the full year), or 50% of the total barrier supply over a 5-year averaging period, calculated by a running monthly average over the preceding 60 months, whichever is less. For the ensuing year, it is estimated that of the 8,000 AF demand next year, 5,600 AF will be recycled water and 2,400 AF will be imported water. Efforts are underway to expand the plant's treatment capabilities and increase the recycled percentage amount to 100% to eliminate the need for imported water.

Recycled water for the ABP is available from WRD's Leo J. Vander Lans Water Treatment Facility. This treatment plant was permitted to provide up to 100% of the barrier with recycled water in 2014 and is expected to run at this rate starting in early 2015. For the ensuing year, of the 5,300 AF estimated to be injected at the barrier on the WRD-side of the barrier (not including the Orange County side), an estimate of 4,800 AF will be recycled water and 500 AF will be imported water to make up any plant shut downs for maintenance or other issues.

<u>Imported Water</u>

Since October 2011, MWD terminated its discounted replenishment water program which the District utilized since 1959, and has not yet offered a new replenishment program. Replenishment agencies must rely on the more expensive Tier 1 water if it is available from MWD-member agencies, or pay the even higher priced Tier 2 water if Tier 1 water is unavailable. Over the past few years, WRD has budgeted for Tier 1 water for the spreading grounds and the In-Lieu program.

For the imported water used for injection at the seawater barrier wells, the District had paid the treated Tier 1 rate for decades to ensure availability. Because of the increasing price of Tier 1 water, the District is looking at ways to reduce costs. Methods such as reduction of pumping near the barriers, increased recycled water to offset imported water, or banking water at lower seasonal rates are being explored or implemented. At the ABP, the City of Long Beach and WRD have entered into an agreement to bank seasonal treated water and Tier 1 water through inland injection wells and then extract the water for injection at the barriers when needed, thus saving considerable costs on barrier water. In 2009/2010, the 2,000 AF of Tier 1 water banked in 2008/2009 was utilized. The seasonal water banked in 2004/2005 through 2006/2007 has 2,160 AF remaining and can be called at any time that serves the District most effectively.

Projected Cost of Replenishment Water

WRD has estimated it will need 103,300 AF of replenishment water in the ensuing year. Using currently available information and estimates for the cost of replenishment water to WRD from the various water suppliers, this water will cost WRD approximately $42,125,595. Costs may change over the next few months as the other agencies adopt their budgets, and any changes will be incorporated into an updated ESR.

Tables 1 and 2 provide a detailed breakdown of the estimated replenishment water costs for the ensuing water year. These estimated costs are for water purchases only and do not include the additional costs for water replenishment and water quality projects and programs. These projects and programs are discussed in detail in Chapter 5. The anticipated costs of these projects and programs will be further discussed in District budget workshops, Budget Advisory Committee ("BAC"), and other public meetings before the Board of Directors adopts the 2015/2016 Replenishment Assessment in May.

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CHAPTER 5 - PROJECTS AND PROGRAMS

California Water Code Sections 60220 through 60226 describe the broad purposes and powers of the District to perform any acts necessary to replenish, protect, and preserve the groundwater supplies of the District. In order to meet its statutory responsibilities, WRD has instituted numerous projects and programs in a continuing effort to effectively manage groundwater replenishment and groundwater quality in the Central Basin and West Coast Basin ("CBWCB"). These projects and programs include activities that enhance the replenishment program, increase the reliability of the groundwater resources, improve and protect groundwater quality, and ensure that the groundwater supplies are suitable for beneficial uses.

These projects and programs have had a positive influence on the basins, and WRD anticipates continuing these activities into the ensuing year. The following is a discussion of the projects and programs that WRD intends to continue or initiate during the ensuing year.

001 – Leo J. Vander Lans Water Treatment Facility Project

The Leo J. Vander Lans Water Treatment Facility provides advanced treated recycled water to the Alamitos Seawater Intrusion Barrier. The facility receives tertiary-treated water from the Sanitation Districts and provides the advanced treatment through a process train that includes microfiltration (MF), reverse-osmosis (RO), and ultraviolet light (UV). The facility's operations permit was approved by the Los Angeles Regional Water Quality Control Board ("RWQCB") on September 1, 2005, and the replenishment operations of this facility started in October 2005. The product water has since been discharging to the barrier to replace up to 50% of the potable imported water formerly used, thereby improving the reliability and quality of the water supply to the barrier. The plant has been producing 3 million gallons a day ("MGD") for delivery to the barrier. The Long Beach Water Department ("LBWD") is responsible for operation and maintenance of the treatment plant under contract with WRD.

The facility was expanded in late 2015 to increase the capacity to 8 MGD, with the operations permit amended by the RWQCB for the expanded facility. It is capable of providing up to 100% of the barrier demand with advanced treated recycled water, thereby eliminating altogether the need for imported water. The facility expansion added unique treatment process enhancements to reduce facility's waste generations. The process enhancements include (1) a third-stage RO to increase recovery from the original 85% to 92.5%; and (2) a MF backwash waste treatment system that recovers approximately 95% of the backwash waste stream through dissolve air flotation (DAF) treatment and a follow-up polishing MF. With these process enhancements, the facility has been expanded to almost triple the production capacity without any increases in waste generations.

Expected operations costs for the coming year will involve operation and maintenance of the plant and groundwater monitoring at the barrier. Because the primary purpose of this project is to provide a more reliable means of replenishing the basin through injection, 100% of the costs are drawn from the Replenishment Fund. The capital costs for the expansion are funded by federal and state grants as well as the District's bond proceeds.

002 – Robert W. Goldsworthy Desalter Project

The Robert W. Goldsworthy Desalter has been operating since 2002 to remove over 20,000 AF of brackish groundwater from a seawater intrusion plume (aka “saline plume”) in the Torrance area that was stranded inland of the West Coast Basin Barrier after the barrier project was put into operation in the 1950s and 1960s. The production well and desalting facility are located within the City of Torrance and the product water is delivered for potable use to the City’s distribution system. The treatment plant capacity is about 2,200 AFY. The City is responsible for operation and maintenance of the treatment plant under contract with WRD.

The District has completed a final design for expanding the Goldsworthy Desalter. The expansion project includes an increase of treatment capacity to a total 4,800 AFY, the addition of two new source water wells, and associated conveyance pipelines and pump stations. Construction of these new facilities is expected to begin in the middle of 2015. The purpose of the desalter expansion is directly related to remediating degraded groundwater quality and costs will be funded through WRD’s Capital Improvement Program. Expected costs for the coming year will involve capital improvements for the plant expansion as well as operation and maintenance of the plant.

Additional measures may be necessary in the future to fully contain and remediate the saline plume, which extends outside of the Torrance area. WRD is completing work on a groundwater master plan for the West Coast Basin to determine long-term solutions to this problem. The District continues to work with the City of Torrance Municipal Water Department, the pumpers’ Technical Advisory Committee, and other West Coast Basin stakeholders on the future of the saline plume removal in the West Coast Basin.

004 – Recycled Water Program

Recycled water or reclaimed municipal wastewater has been successfully used for groundwater recharge by WRD since 1962. Recycled water provides a reliable source of high quality water for surface spreading in the Montebello Forebay and for injection at the seawater intrusion barriers. In light of the recurring drought conditions in California and uncertainties about future water availability and increasing cost of imported water supplies, recycled water has become increasingly vital as a replenishment source.

In order to ensure that the use of recycled water for groundwater recharge remains a safe and reliable practice, WRD participates in various research and monitoring activities, proactively contributes to the regulatory and legislative development processes, and engages in information exchange and dialogue with regulatory agencies and other recycled water users. The District continues to closely coordinate with the Sanitation Districts of Los Angeles County (SDLAC), which produces the recycled water used for surface spreading in the Montebello Forebay, on permit compliance activities, including groundwater monitoring, assessment, and reporting. Many monitoring and production wells are sampled frequently by WRD staff, and the results are reported to the regulatory agencies.

In addition to compliance monitoring and sampling associated with the spreading grounds, WRD is partnering with others to more fully investigate the effectiveness of soil aquifer treatment (SAT) during groundwater recharge. A recent research conducted at the test basin adjacent to the spreading grounds augmented past research efforts by characterizing the percolation process and by quantifying the filtering and purifying properties of the underlying soil with respect to constituents of concern, such as nitrogen, total organic carbon, and chemicals of emerging concern (CECs). The District continues to be vigilant in monitoring research on the occurrence, significance, attenuation, and removal of CECs, including pharmaceuticals, endocrine disruptors, and personal care products.

Three separate groundwater tracer studies were performed in 2003-2005, 2005-2006, and 2010-2011 for the purpose of tracking and verifying the movement of recycled water from the spreading grounds by testing the monitoring wells and the production wells. Results showed that the depth rather than the horizontal distance from the recharge ponds is the key factor influencing arrival times of recycled water to wells. Travel time to deeper wells is greater than to shallower wells, even if the deeper wells are located much closer to the spreading grounds than shallower wells. In some cases, WRD made modifications to wells to seal off their shallow perforations so that the wells would only produce from the deeper aquifers. Tracer tests conducted subsequent to well modification demonstrated an increased travel time compared to earlier results. These efforts, in addition to periodic studies assessing health effects and toxicological issues, are necessary to provide continued assurances that the use of recycled water for groundwater recharge remains safe and compliant with all regulatory standards.

In response to the prolonged drought, WRD worked closely with the regulatory agencies to allow a greater amount of recycled water to be used for spreading at the Montebello Forebay Spreading Grounds, through an amendment of the existing permit in 2014. This amendment will allow WRD to continue to utilize recycled water even when storm water and imported water become scare or unavailable. As required by the permit amendment, WRD will implement additional monitoring when the recycled water contribution reaches forty percent. In addition, WRD, in concert with other stakeholders, worked closely with the State Water Resources Control Board's Division of Drinking Water (DDW; formerly, California Department of Public Health) to review, update, and help shape the regulations on groundwater recharge using recycled water, which became effective in June 2014.

Recycled water is also injected into the Los Angeles County Department of Public Works' three seawater intrusion barriers located along the coast of Los Angeles County (Alamitos, West Coast, and Dominguez Gap barriers). Highly purified recycled water used for injection at the Alamitos Barrier is produced at WRD's Leo J. Vander Lans Water Treatment Facility. The recycled water for the Dominguez Gap Barrier is generated at the City of Los Angeles' Terminal Island Water Reclamation Plant. And the recycled water for the West Coast Barrier is produced at the West Basin Municipal Water Districts' Edward C. Little Water Recycling Facility. Extensive recycled water monitoring and regular groundwater modeling are performed to ensure that the treatment plants are operating as intended and that the injected water is making a positive contribution to the groundwater basins. All three barrier projects are in various phases of expanding the recycled water produced for the barrier operations, with the ultimate goal of completely phasing out the potable water used at the barriers. Alamitos Barrier will reach the goal of 100% recycled water recharge in 2015, with the other two barriers following in the near future.

Projects under this program help improve the reliability and utilization of an available local resource, i.e. locally produced recycled water. This resource is used to improve replenishment capabilities and is thus funded from the Replenishment Fund.

005 – Groundwater Resources Planning Program

The Groundwater Resources Planning Program was instituted to evaluate basin management issues and to provide a means of assessing project impacts in the District's service area. Prior to moving forward with a prospective project, an extensive evaluation is undertaken. Within the Groundwater Resources Planning Program, new projects and programs are analyzed based on benefits to overall basin management. This analysis includes performing an extensive economic evaluation to compare estimated costs with anticipated benefits. As part of this evaluation process, all capital projects are brought to the District's Technical Advisory Committee for review and recommendation. The culmination of this review and evaluation process is the adoption of the five - year Capital Improvement Program ("CIP") by the District's Board of Directors.

Under this program, District staff will continue to monitor state and federal funding programs to determine applicability to the District's list of prospective projects. In the coming year, the District will continue participation in Integrated Regional Water Management Planning ("IRWMP") for Greater Los Angeles County. Collaborative development of the region's IRWM plan is a requirement for entities to secure grant funding under Proposition 84 that was passed in November 2006 and Proposition 1 that was passed in November 2014. Grant applications for Proposition 84, Round 4 are expected to be submitted to the California Department of Water Resources in the upcoming year. The District anticipates submitting an application for the Groundwater Reliability Improvement Program ("GRIP") under this program.

Projects under the Groundwater Resources Planning Program serve to improve replenishment operations and general basin management. Accordingly, this program is also wholly funded through the Replenishment Fund.

006 – Groundwater Quality Program

This program is an ongoing effort to address water quality issues that affect WRD projects and the pumpers' facilities. The District monitors and evaluates the impacts of proposed, pending and recently promulgated drinking water regulations and legislation. The District assesses the justification and reasoning used to draft these proposals and, if warranted, joins in coordinated efforts with other interested agencies to resolve concerns during the early phases of the regulatory and/or legislative process.

Annually, the District offers a groundwater quality workshop to water purveyors. At the workshop, field experts and regulators provide information on the latest water quality regulations, state of the groundwater in the local basins, information on the cutting edge technology for contaminant removal or well rehabilitation, and other topics that are of key interest to the District's water purveyors. This year's annual workshop is anticipated to feature speakers from the State Water Resources Control Board to help deconstruct the requirements of the 2014 Statewide Permit for Drinking Water Discharges and to help respond to questions from the purveyors. The annual workshop also gives a comprehensive overview of the resources provided under the District's Groundwater Quality Program.

The District continually evaluates compliance with current and anticipated water quality regulations in production wells, monitoring wells, and spreading/injection waters of the basins. WRD proactively investigates any potential non-compliance situations to confirm or determine the causes of noncompliance, develops recommended courses of action and estimates their associated costs to address the problem, and implements the best alternative to achieve compliance.

Effective January 1, 2007, the District assumed responsibility for the Central Basin Title 22 Groundwater Monitoring Program. The program involves working with participating pumpers to comply with regulatory requirements for well water monitoring, including: (1) scheduling the collection and analysis of samples for Title 22 compliance required by the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) and special sampling such as the Unregulated Contaminant Monitoring Rule ("UCMR") required by the United States Environmental

Protection Agency ("EPA"); (2) coordinating the submittal of results to the SWRCB DDW; and 3) preparing the annual Consumer Confidence Reports for the pumpers. This program is available to pumpers who choose to participate and agree to reimburse the District the actual monitoring costs, including District staff time in administering the program. The District presently has 22 pumpers/participants in this program, which involves a total of 84 wells.

In recent years, new Chemicals of Emerging Concern (CECs) have been identified nationwide as potentially impacting surface water and groundwater. CECs can be broadly defined as any synthetic or naturally occurring chemical or any microorganism that is not commonly monitored in the environment but has been recently detected in the environment. CECs such as pharmaceuticals and personal care products, perfluorinated compounds, polybrominated diphenyl ethers, and others may pose a potential threat to water resources. Their detection in the environment does not necessarily mean that they pose a health threat at their measured concentrations. WRD is actively monitoring surface spreading and injection activities for water quality constituents, including many CECs. In addition, the District supports research evaluating CEC removals using innovative treatment technologies.

WRD's service area contains a large and diverse industrial and commercial base. Consequently, many potential groundwater contamination sources exist within District boundaries. Examples of potential contamination sources include leaking underground storage tanks, petroleum pipeline leaks at refineries and petrochemical plants, and discharges from dry cleaning facilities, auto repair shops, metal works facilities, and others. Such contamination sources may pose a threat to the drinking water aquifers. Accordingly, WRD established its Groundwater Contamination Prevention Program as a key component of the Groundwater Quality Program in an effort to minimize or eliminate threats to groundwater supplies. The Groundwater Contamination Prevention Program includes several ongoing efforts:

- Central Basin and West Coast Basin Groundwater Contamination Forum: More than 10 years ago, WRD established this data-sharing and discussion forum with key stakeholders including the EPA, the California Department of Toxic Substances Control ("DTSC"), the RWQCB, the SWRCB DDW, the United States Geological Survey ("USGS"), and various cities and purveyors. Stakeholders drafted and signed a Memorandum of Understanding ("MOU") agreeing to meet regularly and share data on contaminated groundwater sites within the District. WRD acts as the meeting coordinator and data repository/distributor, helping stakeholders to characterize the extent of contamination to identify potential pathways for contaminants in shallow aquifers to reach deeper drinking water aquifers and develop optimal methods for remediating contaminated groundwater.

- With the cooperation and support of all stakeholders in the Groundwater Contamination Forum, WRD developed a list of high-priority contaminated groundwater sites located within the District. This list is a living document, subject to cleanup and "closure" of sites, as well as discovery of new sites warranting further attention. Currently, the list includes 48 sites across the CBWCB. WRD works with the lead regulatory agencies for each of these sites to keep abreast of their status, offer data collection, review and recommendations as needed, and facilitate progress in site characterization and cleanup.

- In 2012, WRD formed the Los Angeles Forebay Groundwater Task Force to coordinate and align regulators and water purveyors/agencies to collaboratively address groundwater contamination in the Los Angeles Forebay that is a threat to drinking water resources. The Task Force members currently include WRD, DTSC, EPA, RWQCB, SWRCB DDW, USGS, City of Vernon, City of

Los Angeles and others. WRD and DTSC are investigating and collecting data to assess the extent of regional volatile organic compound and perchlorate plumes and find the source(s) of this contamination. This data will be utilized by the regulatory agencies to eventually facilitate remediation of the plumes.

WRD remains committed to projects seeking opportunities and innovative project concepts to enhance capture and recharge of local stormwater runoff in order to augment local groundwater resources, as follows:

- For over a decade, the District has participated on the Technical Advisory Committee ("TAC") for the Water Augmentation Study ("WAS") of the Los Angeles and San Gabriel Rivers Watershed Council. WAS is a multi-year investigation into the feasibility of capturing more local storm runoff, which would otherwise discharge into the storm drains, channels, and ultimately be lost to the ocean. Local stormwater captured from small-scale sites (e.g. neighborhoods, parks, ball fields, etc.) using various infiltration practices (e.g. bioswales, infiltration basins, and porous pavements) represents a potential source of new replenishment water, above and beyond the stormwater currently captured and used for percolation at the existing spreading grounds. As a TAC member, WRD helps to steer the study to examine and ensure that this new source of recharge water does not degrade groundwater quality if allowed to percolate at local sites. In 2012, with financial contributions from the District, two lysimeters were installed as part of the WAS investigation to evaluate the potential impacts of the locally captured stormwater on groundwater quantity and quality at the Elmer Avenue neighborhood BMP demonstration project constructed in 2009. Monitoring of the lysimeters began in early 2013 and extended through 2014. The results of the water quality sampling at Elmer Avenue is summarized in Council for Watershed Health's 2014 Annual Monitoring Report for Prop 84 Storm Water Grant Program Agreement #12-425-550 (*Assessing the Effect of Long-Term Stormwater Infiltration on Groundwater Quality; Continued Monitoring of the Los Angeles Basin Water Augmentation Study Infiltration Best Management Practices (BMPs*)).

- The Stormwater Recharge Feasibility Study, which began mid-2011 and was completed in August 2012, investigated regional and distributed alternatives to capture more stormwater from parcels within the District service area for groundwater recharge. To identify and prioritize catchments or parcels with greatest potential to provide additional groundwater recharge and reduce pollutant loading to surface water bodies, an in-depth, regional assessment was conducted using spatial analysis and locally developed models, including the Structural Best management practices Prioritization and Analysis Tool ("SBPAT"), the Groundwater Augmentation Model ("GWAM"), and the WRD/USGS MODular three-dimensional finite-difference ground-water FLOW model ("MODFLOW"). The assessment considered a suite of factors important to siting groundwater recharge projects (e.g. surface flows, soil conditions, depth to water, and subsurface geologic conditions, preexisting contamination, and permanent dewatering activities) as well as local water quality objectives.

  The study identified 17 high priority catchments within the District service area where expected water supply benefits were estimated at 4,300 AFY if appropriate infiltration facilities are installed and maintained. A single 100 acre catchment was selected, and concept designs for a catchment-wide pilot stormwater capture and recharge facilities were completed. Results from the analyses and pilot project are scalable to inform future decisions about widespread implementation of distributed and regional stormwater capture projects. Findings of the study were presented to various audiences, including water purveyors, regulators, local environmental groups, and at regional and national stormwater conferences. The benefit cost analyses, which examined multiple factors including but not limited to water quality improvements, water supply benefits, and social benefits garnered wide interest from water quality agencies, water supply agencies, and policymakers.

In 2012, the District partnered with the City of Los Angeles Bureau of Sanitation (the lead applicant) to pursue Proposition 84 funding (Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006) to implement a portion of the concept design to increase stormwater infiltration and to assist the City of Los Angeles in its compliance with total maximum daily load (water quality-related) requirements. The proposed project area is located in the City of Los Angeles south of the 10 freeway and east of the 110 freeway. The combined watershed of all proposed stormwater infiltration projects is approximately 228 acres with mixed land uses. In 2013, the City was awarded $2,939,361 by the State Water Resources Control Board to construct and monitor the project. Known as the "Broadway Neighborhood Stormwater Greenway (Broadway) Project, this project is pending completion in 2015.

Much of the work for the coming year will involve additional investigations at well sites known to have contaminated water, continued tracking of water quality regulations and policies affecting production and replenishment operations, further characterization of contaminant migration into the deeper aquifers, and monitoring and expediting cleanup activities at contaminated sites. All work under this program is related to water quality and cleanup efforts and is funded from the Clean Water Fund.

010 – Geographic Information System ("GIS")

The District maintains an extensive in-house database and Geographic Information System (GIS). The database includes water level and water quality data for WRD's service area with information drawn not only from the District's Regional Groundwater Monitoring Program and permit compliance monitoring, but also from water quality data obtained from the DDW. The system requires continuous update and maintenance but serves as a powerful tool for understanding basin characteristics and overall basin health.

The GIS is used to provide better planning and basin management. It is used to organize and store an extensive database of spatial information, including well locations, water level data, water quality information, well construction data, production data, aquifer locations, and computer model files. In the coming year, this information will be further integrated with readily available data from other state and federal agencies, as well as other District departments. Staff uses the system daily for project support and database management. Specific information is available upon request to any District pumper or stakeholder and can be delivered through the preparation of maps, tables, reports, or in other compatible formats. Additionally, the District has made its web-based Interactive Well Search tool available to selected users. This web site provides these users with limited access to WRD's water quality and production database.

District staff will continue to streamline and refine the existing data management system and website as well as satisfy both internal and external data requests. As part of the streamlining of the data, staff will work closely with other District departments to evaluate and implement updates to the District's existing system to facilitate the seamless transfer of data and access to that data. Additionally, District staff will continue the development of applications to more efficiently manage and report groundwater production information. Continued use, upkeep, and maintenance of the GIS are planned for the coming year. The use of the system supports both replenishment activities and groundwater quality efforts. Accordingly, the cost for this program is equally split between the Replenishment and Clean Water Funds.

011 – Regional Groundwater Monitoring Program

WRD has been monitoring groundwater quality and water levels in the CBWCB for over 50 years. The Regional Groundwater Monitoring Program provides for the collection of basic information used for groundwater basin management including groundwater level data and water quality data. It currently consists of a network of over 300 WRD and USGS-installed monitoring wells at over 55 locations throughout the District, supplemented by the existing groundwater production wells operated by the water purveyors. The information generated by this program is stored in the District's GIS and provides the basis to better understand the dynamic changes in the Central Basin and West Coast Basin. WRD hydrogeologists and engineers, provide the in-house capability to collect, analyze and report groundwater data.

Water quality samples from the monitoring wells are collected twice a year and analyzed for numerous common constituents such as general minerals, volatile organic compounds, metals, and general physical properties, as well as "special study constituents" on a case by case basis such as perchlorate, n-nitrosodimethylamine ("NDMA"), hexavalent chromium, 1,4-dioxane, and CECs. Water levels are measured in most monitoring wells with automatic data loggers daily, while water levels in all monitoring wells are measured by WRD field staff a minimum of four times per year. On an annual basis, staff prepares the Regional Groundwater Monitoring Report that documents groundwater level and groundwater quality conditions throughout the District. This report is distributed to the stakeholders in WRD and is also available on the District's website. In 2011, the National Groundwater Associated presented WRD with the "2011 Groundwater Protection Project Award" in recognition of the regional groundwater monitoring program.

WRD is also the designated groundwater monitoring entity for the CBWCB under the State of California's CASGEM program (California Statewide Groundwater Elevation Monitoring). WRD collects water level data from 28 of its nested monitoring wells and uploads it to the State's CASGEM website on a regular basis for seasonal and long-term water level trend tracking. Public access to the CASGEM website is at www.water.ca.gov/groundwater/casgem.

Most of the work during the ensuing year will involve the on-going collection of water levels and water quality samples from the WRDs monitoring wells, continuous well and equipment maintenance, and annual reporting activities. Work associated with the Regional Groundwater Monitoring Program also supports activities relating to both replenishment and water quality projects. The program is funded equally by the Replenishment and Clean Water Funds.

012 – Safe Drinking Water Program

WRD's Safe Drinking Water Program ("SDWP") has operated since 1991 and is intended to promote the cleanup of groundwater resources at specific well locations. Through the installation of wellhead treatment facilities at existing production wells, the District removes contaminants from the underground supply and delivers the extracted water for potable purposes. Projects implemented through this program are accomplished in collaboration with well owners.

One component of the program focuses on the removal of VOCs and offers financial assistance for the design, equipment and installation at the selected treatment facility. Another component offers zero-interest loans for secondary constituents of concern that affect a specific production well. The capital costs of wellhead treatment facilities range from $800,000 to over $2,000,000. Due to financial constraints, the initial cost is generally prohibitive to most pumpers. Financial assistance through the District's SDWP makes project implementation much more feasible.

There are several projects in various stages of implementation and new candidates for participation are under evaluation. A total of 16 facilities have been completed and are online and one facility has successfully completed removal of the contamination and no longer needs to treat. While continued funding of this program is anticipated for next year, the District has revised the guidelines of the SDWP to place a greater priority on projects involving VOC contamination or other anthropogenic (man-made) constituents, now classified as Priority A Projects. Treatment projects for naturally-occurring constituents are classified as Priority B Projects and funded as a secondary priority, on a case-by-case basis and only if program monies are still available during the fiscal year. While such projects are of interest to WRD, availability of funding for them will not be determined until after the budget process is completed.

The District recently revised the Safe Drinking Water Program to include a revolving fund plan for Priority B Projects and implementation of a revitalization plan to maximize program participation. The Safe Drinking Water Program now includes a third component, the Disadvantage Communities (DAC) Outreach Assistance Program, which will provide assistance to water systems in Disadvantaged areas with applying for State funding.

Projects under the SDWP involve the treatment of contaminated groundwater for subsequent beneficial use. This water quality improvement assists in meeting the District's groundwater cleanup objectives.

018 – Dominguez Gap Barrier Recycled Water Injection

This Project involves the delivery of recycled water from the City of Los Angeles Department of Public Works - Bureau of Sanitation (BOS) Terminal Island Water Reclamation Plant/Advanced Water Treatment Facility (AWTF) to the Dominguez Gap Barrier (DGB). Delivery of recycled water to the barrier, which commenced in late February 2006, was temporarily interrupted for about a year starting November 2011 when the AWTF shut down for plant upgrade and maintenance. Recycled water delivery to the DGB resumed in December 2012.

Prior to injection at the barrier, the recycled water produced at the AWTF undergoes advanced treatment processes including microfiltration, reverse osmosis, and chlorination. The DGB injection project was permitted by LARWQCB in conjunction with DDW for up to 5 mgd of recycled water and 50% recycled water contribution (meaning recycled water may not exceed 50% of the total injected volume with the remainder consisting of potable water). Water quality requirements, including turbidity and modified fouling index (MFI), must also be satisfied to minimize potential fouling of DGB injection wells owned and operated by the County of Los Angeles Department of Public Works. WRD is working with BOS to expand the amount of recycled water produced for the DGB, with the ultimate goal of eliminating all potable water used for barrier injection.

While BOS is responsible for the treatment and the water quality monitoring of the recycled water and LADWP for the delivery of the recycled water to the DGB, WRD has responsibility for groundwater monitoring and compliance. As part of the DGB injection permit requirements, WRD conducts groundwater monitoring to measure and track water quality conditions, evaluate potential impact of recycled water on groundwater, and identify potential problems well before recycled water arrives at any downgradient drinking water wells. In addition, an extensive tracer study was conducted from the start of recycled water injection in February 2006 through fall 2010 to determine the extent of travel and movement of the recycled water blend through the aquifers. The tracer study confirmed that after injection, adequate mixing and further blending of recycled water with diluent water occurs in the ground and that groundwater samples collected were representative of the recycled water blend. Recycled water use at the seawater intrusion barriers in Los Angeles County improves the reliability of a supply in continuous demand. Traditionally, water purchases for the barriers have been viewed as a replenishment function. Therefore, this program is funded 100% through the Replenishment Fund.

023 – Replenishment Operations

WRD actively monitors the operation and maintenance practices at the LACDPW-owned and operated spreading grounds and seawater barriers within the District. Optimizing replenishment opportunities is fundamentally important to WRD, in part because imported and recycled water deliveries directly affect the District's annual budget. Consequently, the District seeks to ensure that the conservation of stormwater is maximized, and that imported and recycled water replenishment is optimized.

Due to the reduction and unreliability of imported water for replenishment, WRD is working on its Water Independence Now ("WIN") program to eventually become independent from imported water for groundwater recharge. Currently, the District needs about 21,900 AF of imported water for recharge; 16,000 AF for spreading and 5,900 AF for injection at the seawater barriers. By maximizing the use of recycled water and stormwater, the amount of imported water needed can eventually be reduced or eliminated, thereby providing the groundwater basins with full replenishment needs through locally-derived water.

WRD coordinates regular meetings with LACDPW, MWD, SDLAC, and other water interests to discuss replenishment water availability, spreading grounds operations, barrier operations, scheduling of replenishment deliveries, seawater barrier improvements, upcoming maintenance activities, and facility outages or shutdowns. The District tracks groundwater levels in the Montebello Forebay weekly to assess general basin conditions and determine the level of artificial replenishment needed. WRD also monitors the amount of recycled water used at the spreading grounds and seawater barriers to maximize use while complying with pertinent regulatory limits.

While improvements undertaken in recent years by LACDPW/WRD (e.g., expansion of Whittier Narrows Conservation Pool, installation of rubber dams on San Gabriel River, Interconnection Pipeline) have considerably increased the stormwater portion of WRD's supply portfolio, the potential for further increasing the use of stormwater for groundwater augmentation remains significant. Working with the Army Corps of Engineers and LACDPW on additional improvements to the Whittier Narrows Conservation Pool will allow capture of more stormwater, as will development of Montebello Forebay projects to lower the water table through increased pumping and delivery downgradient to free up underground space to capture more storm water and/or recycled water. WRD has submitted a request to the Army Corps of Engineers for a temporary deviation for the Whittier Narrows Conservation Pool to increase the operational water surface elevation (WSE) from 201.6 feet to 205 feet for three years beginning WY 2015-16. During this period, WRD will pursue a permanent Army Corps of Engineers operational change from WSE 201.6 feet to WSE 205 feet.

The District plans to continue working with the LACDPW on several design projects for the Rio Hondo and San Gabriel Coastal Spreading Grounds with the goal of increasing the volume of recycled water conserved. The District is continually looking for opportunities to work with the LACDPW on improvement projects at the recharge facilities. Several potential projects have been identified and are being further evaluated to determine if they should be pursued. Two such projects are planned for completion this fiscal year. These projects consist of the construction of turnout structures along the San Gabriel River which will allow the delivery of increased recycled water to 1) the San Gabriel Coastal Spreading Grounds – Basin #2 & Interconnection Pipeline and 2) the portion of the unlined San Gabriel River south of Rubber Dam #4. Together these two turnout structures will help increase the spreading of recycled water at the San Gabriel Coastal and Rio Hondo Coastal Spreading Grounds and minimize the loss of recycled water to the ocean.

As its name implies, the Replenishment Operations Program deals primarily with replenishment issues and therefore its costs are borne by the Replenishment Fund.

025 – Hydrogeology Program

This program accounts for the projects and programs related to hydrogeologic investigations of the District and surrounding areas to ensure safe and reliable groundwater. Work performed under this program includes the preparation of the annual Engineering Survey and Report, which incorporates the calculation and determination of annual overdraft, accumulated overdraft, changes in storage, pumping amounts, and replenishment water availability into a document to help the District assess its replenishment needs and costs in the ensuing year. Extensive amounts of data are compiled and analyzed by staff to determine these values. Maps are created showing water levels in the basins and production patterns and amounts. Much of this information is published in Technical Bulletins – easy to read two-page documents that summarize groundwater issues of importance in the District.

An ongoing effort at the District to better characterize the hydrogeologic conditions across the Central and West Coast Basins is called the "Hydrogeologic Conceptual Model". This long-term project involves compiling and interpreting the extensive amounts of data generated during drilling and logging of the WRD/USGS monitoring wells and collected from historical information for production wells and oil wells within the District. In 2013, WRD obtained extensive seismic reflection data which is being analyzed to help fill in gaps in the geologic structure. The ultimate goal of this project is to incorporate the data in WRD's database/GIS and apply the system to generate aquifer surfaces and cross-sections for comparison with historical interpretations of basin hydrogeology. The final conceptual model will significantly improve the understanding of the aquifer depths, extents and thicknesses throughout the District and will assist staff, pumpers and stakeholders with planning for groundwater resource projects such as new well drilling, storage opportunities or modeling. The data will also be made available on WRD's website to be used as a reference source for hydrogeologic interpretations and to fill project-related data requests.

The conceptual model updates are being incorporated into the USGS numerical model updates. The updates to the numerical model are being performed based on the new information gleaned from the additional aquifer-specific WRD monitoring wells installed since 2000 and the extensive groundwater monitoring that the District has performed since then to identify trends in groundwater levels. The upgrades will also include refining the model's resolution to 1/8-mile square cells versus the previous model's 1/2 - mile cells, and creating more than 10 vertical layers to simulate groundwater flow in the various aquifers versus the previous model's 4 layers. The model has also been converted to the newest version of Modflow known as Unstructured Grids (USG), which allows better simulation of groundwater flow in the complex geology of the Central and West Coast Basins. New seismic reflection data purchased by WRD in 2013 will also be incorporated into the model. Time frames for model calculation will improve from annual measurements to quarterly. All of these upgrades will lead to a much improved groundwater modeling simulator for the District's future management efforts. This model is a significant analytical tool utilized by WRD to determine basin benefits and impacts of changes proposed in the management of the Central Basin and West Coast Basin. It is anticipated that this model will be completed in 2015 or early 2016.

Hydrogeologic analysis is also needed for projects associated with groundwater quality concerns and specific cleanup projects. Staff work may include investigative surveys, data research, and oversight of specific project studies. Such efforts are used to relate water quality concerns with potential impact to basin resources. An example of this type of staff work is the District's Well Profiling Program. The District assists pumpers in evaluating drinking water supply well contamination. Services may include existing data collection and review and field tasks such as spinner logging and depth-discrete sampling. WRD's evaluation helps pumpers to determine the best course of action; e.g., sealing off a particular screened interval of a well, wellhead treatment, or well destruction.

Salt / Nutrient Management Plans are a new State requirement for all groundwater basins throughout California. The Plans are required as part of the Recycled Water Policy issued by the State Water Resources Control Board ("SWRCB") and effective as of May 14, 2009. As stated in the Policy, its purpose is to "establish uniform requirements for recycled water use and to develop sustainable water supplies throughout the state". The SWRCB therefore "supports and encourages every region…to develop a Salt / Nutrient Management Plan by 2014". WRD along with other stakeholders completed the SNMP in 2014 and the Regional Water Quality Control Board adopted a Basin Plan Amendment to incorporate the SNMP in February 2015. Follow up work will be to monitor the salt and nutrient concentrations in the District over time, and compare results to the model predictions in the SNMP.

Modeling of groundwater flow and movement of injected recycled water at the Alamitos and Dominguez Gap seawater barriers are also included in this program. These efforts are required under permits for the recycled water injection and will continue in the ensuing year.

In 2013, WRD received a grant from MWD through WBMWD to perform groundwater tracer tests using noble gasses at the three seawater barrier systems. Use of noble gasses instead of other compounds, if found effective, will provide a cost-effective means to reliably follow the movement of injected water through the aquifers. This project was initiated in 2014, and monitoring will continue in 2015 and 2016, with a final report issued in 2016.

The Hydrogeology Program addresses both groundwater replenishment objectives and groundwater quality matters. The cost of the program is evenly split between the Replenishment and Clean Water Funds.

033 – Groundwater Reliability Improvement Program ("GRIP")

The WRD continues to pursue projects through its Water Independence Now ("WIN") program to develop local and sustainable sources of water for use in groundwater replenishment activities. This has become increasingly important in light of persistent drought conditions in the state and environmental and regulatory issues that limit delivery of imported water to the Los Angeles area.

To address these issues, WRD is seeking alternative sources of water to offset the imported water used for replenishment in the Montebello Forebay. This program is referred to as the Groundwater Reliability Improvement Program ("GRIP"). The goal of GRIP is to offset the current use of imported water by providing up to 21,000 AFY of recharge using reliable alternative supply sources (e.g., recycled water, storm water) for replenishment via the Montebello Forebay. The primary goals of GRIP are to:

- Provide a sustainable and reliable supply for replenishing the Basins;
- Protect groundwater quality;
- Minimize the environmental/energy footprint of any option or options selected;
- Comply with pertinent regulatory requirements employing an institutionally feasible approach;
- Minimize cost to agencies using ground water; and
- Engage stakeholders in the decision making process.

The GRIP Advanced Water Treatment Facility (AWTF) will provide 10,000 AFY of highly treated recycled water to the Montebello Forebay for groundwater recharge to better identify the design/operation parameters of GRIP. The additional 11,000 AFY of 21,000 AFY to be provided as part of the GRIP will come from tertiary treated recycled water from the SDLAC's San Jose Creek Water Reclamation Plant.

The District has recently purchased a 5.2 acre parcel in the City of Pico Rivera which will be the future site for the GRIP AWTF. As a result of this recent development, the previously completed Draft Environmental Impact Report ("DEIR") for GRIP and is being amended and will be made available for public review in early spring of 2015. Once public comments are incorporated in the document, the EIR will be presented to the WRD Board of Directors for adoption in the summer of 2015. Thereafter, full scale design and regulatory permitting efforts will commence to be followed by construction. Additional information related to GRIP may be found at www.wrd.org/grip.

GRIP efforts are part of WRD's capital improvement program and are funded primarily through bond proceeds.

035 – West Coast Seawater Barrier Monitoring Well Sampling Project

In a cooperative agreement with West Basin Municipal Water District ("WBMWD"), WRD has been contracted to sample eight West Coast Barrier monitoring wells to help satisfy WBMWD's permit compliance criteria for recycled water injection into the West Coast Barrier. WRD's hydrogeologists sample the eight wells quarterly and submit the samples to WBMWD's laboratory for analysis. Sampling of the monitoring wells is required by WBMWD's Regional Water Quality Control Board permit, which enforces the monitoring and testing of the recycled water that is injected into the West Coast Basin Barrier to prevent seawater intrusion. WBMWD fully reimburses WRD for its sample collection activities and therefore there are no impacts on the WRD replenishment assessment.

038 – Engineering Program

The Engineering Department provides technical, engineering, program management, and hands on support on capital improvement projects ranging from concept development through engineering design, project management and construction inspections. The engineering department is also responsible for developing, updating, and managing the capital improvement program (CIP) and its related projects. The engineering department prepares and/or oversees the preparation plans, specifications and engineer's estimates of probable construction costs (PS&E's), or creates request for proposals/qualifications (RFPs/RFQs) for professional engineering consultation and construction management services depending on the size and specific needs of the project.

This engineering department receives and reviews public bids and provides recommendations to various committees and the Board of Directors to award contracts. The engineering department also applies, secures, and administers/manages grants from various, Federal, State, and Local organizations to supplement funds allocated by WRD.
The engineering department also provides (oversees) project planning and environmental review/entitlement services for its CIP projects. The engineering department monitors construction work in progress, reviews/approves progress pay estimates, and provides quality assurance/control oversight services on approved development projects to ensure compliance with Board goals and objectives.

The Engineering Program is intended to provide a mechanism for engineering staff to plan and further develop alternatives for potential capital improvement projects. Not all CIP project concepts develop into multi-year capital improvement program projects, and more often than not require many months of advanced planning and concept development before being capitalized. The Engineering Program deals primarily with replenishment issues and therefore its costs are borne by the Replenishment Fund until such time as alternative capital improvement program funding is identified.

TABLES

Table 1

GROUNDWATER CONDITIONS AND REPLENISHMENT SUMMARY

	WATER YEAR Oct 1 - Sep 30		
	2013-2014	*2014-2015* [(a)]	*2015-2016* [(a)]
Total Groundwater Production	241,105 AF	242,400 AF	244,000 AF
Annual Overdraft	(149,000) AF	(97,200) AF	(98,800) AF
Accumulated Overdraft	(819,600) AF	(813,300) AF	

Quantity Required for Artificial Replenishment for the Ensuing Year		
Spreading		
Imported for Spreading in Montebello Forebay	16,000	AF
Recycled for Spreading in Montebello Forebay	55,000	
Subtotal Spreading	71,000	
Injection		
Alamitos Seawater Barrier Imported Water (WRD side only)	500	
Alamitos Seawater Barrier Recycled Water (WRD side only)	4,800	
Dominguez Gap Seawater Barrier Imported Water	2,400	
Dominguez Barrier Seawater Barrer Recycled Water	5,600	
West Coast Seawater Barrier Imported Water	4,700	
West Coast Seawater Barrier Recycled Water	14,300	
Subtotal Injection	32,300	
In-lieu[(b)] Subtotal In-lieu	-	
Total	**103,300**	AF

(a) Estimated values

(b) In-Lieu Program currently not established for ensuing year

Table 2

QUANTITY AND COST OF REPLENISHMENT WATER FOR THE ENSUING WATER YEAR

Summary - All Water

Item	Quantity (AF)	Total Cost
Spreading - Tier 1 Untreated Imported	16,000	$ 11,898,400
Spreading - Recycled	55,000	$ 3,485,000
Alamitos Barrier - Imported	500	$ 583,220
Alamitos Barrier - Recycled	4,800	$ 504,000
Dominguez Barrier - Imported	2,400	$ 3,041,923
Dominguez Barrier - Recycled	5,600	$ 5,101,600
West Coast Barrier - Imported	4,700	$ 6,253,352
West Coast Barrier - Recycled	14,300	$ 11,258,100
In-Lieu MWD Member	0	$ -
In-Lieu WBMWD Customer	0	$ -
TOTAL	**103,300**	**$ 42,125,595**

Detailed Breakout of Water Costs and Surcharges to WRD

Item	Quantity	Oct-Dec	Jan-Jun	Jul-Sep	Melded	Total
Imported Water						
CBMWD						
MWD Untreated Tier 1 - Spreading ($/af)	16,000	$ 582	$ 594	$ 594	$ 591	$ 9,456,000
MWD RTS ($/af)	16,000	$ 51	$ 51	$ 54	$ 52	$ 832,000
CBMWD Administrative Surcharge ($/af)	16,000	$ 95	$ 95	$ 100	$ 96	$ 1,536,000
CBMWD Water Service Charge ($/month)	N/A	$ 6,200	$ 6,200	$ 6,200	$ 6,200	$ 74,400
Total to CBMWD						**$ 11,898,400**
LBWD						
MWD Treated Tier 1 - Alamitos Barrier ($/af)	500	$ 923	$ 942	$ 942	$ 937	$ 468,500
MWD Capacity Charge ($/cfs/month)	5.0	$ 925	$ 908	$ 908	$ 912	$ 54,720
LBWD RTS ($/af)	500	$ 113	$ 113	$ 119	$ 115	$ 57,500
LBWD Administrative Surcharge ($/af)	500	$ 5	$ 5	$ 5	$ 5	$ 2,500
Total to LBWD						**$ 583,220**
WBMWD						
MWD Treated Tier 1-DG/WC Barriers ($/af)	7,100	$ 923	$ 942	$ 942	$ 937	$ 6,652,700
MWD RTS ($/af)	7,100	$ 112	$ 112	$ 112	$ 112	$ 795,200
MWD Capacity Charge ($/cfs/month)	46.8	$ 733	$ 718	$ 718	$ 722	$ 405,475
WBMWD Administrative Surcharge ($/af)	7,100	$ 186	$ 186	$ 205	$ 191	$ 1,356,100
WBMWD Water Service Charge ($/cfs/month)	130	$ 54	$ 54	$ 57	$ 55	$ 85,800
Total to West Basin MWD						**$ 9,295,275**
IN-LIEU						
MWD Member Agency ($/af)	0	-	-	-		No IL Program
WBMWD Member Agency ($/af)	0	-	-	-		No IL Program
Total for In-Lieu Payments						**$ -**
Recycled Water						
LADWP						
Recycled Water for Dominguez Barrier ($/af)	5,600	$ 900	$ 900	$ 945	$ 911	$ 5,101,600
Total to LADWP						**$ 5,101,600**
SDLAC						
Tertiary Water - WN, SJC, Pomona ($/af)≤50k	50,000	$ 40	$ 40	$ 45	$ 41	$ 2,050,000
Tertiary Water - WN, SJC, Pomona ($/af) >50k	5,000	$ 284	$ 284	$ 294	$ 287	$ 1,435,000
Total to SDLAC						**$ 3,485,000**
WBMWD						
WBMWD Recycled Water Rate (S/af)≤4,500	4,500	$ 1,160	$ 1,160	$ 1,196	$ 1,169	$ 5,260,500
WBMWD Recycled Water Rate (S/af) 4,500+	9,800	$ 607	$ 607	$ 628	$ 612	$ 5,997,600
Total to WBMWD						**$ 11,258,100**
LBWD						
Source Water for Vander Lans Plant ($/af)	4,800	$ 104	$ 104	$ 108	$ 105	$ 504,000
Total to WRD						**$ 504,000**
TOTAL	**103,300**					**$ 42,125,595**

Table 3

WRD PROJECTS AND PROGRAMS

PROJECT / PROGRAM		DISTRICT FUNCTION	
		Replenishment	Clean Water
001	Leo J. Vander Lans Water Treatment Facility Project	100%	
002	Robert W. Goldsworthy Desalter Project		100%
004	Recycled Water Program	100%	
005	Groundwater Resources Planning Program	100%	
006	Groundwater Quality Program		100%
010	Geographic Information System	50%	50%
011	Regional Groundwater Monitoring Program	50%	50%
012	Safe Drinking Water Program		100%
018	Dominguez Gap Barrier Recycled Water Injection	100%	
023	Replenishment Operations (Spreading & Barriers)	100%	
025	Hydrogeology Program	50%	50%
033	Groundwater Resources Improvement Program (GRIP)	100%	0%
035	West Coast Seawater Barrier Monitoring Well Sampling	50%	50%
038	Engineering Program	100%	

Table 4
30-YEAR AVERAGE GROUNDWATER BALANCE
FROM USGS AND WRD REGIONAL MODEL

INFLOWS	Average AFY	OUTFLOWS	Average AFY
Natural Inflows:		**Artificial Outflows:**	
Local water conserved at spreading grounds (1)	48,825	Pumping	250,590
Interior and mountain front recharge	47,900		
Net underflow from adjacent basins (2)	48,480		
Subtotal Natural Inflows:	145,205		
Artificial Inflows:			
Imported and recycled spreading (3)	74,075		
Barrier injection water (4)	34,600		
Subtotal Artificial Inflows:	108,675		
Total Inflows:	**253,880**	**Total Outflows:**	**250,590**

Average Annual Groundwater Deficiency (afy) = Natural Inflows - Total Outflows = (105,385)

(1) includes stormwater and base flow water captured and recharged at the spreading grounds
(2) does not include average of 7,100 afy of seawater intrusion, which can not be considered as replenishment per the water code
(3) includes all imported purchased, all recycled purchased, and Pomona Plant (free) recycled water.
(4) includes all injected water at the three barrier systems, including all of Alamitos Barrier. Model value may differ slightly from actual purchases.

Description of the model can be found in USGS, 2003, Geohydrology, Geochemistry, and Ground-Water Simulation - Optimization of the Central and West Coast Basins, Los Angeles County, California; Water Resources Investigation Report 03-4065 by Reichard, E.G., Land, M., Crawford, S.M., Johnson, T., Everett, R.R., Kulshan, T.V., Ponti, D.J., Halford, K.J., Johnson, T.A., Paybins, K.S., and Nishikawa, T.

Table 5

Annual Rainfall in the WRD Service Area

Water Year	Inches	Water Year	Inches	Water Year	Inches	Water Year	Inches
1925-26	12.63	1950-51	8.27	1975-76	9.55	2000-01	14.98
1926-27	16.92	1951-52	24.68	1976-77	11.23	2001-02	2.52
1927-28	11.97	1952-53	10.53	1977-78	33.85	2002-03	19.89
1928-29	11.52	1953-54	12.33	1978-79	18.68	2003-04	7.73
1929-30	10.84	1954-55	11.84	1979-80	28.29	2004-05	23.43
1930-31	10.45	1955-56	13.97	1980-81	8.74	2005-06	11.36
1931-32	14.52	1956-57	9.89	1981-82	13.41	2006-07	1.95
1932-33	10.02	1957-58	24.65	1982-83	30.3	2007-08	17.11
1933-34	11.1	1958-59	6.68	1983-84	11.96	2008-09	9.49
1934-35	21.94	1959-60	9.84	1984-85	12.44	2009-10	13.02
1935-36	9.65	1960-61	4.3	1985-86	19.47	2010-11	17.73
1936-37	22.11	1961-62	18.46	1986-87	6.49	2011-12	8.84
1937-38	21.75	1962-63	10.9	1987-88	11.47	2012-13	6.19
1938-39	18.69	1963-64	6.86	1988-89	7.82	2013-14	5.23
1939-40	12.81	1964-65	13.27	1989-90	7.87		
1940-41	34.21	1965-66	17.02	1990-91	12.22		
1941-42	14.66	1966-67	17.78	1991-92	16.07		
1942-43	17.91	1967-68	11.46	1992-93	26.55		
1943-44	17.89	1968-69	22.33	1993-94	9.26		
1944-45	11.25	1969-70	7.52	1994-95	26.82		
1945-46	10.31	1970-71	11.45	1995-96	10.68		
1946-47	15.24	1971-72	6.4	1996-97	13.95		
1947-48	8.62	1972-73	18.57	1997-98	32.47		
1948-49	9.04	1973-74	14.51	1998-99	7.29		
1949-50	10.14	1974-75	15.01	1999-00	9.21		

Period of Record	**89 years**
Running 89 Year Average	**14.05 inches**
Minimum	**1.95 inches**
Maximum	**34.21 inches**

Table 6
ANNUAL OVERDRAFT CALCULATION
for Current and Ensuing Water Years (in acre-feet)*

Item	WATER YEAR	
	2014-2015	2015-2016
Average Annual Groundwater Deficiency (from Table 4)	(105,385)	(105,385)
Adjustments/Variances to AAGD		
(1) Local Water at Spreading Grounds[(a)]	0 [(d)]	0 [(d)]
(2) Precipitation, mountain front recharge, applied water[(a)]	0 [(d)]	0 [(d)]
(3) Subsurface inflow[(b)]	0 [(d)]	0 [(d)]
(4) Groundwater Extractions[(c)]	(8,200) [(d)]	(6,600) [(d)]
ANNUAL OVERDRAFT [AAGD+(1)+(2)+(3)-(4)]	(97,200)	(98,800)

** Previous Year Annual Overdraft is derived in Chapter III*

(a) Difference between actual and model average. Positive value indicates increased recharge.

(b) Difference between annual model value and average model value. Positive value indicates increased inflow. Does not include seawater intrusion inflow

(c) Difference between actual and model average. Positive value indicates increased pumpage.

(d) Estimated Values. A value of zero indicates average year was assumed.

Table 7

ACCUMULATED OVERDRAFT CALCULATION (in acre-feet)

ITEM	AMOUNT
Accumulated Overdraft at End of Previous Water Year	(819,600)
Estimated Annual Overdraft for Current Year	(97,200)
Subtotal without artificial replenishment	(916,800)
Planned Artificial Replenishment for Current Year	
Imported Water Purchased for Spreading	16,250
Recycled Water Purchased for Spreading	56,000
Imported and Recycled Water Purchased for Barrier Wells	31,300
Replenishment Subtotal	103,550
PROJECTED ACCUMULATED OVERDRAFT FOR CURRENT YEAR	**(813,300)**

Table 8

CHANGES IN GROUNDWATER STORAGE

WATER YEAR	ANNUAL CHANGE IN STORAGE (AF)	CUMULATIVE CHANGE IN STORAGE (AF)	WATER YEAR	ANNUAL CHANGE IN STORAGE (AF)	CUMULATIVE CHANGE IN STORAGE (AF)	WATER YEAR	ANNUAL CHANGE IN STORAGE (AF)	CUMULATIVE CHANGE IN STORAGE (AF)
1961-62	88,500	88,500	1985-86	10,600	238,200	2009-10	27,000	141,500
1962-63	(11,100)	77,400	1986-87	4,000	242,200	2010-11	110,000	251,500
1963-64	10,300	87,700	1987-88	(11,700)	230,500	2011-12	(73,200)	178,300
1964-65	35,200	122,900	1988-89	10,400	240,900	2012-13	(68,000)	110,300
1965-66	21,100	144,000	1989-90	13,600	254,500	2013-14	(62,100)	48,200
1966-67	21,400	165,400	1990-91	28,400	282,900	2014-15	-	-
1967-68	11,400	176,800	1991-92	1,600	284,500	2015-16	-	-
1968-69	(7,500)	169,300	1992-93	45,800	330,300	2016-17	-	-
1969-70	(800)	168,500	1993-94	(28,500)	301,800	2017-18	-	-
1970-71	(3,400)	165,100	1994-95	19,400	321,200	2018-19	-	-
1971-72	(50,600)	114,500	1995-96	12,500	333,700	2019-20	-	-
1972-73	34,800	149,300	1996-97	15,700	349,400	2020-21	-	-
1973-74	(2,400)	146,900	1997-98	16,700	366,100	2021-22	-	-
1974-75	(14,100)	132,800	1998-99	(80,200)	285,900	2022-23	-	-
1975-76	(40,200)	92,600	1999-00	(30,000)	255,900	2023-24	-	-
1976-77	(32,900)	59,700	2000-01	(400)	255,500	2024-25	-	-
1977-78	88,600	148,300	2001-02	(36,500)	219,000	2025-26	-	-
1978-79	30,100	178,400	2002-03	(10,500)	208,500	2026-27	-	-
1979-80	(1,100)	177,300	2003-04	(43,000)	165,500	2027-28	-	-
1980-81	17,100	194,400	2004-05	89,100	254,600	2028-29	-	-
1981-82	18,400	212,800	2005-06	12,000	266,600	2029-30	-	-
1982-83	46,800	259,600	2006-07	(59,000)	207,600	2030-31	-	-
1983-84	(22,400)	237,200	2007-08	(41,600)	166,000	2031-32	-	-
1984-85	(9,600)	227,600	2008-09	(51,500)	114,500	2032-33	-	-

Note: Numbers in parentheses represent negative values.

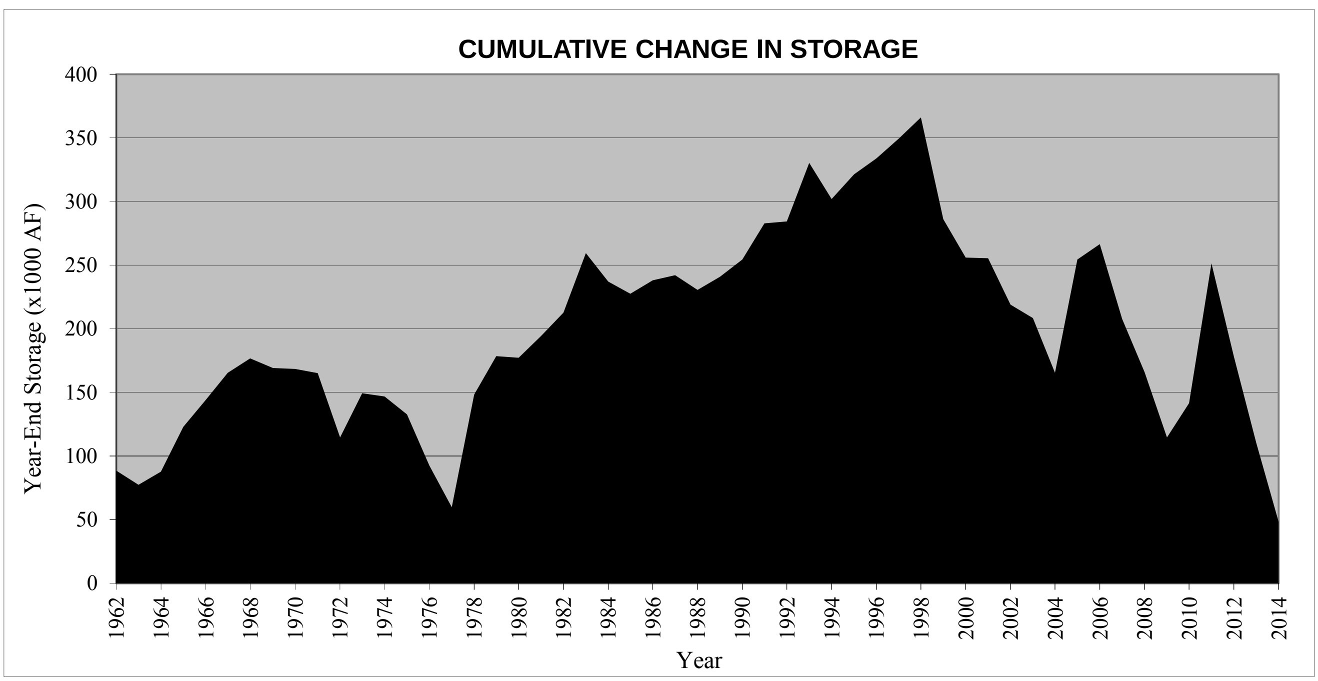


Table 9

QUANTITY OF WATER REQUIRED FOR ARTIFICIAL REPLENISHMENT

WATER TYPE	AMOUNT (AF)
Long Term Average for Imported Spreading (updated, see below)*	16,000
Recycled Water for Spreading (WRD Purchases)	55,000
Total Spreading	**71,000**
West Coast Barrier - Imported	4,700
West Coast Barrier - Recycled	14,300
Dominguez Gap - Imported	2,400
Dominguez Gap - Recycled	5,600
Alamitos Barrier - Imported - WRD portion only	500
Alamitos Barrier - Recycled - WRD portion only	4,800
Total Barriers	**32,300**
In-Lieu Central Basin	0
In-Lieu West Coast Basin	0
Total In-Lieu	**0**
Total Water Purchase Estimate for Ensuing Year	103,300
Less Other Actions	0
Total Water Purchase Estimate for Ensuing Year	**103,300**

* - Derivation of new Long Term Imported Spreading Requirement is possible due to new projects that will capture more storm/recycled water for conservation, and thus less imported needs:

1. Long Term Average of 27,600 af defined in 2003 ESR
2. Minus 3,000 afy for increasing Whittier Narrows Conservation Pool
3. Minus 3,600 afy for two new rubber dams on San Gabriel River
4. Minus 5,000 afy of imported due to 5,000 afy increase in recyled based on new averaging period effective 2013
5. Equals new Long Term Average of 16,000 afy imported spreading

HISTORICAL AMOUNTS OF WATER RECHARGED IN THE MONTEBELLO FOREBAY SPREADING GROUNDS [(a) (g)]

(in acre-feet)

WATER YEAR	Imported Water: LACFCD or Other	Imported Water: WRD	Imported Water: TOTAL	Recycled Water: Whittier WRP	Recycled Water: San Jose Creek WRP	Recycled Water: Pomona WRP	Recycled Water: TOTAL	Local Water: Stormwater and River Baseflow	Make-up Water: USGVMWD & SGVMWD	Make-up Water: CBMWD	Make-up Water: TOTAL	TOTAL
1959-60	80,900		80,900				-	20,064			-	100,964
1960-61	80,800	67,000	147,800				-	9,118			-	156,918
1961-62	39,500	168,622	208,122	1,178			1,178	39,548			-	248,848
1962-63	4,800	75,790	80,590	12,405			12,405	14,565			-	107,560
1963-64	-	104,900	104,900	13,258			13,258	9,992			-	128,150
1964-65	75,500	84,670	160,170	14,528			14,528	13,097			-	187,795
1965-66	67,800	53,900	121,700	15,056			15,056	45,754	6,500		6,500	189,010
1966-67	74,100	10,200	84,300	16,223			16,223	59,820	-		-	160,343
1967-68	66,600	28,800	95,400	18,275			18,275	39,760	-		-	153,435
1968-69	12,500	5,300	17,800	13,877			13,877	119,395	-		-	151,072
1969-70	25,800	43,100	68,900	17,158			17,158	52,917	-		-	138,975
1970-71	46,700	25,400	72,100	19,494		3,232	22,726	44,757	-		-	139,583
1971-72	-	34,400	34,400	17,543		4,456	21,999	17,688	-		-	74,087
1972-73	-	71,947	71,947	13,622	8,327	5,937	27,886	45,077	-	20,000	20,000	164,910
1973-74	-	68,237	68,237	13,385	7,064	3,003	23,452	29,171	-	23,921	23,921	144,781
1974-75	-	71,900	71,900	14,650	6,549	5,592	26,791	29,665	-	-	-	128,356
1975-76	-	50,800	50,800	12,394	9,062	6,231	27,687	22,073	-	-	-	100,560
1976-77	-	9,300	9,300	10,158	12,705	6,496	29,359	19,252	14,500	6,900	21,400	79,311
1977-78	-	39,900	39,900	13,104	5,997	6,621	25,722	147,317	7,800	-	7,800	220,739
1978-79	-	65,300	65,300	10,716	11,741	6,403	28,860	68,859	-	-	-	163,019
1979-80	-	10,200	10,200	14,568	9,815	5,023	29,406	106,820	10,900	-	10,900	157,326
1980-81	3,300	28,700	32,000	11,464	14,645	5,613	31,722	50,590	31,500	-	31,500	145,812
1981-82	-	4,600	4,600	14,133	15,285	4,634	34,052	47,930	30,900	-	30,900	117,482
1982-83	-	2,000	2,000	12,818	4,217	5,735	22,770	126,076	8,900	-	8,900	159,746
1983-84	-	1,500	1,500	13,194	14,590	4,457	32,241	60,710	20,800	-	20,800	115,251
1984-85	-	40,600	40,600	12,905	14,093	4,380	31,378	39,099	-	-	-	111,077
1985-86	-	21,500	21,500	13,827	11,487	3,965	29,279	66,966	-	-	-	117,745
1986-87	-	49,200	49,200	15,280	20,041	2,655	37,976	27,613	-	6,500	6,500	121,289
1987-88	-	23,300	23,300	14,585	27,182	1,582	43,349	50,068	5,800	-	5,800	122,517
1988-89	-	50,300	50,300	13,830	33,327	2,616	49,773	17,096	6,500	-	6,500	123,669
1989-90	-	52,700	52,700	15,043	33,498	1,568	50,109	9,388	13,600	-	13,600	125,797
1990-91	-	56,300	56,300	13,841	38,603	1,420	53,864	35,717	100	-	100	145,981
1991-92	-	43,100	43,100	12,620	31,326	2,957	46,903	136,357	-	-	-	226,360
1992-93	-	16,561	16,561	11,026	29,811	8,027	48,864	147,699	-	-	-	213,124
1993-94	-	20,411	20,411	10,249	40,768	2,965	53,981	55,896	-	-	-	130,288
1994-95	-	21,837	21,837	10,642	18,431	4,228	33,300	100,578	-	-	-	155,715
1995-96	-	18,012	18,012	9,971	40,922	2,969	53,862	62,920	-	-	-	134,794
1996-97	-	22,738	22,738	9,850	36,977	3,132	49,959	58,262	-	-	-	130,959
1997-98	-	952	952	8,378	26,483	2,156	37,017	96,706	-	-	-	134,675
1998-99	-	-	-	10,968	34,782	1,451	47,201	32,013	-	-	-	79,214
1999-00	-	45,037	45,037	8,950	30,481	3,839	43,270	20,607	-	-	-	108,914
2000-01	-	23,451	23,451	8,253	35,165	2,925	46,343	39,725	-	-	-	109,519
2001-02	-	42,875	42,875 (c)	8,474	50,194	1,928	60,596	17,000	-	-	-	120,471
2002-03	-	22,366	22,366 (d)	5,156	35,320	2,320	42,796	58,202	-	-	-	123,364
2003-04	-	27,520	27,520 (e)	8,195	34,033	2,697	44,925	30,467	-	-	-	102,912
2004-05	-	25,296	25,296 (e)	6,741	20,547	2,215	29,503	148,674	-	-	-	203,473
2005-06	-	33,229	33,229	8,868	30,180	2,973	42,022	60,377	-	-	-	135,628
2006-07	-	40,214	40,214	7,334	34,823	2,882	45,039	11,495	-	-	-	96,748
2007-08	1,510	-	1,510 (b)	6,212	29,131	4,424	39,767	54,518	-	-	-	95,795
2008-09	-	-	-	5,202	29,999	4,410	39,611	35,348	-	-	-	74,959
2009-10	-	26,286	26,286	5,431	45,538	4,762	55,731	35,398	-	-	-	117,415
2010-11	-	37,315	37,315	7,576	24,323	5,231	37,131	113,295	-	-	-	187,741
2011-12	-	-	-	7,558	43,479	4,760	55,797	36,155	-	-	-	91,952
2012-13	-	-	-	7,004	47,207	4,933	59,145	6,048	-	-	-	65,193
2013-14	-	-	-	7,733	43,556	4,357	55,646	0	-	-	-	55,646
TOTAL	**579,810**	**1,887,565**	**2,467,375**	**604,903**	**1,091,704**	**174,156**	**1,870,764**	**2,843,703**	**157,800**	**57,321**	**215,121**	**7,396,963**

(a) Imported and Recycled are purchased, local and Pomona WRP are incidental recharge. Purchased water may have losses to Main Basin before reaching the Spreading Grounds

(b) CBMWD purchased 1,510 af of imported water for spreading for Downey, Lakewood, and Cerritos.

(c) Includes 1,607 af of EPA extracted groundwater from Whittier Narrows considered imported water to WRD. Paid for in 2003.

(d) Includes 5,069 af of EPA extracted groundwater from W.N. considered imported water to WRD. Paid for in June 2005.

(e) Includes 13,000 af of water banked by Long Beach under a storage agreement with WRD (792 af of 02/03, 12,210 af of 3/04).

(g) Includes the Rio Hondo Spreading Grounds, Whitter Narrows Conservation Pool, San Gabriel Spreading Grounds and unlined San Gabriel River below Station F263.

HISTORICAL AMOUNTS OF WATER PURCHASED FOR INJECTION

(in acre-feet)

Water Year	West Coast Barrier (a)			Dominguez Gap Barrier (b)			Alamitos Barrier							TOTAL
							WRD			OCWD			Total	
	Imported	Recycled	Total	Imported	Recycled	Total	Imported	Recycled	Total	Imported	Recycled	Total		
1959-60	3,700		3,700											3,700
1960-61	4,420		4,420											4,420
1961-62	4,460		4,460											4,460
1962-63	4,150		4,150											4,150
1963-64	10,450		10,450											10,450
1964-65	33,020		33,020				2,760		2,760	200		200	2,960	35,980
1965-66	44,390		44,390				3,370		3,370	350		350	3,720	48,110
1966-67	43,060		43,060				3,390		3,390	490		490	3,880	46,940
1967-68	39,580		39,580				4,210		4,210	740		740	4,950	44,530
1968-69	36,420		36,420				4,310		4,310	950		950	5,260	41,680
1969-70	29,460		29,460				3,760		3,760	720		720	4,480	33,940
1970-71	29,870		29,870	2,200		2,200	3,310		3,310	822		822	4,132	36,202
1971-72	26,490		26,490	9,550		9,550	4,060		4,060	936		936	4,996	41,036
1972-73	28,150		28,150	8,470		8,470	4,300		4,300	883		883	5,183	41,803
1973-74	27,540		27,540	7,830		7,830	6,140		6,140	1,148		1,148	7,288	42,658
1974-75	26,430		26,430	5,160		5,160	4,440		4,440	716		716	5,156	36,746
1975-76	35,220		35,220	4,940		4,940	4,090		4,090	565		565	4,655	44,815
1976-77	34,260		34,260	9,280		9,280	4,890		4,890	885		885	5,775	49,315
1977-78	29,640		29,640	5,740		5,740	4,020		4,020	831		831	4,851	40,231
1978-79	23,720		23,720	5,660		5,660	4,220		4,220	898		898	5,118	34,498
1979-80	28,630		28,630	4,470		4,470	3,560		3,560	575		575	4,135	37,235
1980-81	26,350		26,350	3,550		3,550	3,940		3,940	524		524	4,464	34,364
1981-82	24,640		24,640	4,720		4,720	4,540		4,540	394		394	4,934	34,294
1982-83	33,950		33,950	6,020		6,020	3,270		3,270	1,943		1,943	5,213	45,183
1983-84	28,000		28,000	7,640		7,640	2,440		2,440	1,402		1,402	3,842	39,482
1984-85	25,210		25,210	7,470		7,470	3,400		3,400	1,446		1,446	4,846	37,526
1985-86	20,260		20,260	6,160		6,160	3,410		3,410	1,863		1,863	5,273	31,693
1986-87	26,030		26,030	6,230		6,230	4,170		4,170	2,754		2,754	6,924	39,184
1987-88	24,270		24,270	7,050		7,050	3,990		3,990	2,173		2,173	6,163	37,483
1988-89	22,740		22,740	5,220		5,220	3,900		3,900	2,173		2,173	6,073	34,033
1989-90	20,279		20,279	5,736		5,736	4,110		4,110	1,929		1,929	6,039	32,054
1990-91	16,039		16,039	7,756		7,756	4,096		4,096	1,799		1,799	5,895	29,690
1991-92	22,180		22,180	6,894		6,894	4,172		4,172	1,552		1,552	5,724	34,798
1992-93	21,516		21,516	4,910		4,910	3,350		3,350	1,565		1,565	4,915	31,341
1993-94	15,482		15,482	5,524		5,524	2,794		2,794	1,309		1,309	4,103	25,109
1994-95	14,237	1,480	15,717	4,989		4,989	2,883		2,883	890		890	3,773	24,479
1995-96	12,426	4,170	16,596	5,107		5,107	3,760		3,760	2,010		2,010	5,770	27,473
1996-97	11,372	6,241	17,613	5,886		5,886	3,854		3,854	1,750		1,750	5,604	29,103
1997-98	8,173	8,306	16,479	3,771		3,771	3,677		3,677	1,504		1,504	5,181	25,431
1998-99	10,125	6,973	17,097	4,483		4,483	4,012		4,012	1,689		1,689	5,700	27,280
1999-00	11,172	7,460	18,632	6,010		6,010	4,028		4,028	1,707		1,707	5,735	30,377
2000-01	13,988	6,838	20,826	3,923		3,923	3,710		3,710	1,964		1,964	5,674	30,423
2001-02	12,724	7,276	20,000	5,459		5,459	3,961		3,961	2,232		2,232	6,193	31,652
2002-03	10,419	6,192	16,611	8,056		8,056	3,445		3,445	1,197		1,197	4,642	29,309
2003-04	9,304	3,669	12,973	6,089		6,089	3,876		3,876	2,092		2,092	5,968	25,030
2004-05	4,548	3,920	8,468	8,557		8,557	2,870		2,870	1,685		1,685	4,555	21,580
2005-06	5,997	4,249	10,246	7,259	1,450	8,709	1,042	921	1,963	330	254	584	2,547	21,502
2006-07	4,373	10,960	15,333	5,510	1,733	7,243	1,568	219	1,787	543	165	708	2,495	25,071
2007-08	3,662	10,954	14,616	4,468	2,452	6,920	3,467	1,284	4,751	1,283	475	1,758	6,509	28,045
2008-09	7,178	6,434	13,612	4,550	2,414	6,964	4,145	1,275	5,420	1,518	535	2,053	7,473	28,049
2009-10	9,661	7,620	17,281	5,495	2,037	7,532	2,596	1,775	4,371	659	470	1,129	5,500	30,313
2010-11	7,466	7,440	14,906	3,929	2,363	6,292	1,968	1,482	3,450	638	875	1,513	4,963	26,161
2011-12	3,651	6,682	10,333	4,646	103	4,749	1,785	1,527	3,312	814	678	1,492	4,804	19,886
2012-13	9,095	7,761	16,856	2,973	2,170	5,143	2,639	1,309	3,948	1,145	537	1,683	5,631	27,630
2013-14	5,464	13,399	18,863	4,088	3,902	7,990	4,125	286	4,410	2,398	191	2,588	6,999	33,852
TOTAL	1,045,041	138,023	1,183,064	253,428	18,624	272,052	179,822	10,078	189,900	62,583	4,180	66,763	256,663	1,711,778

(a) Prior to 10/1/71, water was purchased by the State, West Basin Water Association, local water interests, Zone II of the LA County Flood Control District and WRD. After 10/1/71, all purchases have been by WRD

(b) In 1970-71, purchases were shared by WRD and Zone II. After 10/1/71, all purchases have been by WRD

HISTORICAL AMOUNTS OF THE IN-LIEU PROGRAM

(in acre-feet)

WATER YEAR	CENTRAL BASIN	WEST COAST BASIN	TOTAL
1965-66	-	745	745
1966-67	-	851	851
1967-68	-	850	850
1968-69	-	850	850
1969-70	-	900	900
1970-71	-	881	881
1971-72	-	756	756
1972-73	-	901	901
1973-74	-	901	901
1974-75	-	400	400
1975-76	-	400	400
1976-77	-	400	400
1977-78	11,316	4,815	16,131
1978-79	9,723	8,655	18,378
1979-80	10,628	4,333	14,961
FISCAL YEAR			
1980-81	17,617	6,206	23,823
1981-82	14,050	4,833	18,883
1982-83	13,813	5,939	19,752
1983-84	29,216	12,524	41,740
1984-85	23,246	13,594	36,840
1985-86	15,505	10,627	26,132
1986-87	16,205	12,997	29,202
1987-88	15,518	12,893	28,411
1988-89	11,356	14,069	25,425
1989-90	16,858	12,293	29,151
1990-91	11,886	10,153	22,039
1991-92	13,000	6,104	19,104
1992-93	37,652	15,654	53,306
1993-94	83,488	26,093	109,581
1994-95	32,904	17,994	50,898
1995-96	37,517	13,816	51,333
1996-97	34,547	4,847	39,394
1997-98	22,995	7,335	30,330
1998-99	13,213	10,303	23,516
1999-00	18,799	3,479	22,278
2000-01	18,364	2,817	21,181
2001-02	11,931	8,789	20,720
2002-03	6,866	4,339	11,205
2003-04	-	-	-
2004-05	6,000	1,804	7,804
2005-06	7,475	2,414	9,889
2006-07	5,779	3,485	9,264
2007-08	-	-	-
2008-09	-	-	-
2009-10	-	-	-
2010-11	6,724	-	6,724
2011-12	7,815	-	7,815
2012-13	2,180	-	2,180
2013-14	4,371	-	4,371
TOTAL	588,558	272,040	860,598

HISTORICAL AMOUNTS OF REPLENISHMENT WATER

(in acre-feet)

WATER YEAR	MONTEBELLO FOREBAY SPREADING WATER					INJECTION WATER*			IN-LIEU	TOTAL
	IMPORTED WATER	RECYCLED WATER	LOCAL WATER	MAKEUP WATER	TOTAL	IMPORTED WATER	RECYCLED WATER	TOTAL	TOTAL	
1959-60	80,900	-	20,064	-	100,964	3,700	-	3,700		104,664
1960-61	147,800	-	9,118	-	156,918	4,420	-	4,420		161,338
1961-62	208,122	1,178	39,548	-	248,848	4,460	-	4,460		253,308
1962-63	80,590	12,405	14,565	-	107,560	4,150	-	4,150		111,710
1963-64	104,900	13,258	9,992	-	128,150	10,450	-	10,450		138,600
1964-65	160,170	14,528	13,097	-	187,795	35,980	-	35,980		223,775
1965-66	121,700	15,056	45,754	6,500	189,010	48,110	-	48,110	745	237,865
1966-67	84,300	16,223	59,820	-	160,343	46,940	-	46,940	851	208,134
1967-68	95,400	18,275	39,760	-	153,435	44,530	-	44,530	850	198,815
1968-69	17,800	13,877	119,395	-	151,072	41,680	-	41,680	850	193,602
1969-70	68,900	17,158	52,917	-	138,975	33,940	-	33,940	900	173,815
1970-71	72,100	22,726	44,757	-	139,583	36,202	-	36,202	881	176,666
1971-72	34,400	21,999	17,688	-	74,087	41,036	-	41,036	756	115,879
1972-73	71,947	27,886	45,077	20,000	164,910	41,803	-	41,803	901	207,614
1973-74	68,237	23,452	29,171	23,921	144,781	42,658	-	42,658	901	188,340
1974-75	71,900	26,791	29,665	-	128,356	36,746	-	36,746	400	165,502
1975-76	50,800	27,687	22,073	-	100,560	44,815	-	44,815	400	145,775
1976-77	9,300	29,359	19,252	21,400	79,311	49,315	-	49,315	400	129,026
1977-78	39,900	25,722	147,317	7,800	220,739	40,231	-	40,231	16,131	277,101
1978-79	65,300	28,860	68,859	-	163,019	34,498	-	34,498	18,378	215,895
1979-80	10,200	29,406	106,820	10,900	157,326	37,235	-	37,235	14,961	209,522
1980-81	32,000	31,722	50,590	31,500	145,812	34,364	-	34,364	23,823	203,999
1981-82	4,600	34,052	47,930	30,900	117,482	34,294	-	34,294	18,883	170,659
1982-83	2,000	22,770	126,076	8,900	159,746	45,183	-	45,183	19,752	224,681
1983-84	1,500	32,241	60,710	20,800	115,251	39,482	-	39,482	41,740	196,473
1984-85	40,600	31,378	39,099	-	111,077	37,526	-	37,526	36,840	185,443
1985-86	21,500	29,279	66,966	-	117,745	31,693	-	31,693	26,132	175,570
1986-87	49,200	37,976	27,613	6,500	121,289	39,184	-	39,184	29,202	189,675
1987-88	23,300	43,349	50,068	5,800	122,517	37,483	-	37,483	28,411	188,411
1988-89	50,300	49,773	17,096	6,500	123,669	34,033	-	34,033	25,425	183,127
1989-90	52,700	50,109	9,388	13,600	125,797	32,054	-	32,054	29,151	187,002
1990-91	56,300	53,864	35,717	100	145,981	29,690	-	29,690	22,039	197,710
1991-92	43,100	46,903	136,357	-	226,360	34,798	-	34,798	19,104	280,262
1992-93	16,561	48,864	147,699	-	213,124	31,341	-	31,341	53,306	297,771
1993-94	20,411	53,981	55,896	-	130,288	25,109	-	25,109	109,581	264,978
1994-95	21,837	33,300	100,578	-	155,715	22,999	1,480	24,479	50,898	231,092
1995-96	18,012	53,862	62,920	-	134,794	23,304	4,170	27,473	51,333	213,600
1996-97	22,738	49,959	58,262	-	130,959	22,862	6,241	29,103	39,394	199,456
1997-98	952	37,017	96,706	-	134,675	17,125	8,306	25,431	30,330	190,436
1998-99	-	47,201	32,013	-	79,214	20,308	6,973	27,280	23,516	130,010
1999-00	45,037	43,270	20,607	-	108,914	22,917	7,460	30,377	22,278	161,569
2000-01	23,451	46,343	39,725	-	109,519	23,585	6,838	30,423	21,181	161,123
2001-02	42,875	60,596	17,000	-	120,471	24,376	7,276	31,652	20,720	172,843
2002-03	22,366	42,796	58,202	-	123,364	23,117	6,192	29,309	11,205	163,878
2003-04	27,520	44,925	30,467	-	102,912	21,361	3,669	25,030	-	127,942
2004-05	25,296	29,503	148,674	-	203,473	17,660	3,920	21,580	7,804	232,857
2005-06	33,229	42,022	60,377	-	135,628	14,628	6,874	21,502	9,889	167,019
2006-07	40,214	45,039	11,495	-	96,748	11,994	13,077	25,071	9,264	131,083
2007-08	1,510	39,767	54,518	-	95,795	12,880	15,165	28,045	-	123,840
2008-09	-	39,611	35,348	-	74,959	17,391	10,658	28,049	-	103,008
2009-10	26,286	55,731	35,398	-	117,415	18,411	11,902	30,313	-	147,728
2010-11	37,315	37,131	113,295	-	187,741	14,001	12,160	26,161	6,724	220,626
2011-12	-	55,797	36,155	-	91,952	10,896	8,990	19,886	7,815	119,653
2012-13	-	59,145	6,048	-	65,193	15,852	11,777	27,630	2,180	95,002
2013-14	-	55,646	-	-	55,646	16,074	17,778	33,852	4,371	93,868
TOTAL	**2,467,375**	**1,870,764**	**2,843,703**	**215,121**	**7,396,963**	**1,540,873**	**170,905**	**1,711,778**	**860,598**	**9,969,339**

** - Including Orange County sidc of Alamitos Barrier*

HISTORICAL AMOUNTS OF GROUNDWATER PRODUCTION*

(in acre-feet)

WATER YEAR	CENTRAL BASIN	WEST COAST BASIN	TOTAL
1959-60	245,400	66,600	312,000
1960-61	292,500	61,900	354,400
1961-62	275,800	59,100	334,900
1962-63	225,400	59,100	284,500
1963-64	219,100	61,300	280,400
1964-65	211,600	59,800	271,400
1965-66	222,800	60,800	283,600
1966-67	206,700	62,300	269,000
1967-68	220,100	61,600	281,700
1968-69	213,800	61,600	275,400
1969-70	222,200	62,600	284,800
1970-71	211,600	60,900	272,500
1971-72	216,100	64,800	280,900
1972-73	205,600	60,300	265,900
1973-74	211,300	55,000	266,300
1974-75	213,100	56,700	269,800
1975-76	215,300	59,400	274,700
1976-77	211,500	59,800	271,300
1977-78	196,600	58,300	254,900
1978-79	207,000	58,000	265,000
1979-80	209,500	57,100	266,600
1980-81	211,915	57,711	269,626
1981-82	202,587	61,874	264,461
1982-83	194,548	57,542	252,090
1983-84	196,660	51,930	248,590
1984-85	193,085	52,746	245,831
1985-86	195,972	53,362	249,334
1986-87	196,660	48,026	244,686
1987-88	194,704	43,837	238,541
1988-89	200,207	44,323	244,530
1989-90	197,621	48,047	245,668
1990-91	187,040	53,660	240,700
1991-92	196,400	56,318	252,718
1992-93	150,495	40,241	190,736
1993-94	156,565	41,826	198,392
1994-95	180,269	41,729	221,998
1995-96	182,413	52,222	234,636
1996-97	187,561	52,576	240,137
1997-98	188,305	51,859	240,164
1998-99	204,441	51,926	256,367
1999-00	198,483	53,599	252,082
2000-01	195,361	53,870	249,231
2001-02	200,168	50,063	250,231
2002-03	190,268	51,946	242,214
2003-04	200,365	48,013	248,378
2004-05	188,783	41,297	230,079
2005-06	191,123	36,808	227,931
2006-07	198,249	37,659	235,908
2007-08	206,297	38,472	244,768
2008-09	197,663	45,538	243,201
2009-10	197,390	44,013	241,403
2010-11	170,630	44,480	215,109
2011-12	195,820	45,597	241,417
2012-13	196,414	42,263	238,678
2013-14	198,585	42,520	241,105
TOTAL	**11,196,046**	**2,904,893**	**14,100,939**

* Numbers sometimes updated when pumping adjustments are required

HISTORICAL AMOUNTS OF WATER USE IN THE WRD SERVICE AREA*

(in acre-feet)

WATER YEAR	GROUNDWATER PRODUCTION	IMPORTED WATER FOR DIRECT USE*	RECLAIMED WATER FOR DIRECT USE*	TOTAL
1960-61	312,000	196,800		508,800
1961-62	334,900	178,784		513,684
1962-63	284,500	222,131		506,631
1963-64	280,400	257,725		538,125
1964-65	271,400	313,766		585,166
1965-66	283,600	308,043		591,643
1966-67	269,000	352,787		621,787
1967-68	281,700	374,526		656,226
1968-69	275,400	365,528		640,928
1969-70	284,800	398,149		682,949
1970-71	272,500	397,122		669,622
1971-72	280,900	428,713		709,613
1972-73	265,900	400,785		666,685
1973-74	266,300	410,546		676,846
1974-75	269,800	380,228		650,028
1975-76	274,700	404,958		679,658
1976-77	271,300	355,896		627,196
1977-78	254,900	373,116		628,016
1978-79	265,000	380,101	100 (a)	645,201
1979-80	266,600	397,213	200	664,013
1980-81	269,626	294,730	300	564,656
1981-82	264,461	391,734	300	656,495
1982-83	252,090	408,543	400	661,033
1983-84	248,590	441,151	1,800	691,541
1984-85	245,831	451,549	2,000	699,380
1985-86	249,334	427,860	2,400	679,594
1986-87	244,686	478,744	2,300	725,730
1987-88	238,541	479,318	3,500	721,359
1988-89	244,530	466,166	5,300	715,996
1989-90	245,668	448,285	5,900	699,853
1990-91	240,700	485,109	5,000	730,809
1991-92	252,718	395,191	4,900	652,809
1992-93	190,736	388,949	824	580,509
1993-94	198,392	483,287	3,413	685,092
1994-95	221,998	437,191	6,143	665,332
1995-96	234,636	426,699	19,804	681,139
1996-97	240,137	436,569	25,046	701,752
1997-98	240,164	375,738	27,075	642,976
1998-99	256,367	396,655	30,510	683,532
1999-00	252,082	395,681	33,589	681,352
2000-01	249,231	395,024	32,589	676,845
2001-02	250,231	395,799	38,694	684,723
2002-03	242,214	381,148	38,839	662,202
2003-04	248,378	389,233	36,626	674,237
2004-05	230,079	402,660	33,988	666,727
2005-06	227,931	366,815	35,301	630,047
2006-07	235,908	376,492	41,899	654,299
2007-08	244,768	346,035	45,120	635,923
2008-09	243,201	320,711	43,153	607,065
2009-10	241,403	278,857	43,547	563,808
2010-11	215,109	286,448	39,418	540,975
2011-12	241,417	282,746	42,138	566,301
2012-13	238,678	304,325	45,377	588,380
2013-14	241,105	304,501	55,311	600,917
TOTAL	13,746,539	20,236,861	752,805	34,736,204

(a) Los Coyotes on-line in 1979; Long Beach on-line in 1980

** - Includes imported & recycled at seawater barriers, but not spreading grounds.*

FIGURES

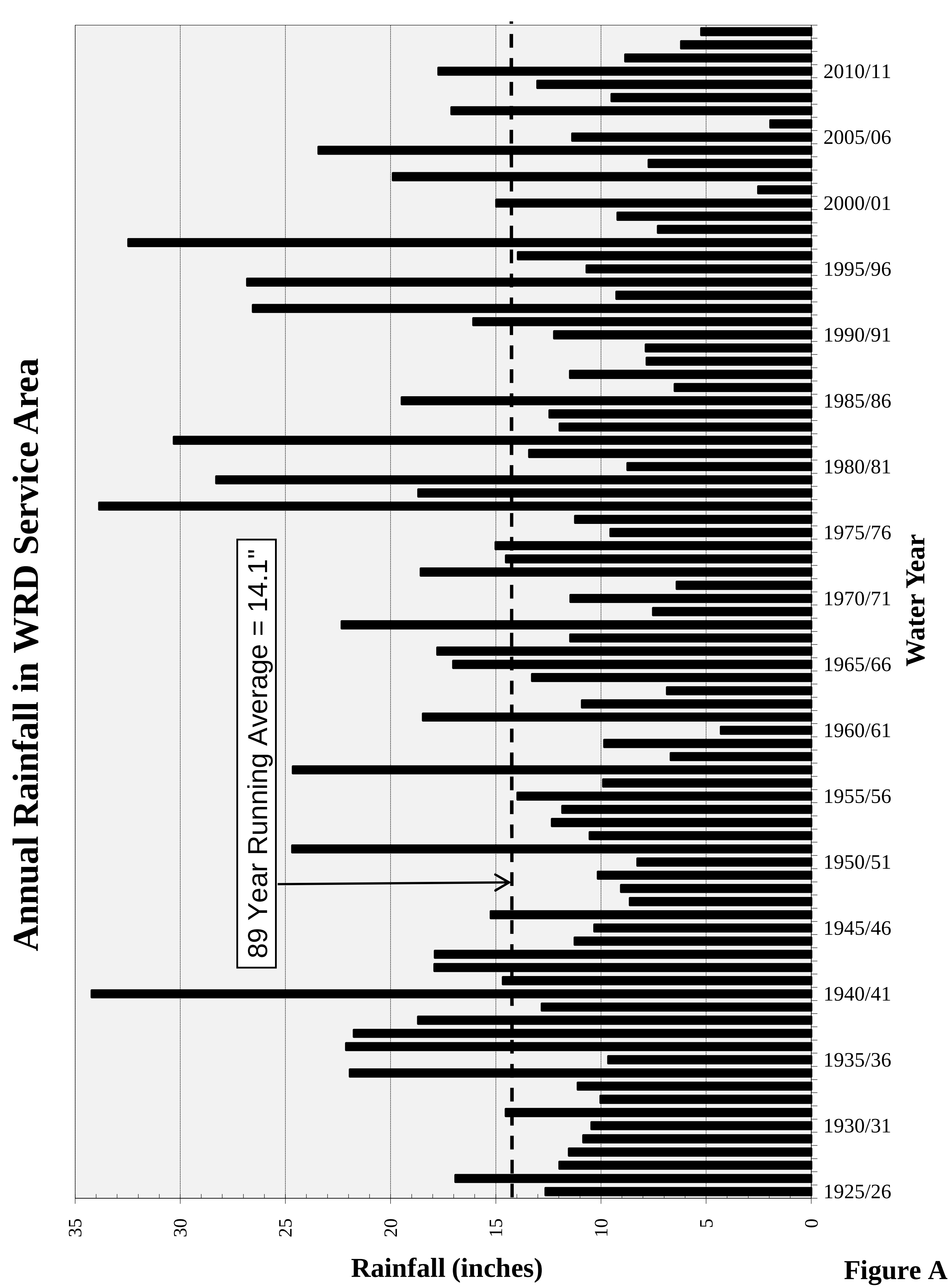
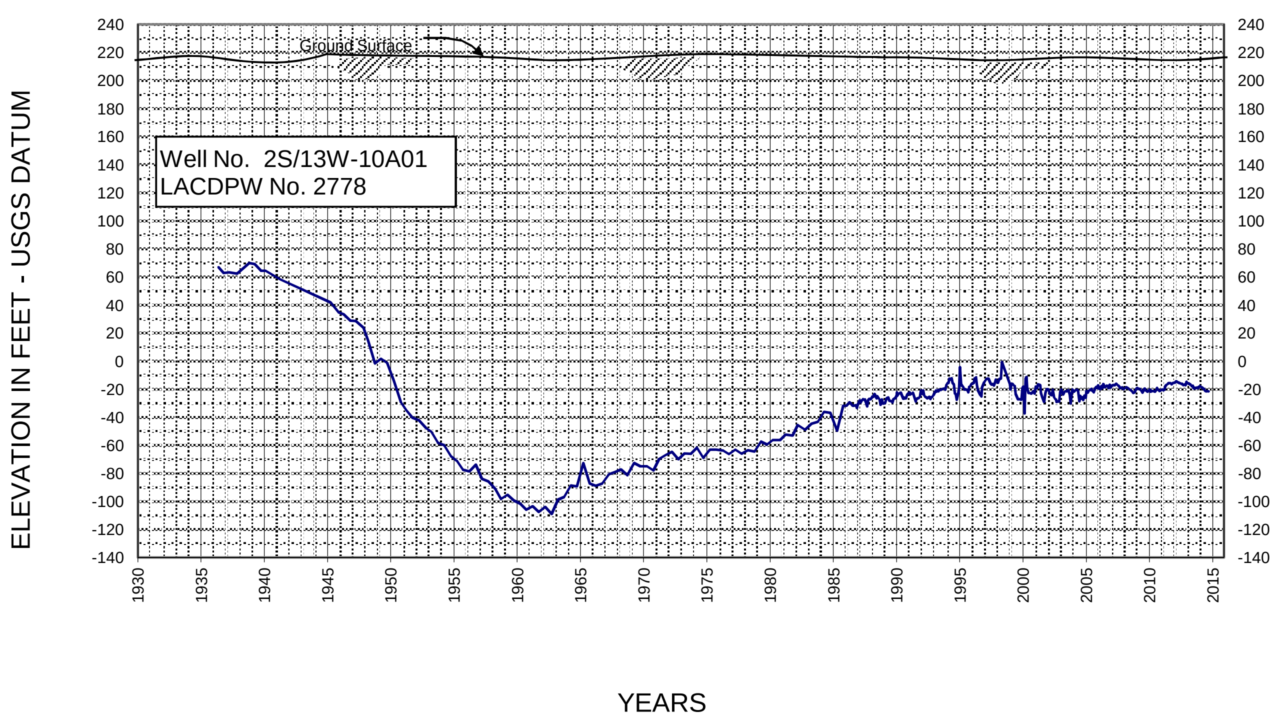

Annual Rainfall in WRD Service Area
89 Year Running Average = 14.1"
Rainfall (inches)
Water Year
35
30
25
20
15
10
5
0
2010/11
2005/06
2000/01
1995/96
1990/91
1985/86
1980/81
1975/76
1970/71
1965/66
1960/61
1955/56
1950/51
1945/46
1940/41
1935/36
1930/31
1925/26

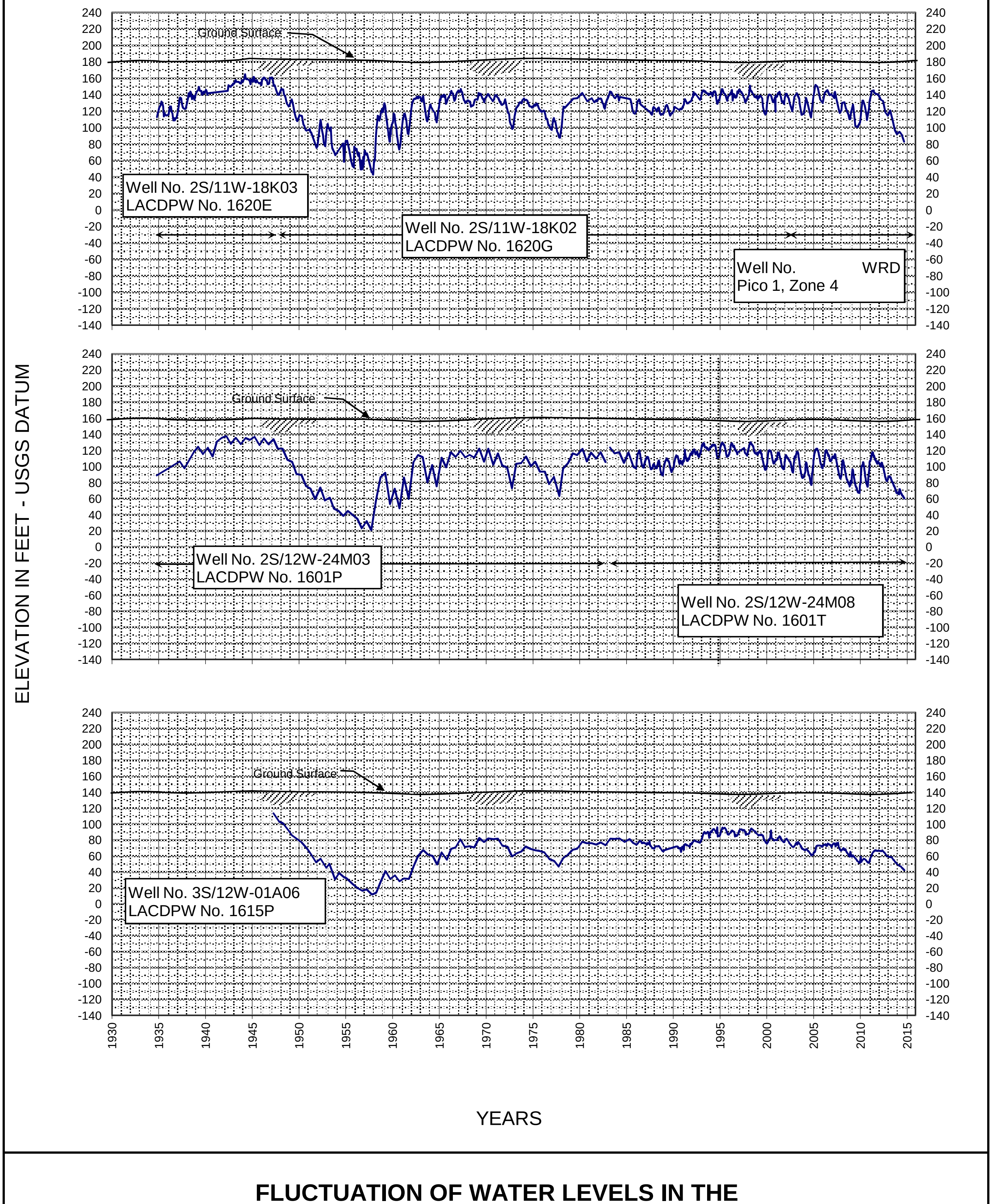
Figure A



FLUCTUATION OF WATER LEVELS IN THE

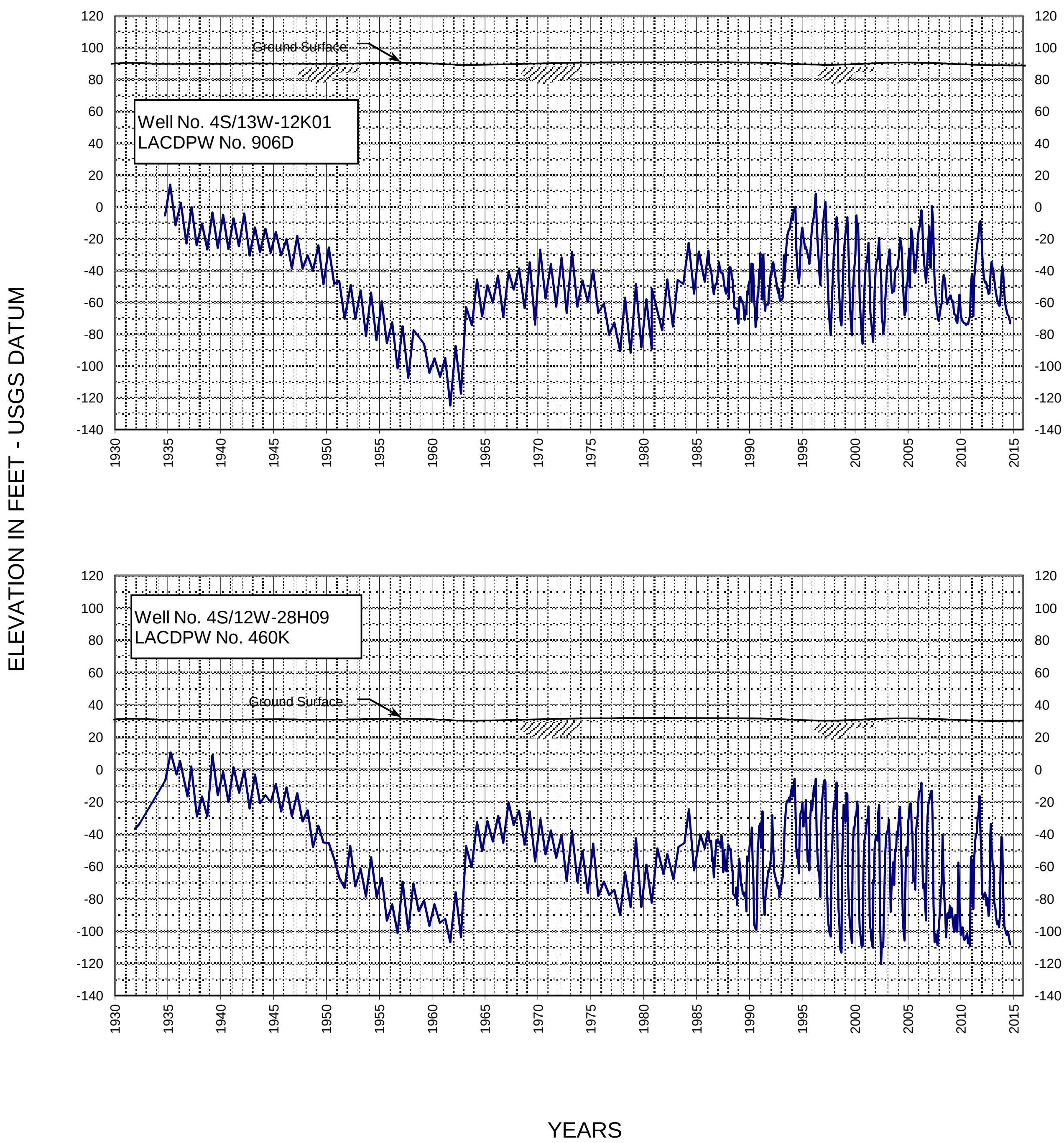
LOS ANGELES FOREBAY

Figure B



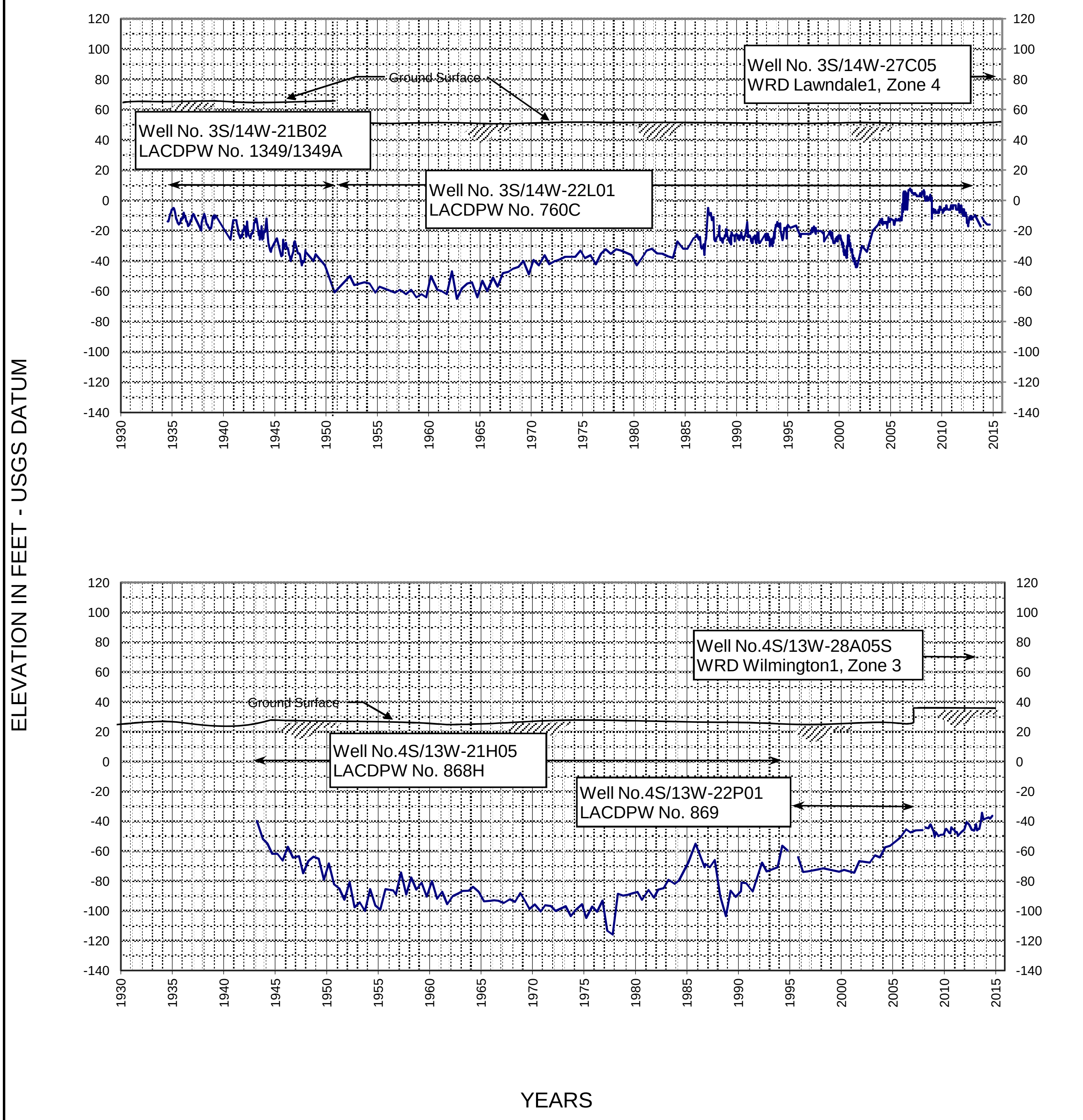
FLUCTUATION OF WATER LEVELS IN THE MONTEBELLO FOREBAY

Figure C



FLUCTUATION OF WATER LEVELS IN THE CENTRAL BASIN PRESSURE AREA

Figure D



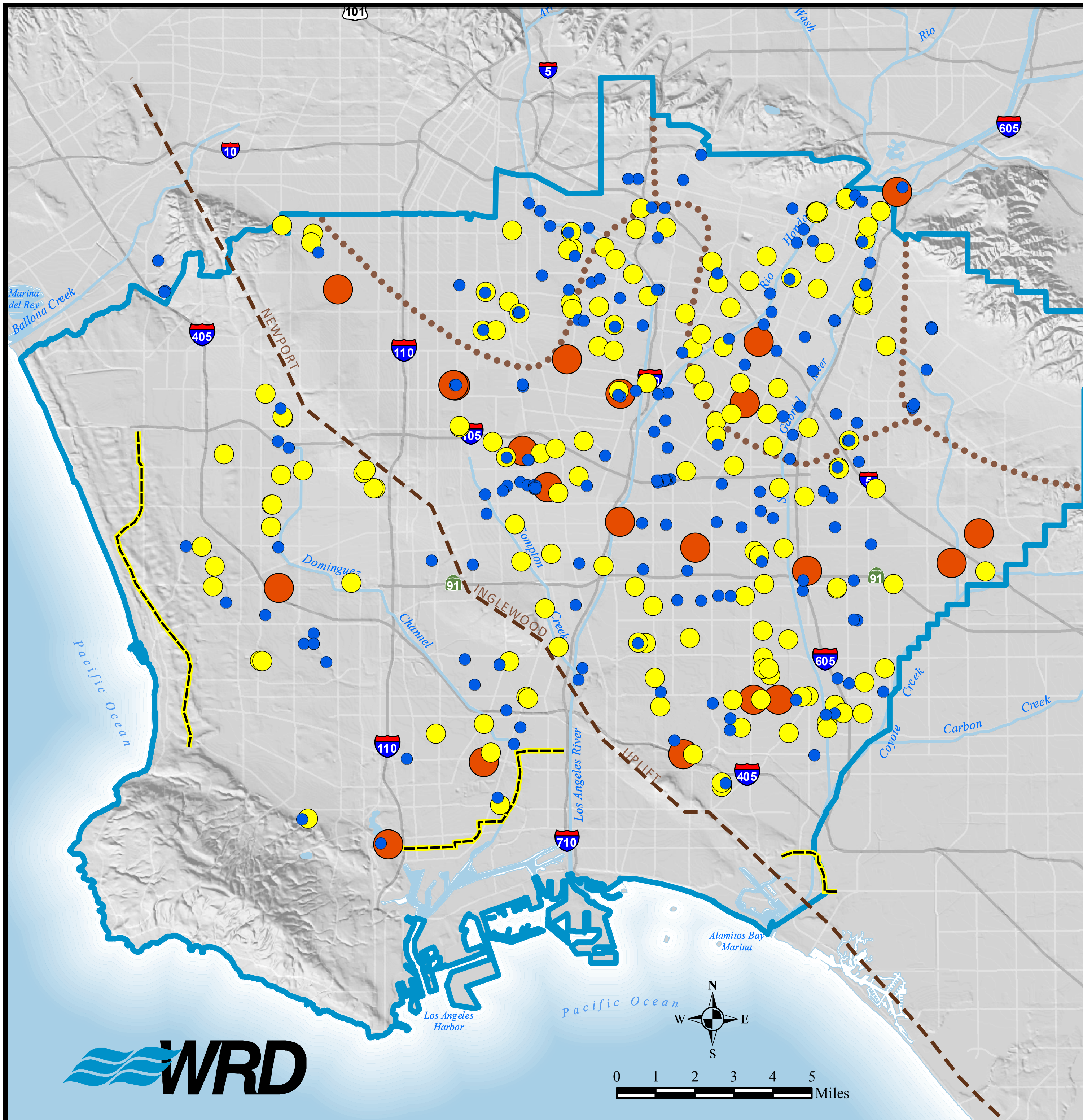
FLUCTUATION OF WATER LEVELS IN THE WEST COAST BASIN

Figure E

PLATES

PLATE 1

GROUNDWATER PRODUCTION
WATER YEAR
2013 - 2014



LEGEND

Groundwater Production (AF/Y)

- < 500 Acre Ft/Yr
- 500 - 2000 Acre Ft/Yr
- > 2000 Acre Ft/Yr

Data Source: WRD Production Database

- Barrier Injection Wells
- WRD Service Area Boundary
- Forebay

RECIRC2655

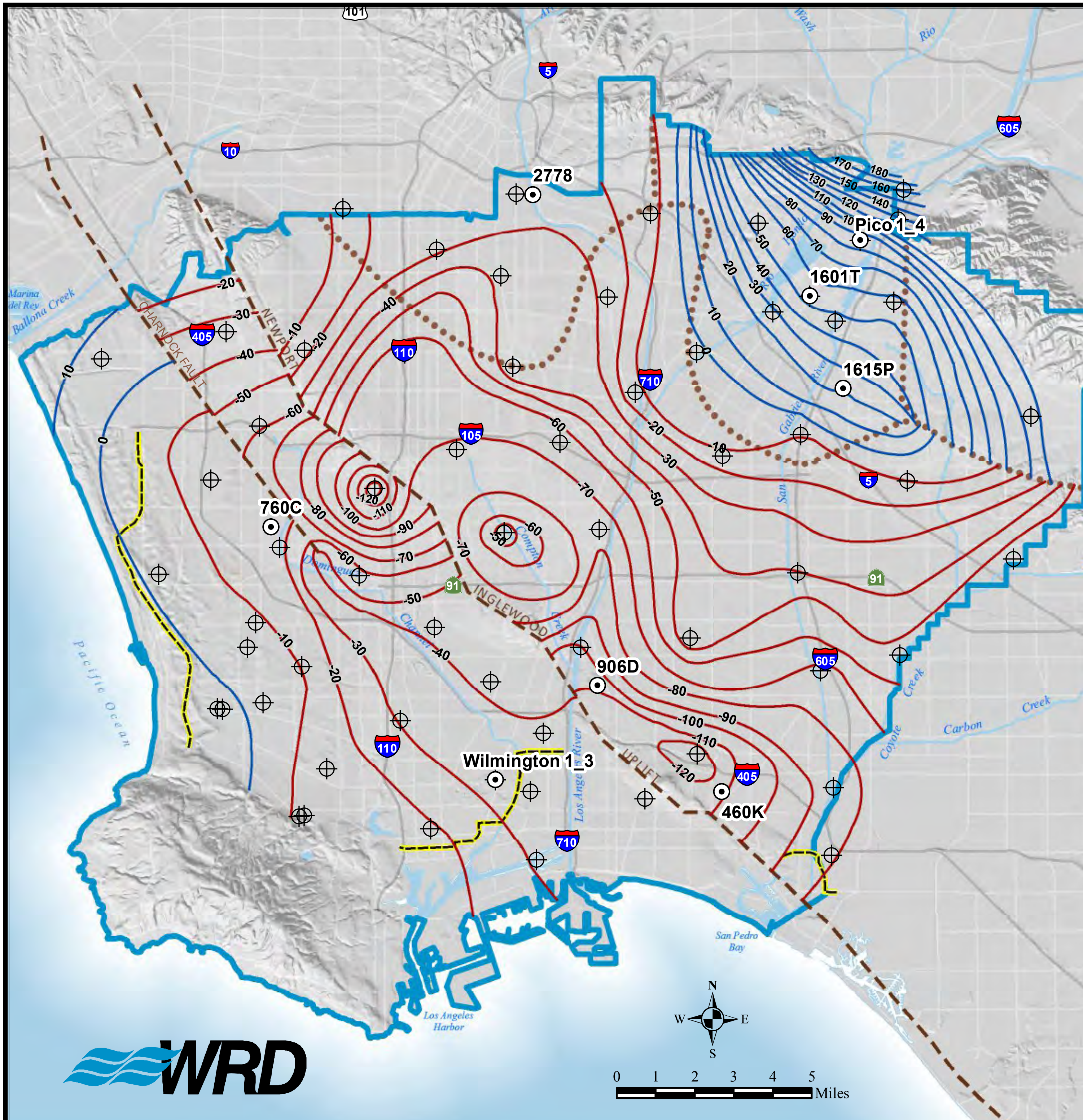


PLATE 2

GROUNDWATER ELEVATION CONTOURS FALL 2014

LEGEND

- Above Sea Level
- Below Sea Level
- Key wells used for hydrographs (Figures B - E)
- Wells used for Contouring

Data Source: WRD Production Database

- Barrier Injection Wells
- WRD Service Area Boundary
- Forebay

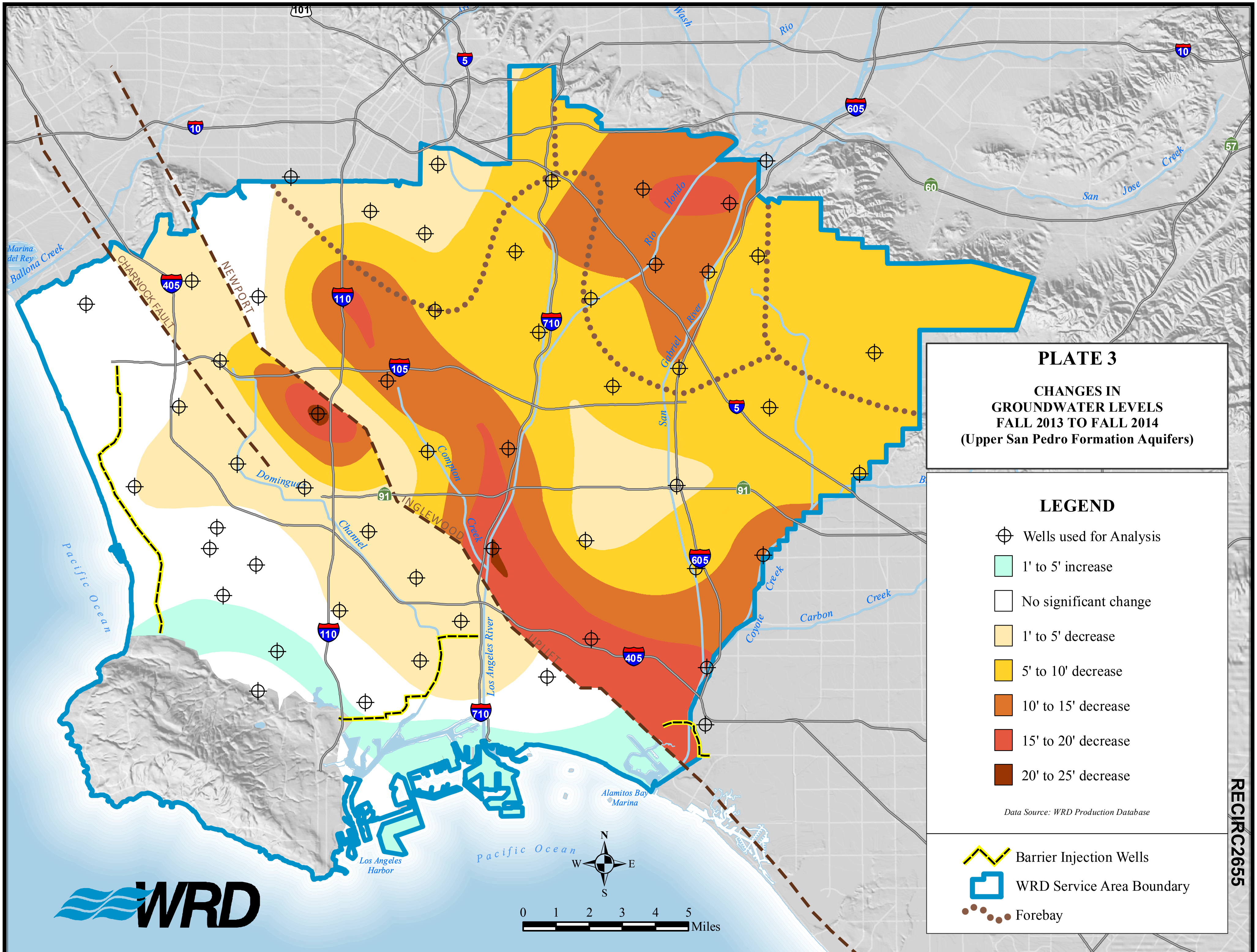


PLATE 3
CHANGES IN
GROUNDWATER LEVELS
FALL 2013 TO FALL 2014
(Upper San Pedro Formation Aquifers)
LEGEND
Wells used for Analysis
1' to 5' increase
No significant change
1' to 5' decrease
5' to 10' decrease
10' to 15' decrease
15' to 20' decrease
20' to 25' decrease
Data Source: WRD Production Database
Barrier Injection Wells
WRD Service Area Boundary
Forebay
RECIRC2655
WRD
0 1 2 3 4 5 Miles
N
S
E
W
Pacific Ocean
Los Angeles Harbor
Alamitos Bay Marina
Marina del Rey
Ballona Creek
CHARNOCK FAULT
NEWPORT
INGLEWOOD
UPLIFT
Dominguez
Channel
Compton Creek
Los Angeles River
San Gabriel River
Rio Hondo
Coyote Creek
Carbon Creek
San Jose Creek
Rio
Wash
10
405
110
105
710
605
5
91
60
57
101

RECIRC2655

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www.wrd.org

WATER REPLENISHMENT DISTRICT
OF SOUTHERN CALIFORNIA

RECIRC2655

Attachment 15

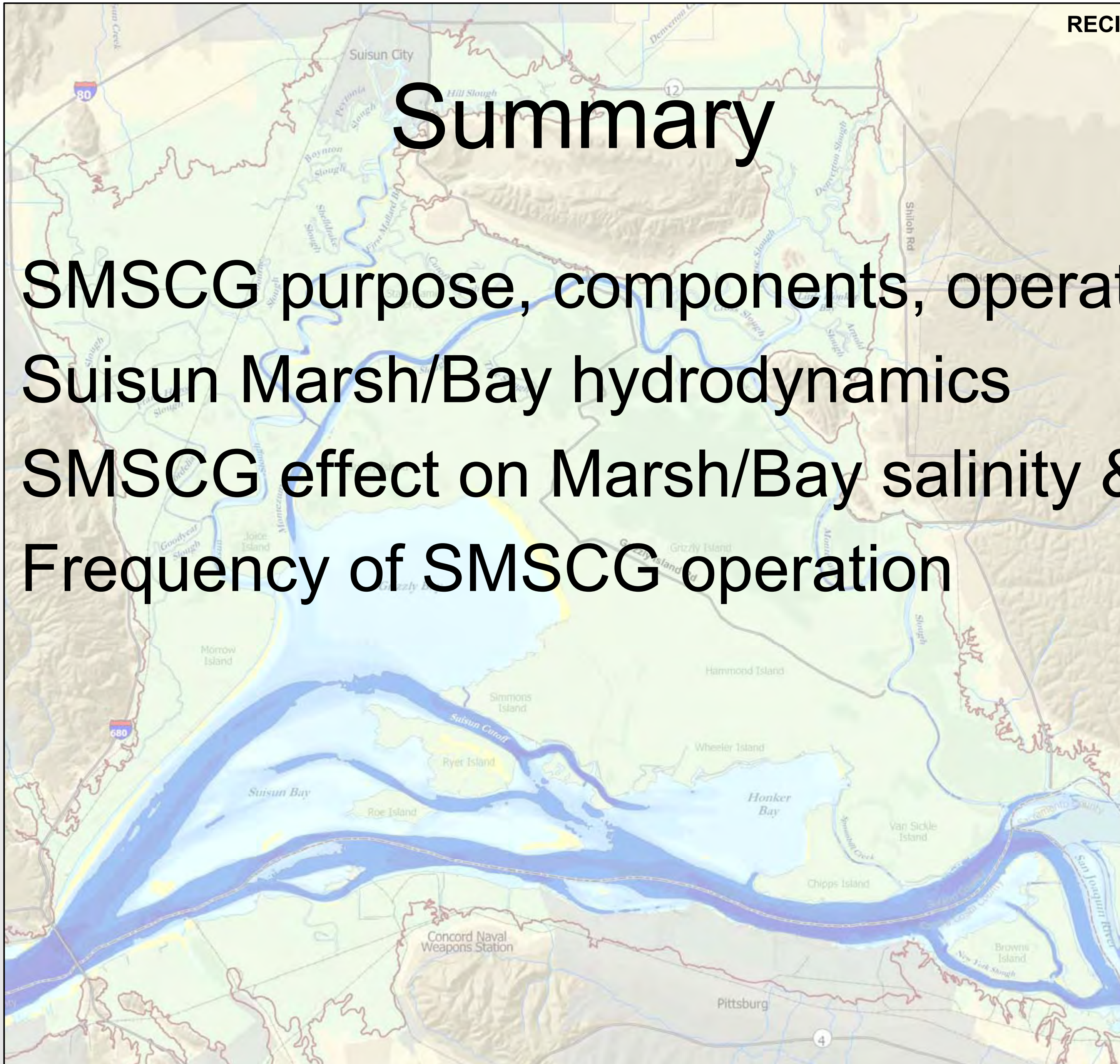
Suisun Marsh Salinity Control Gate: Purpose, Operation, and Hydrodynamics/Salinity Transport Effect

CWEMF
February 28, 2008

Chris Enright
DWR

Summary

- SMSCG purpose, components, operation
- Suisun Marsh/Bay hydrodynamics
- SMSCG effect on Marsh/Bay salinity & X2
- Frequency of SMSCG operation



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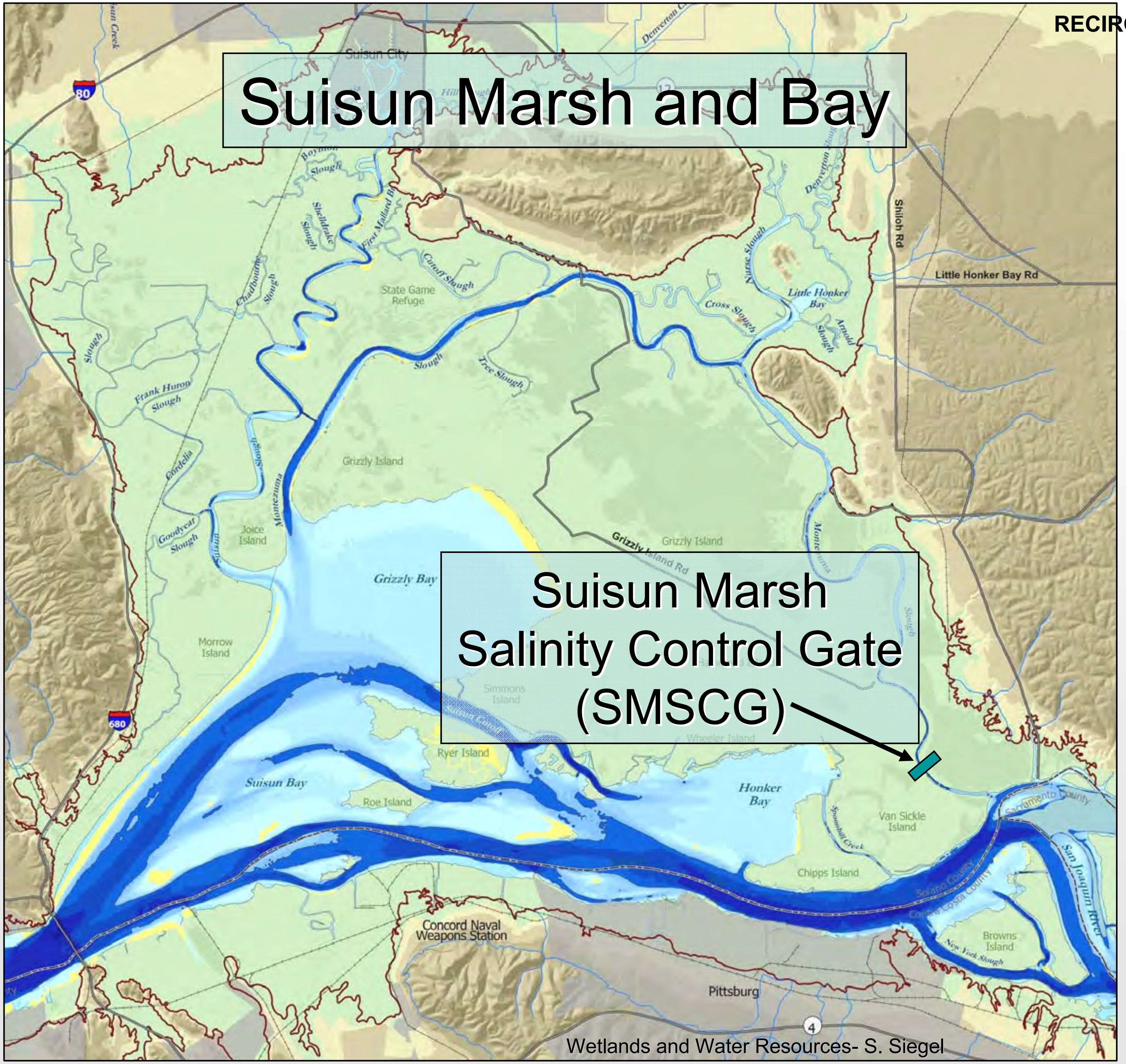
Suisun Marsh and Bay



Wetlands and Water Resources- S. Siegel

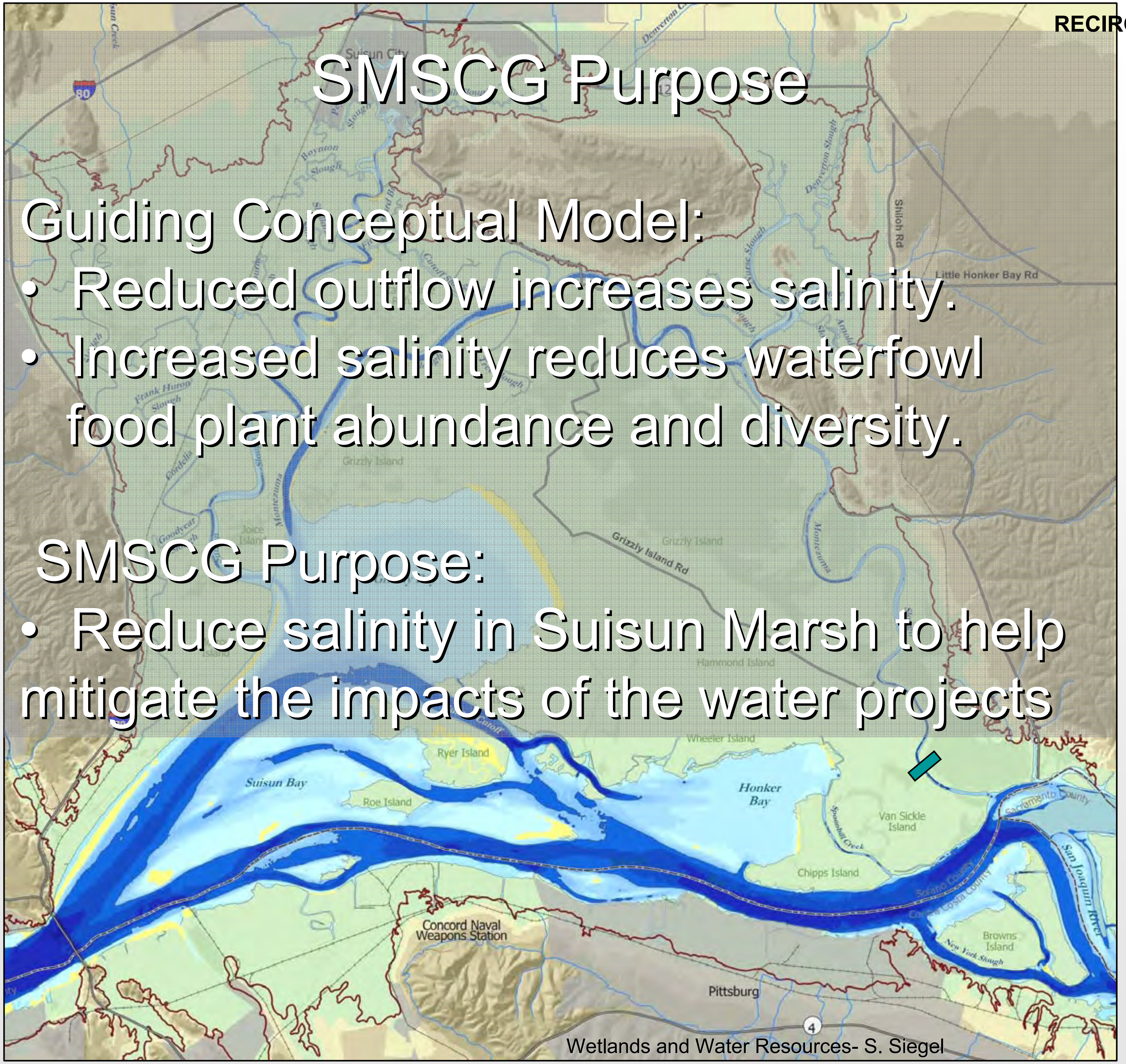
SMSCG Purpose

Guiding Conceptual Model:

- Reduced outflow increases salinity.
- Increased salinity reduces waterfowl food plant abundance and diversity.

SMSCG Purpose:

- Reduce salinity in Suisun Marsh to help mitigate the impacts of the water projects

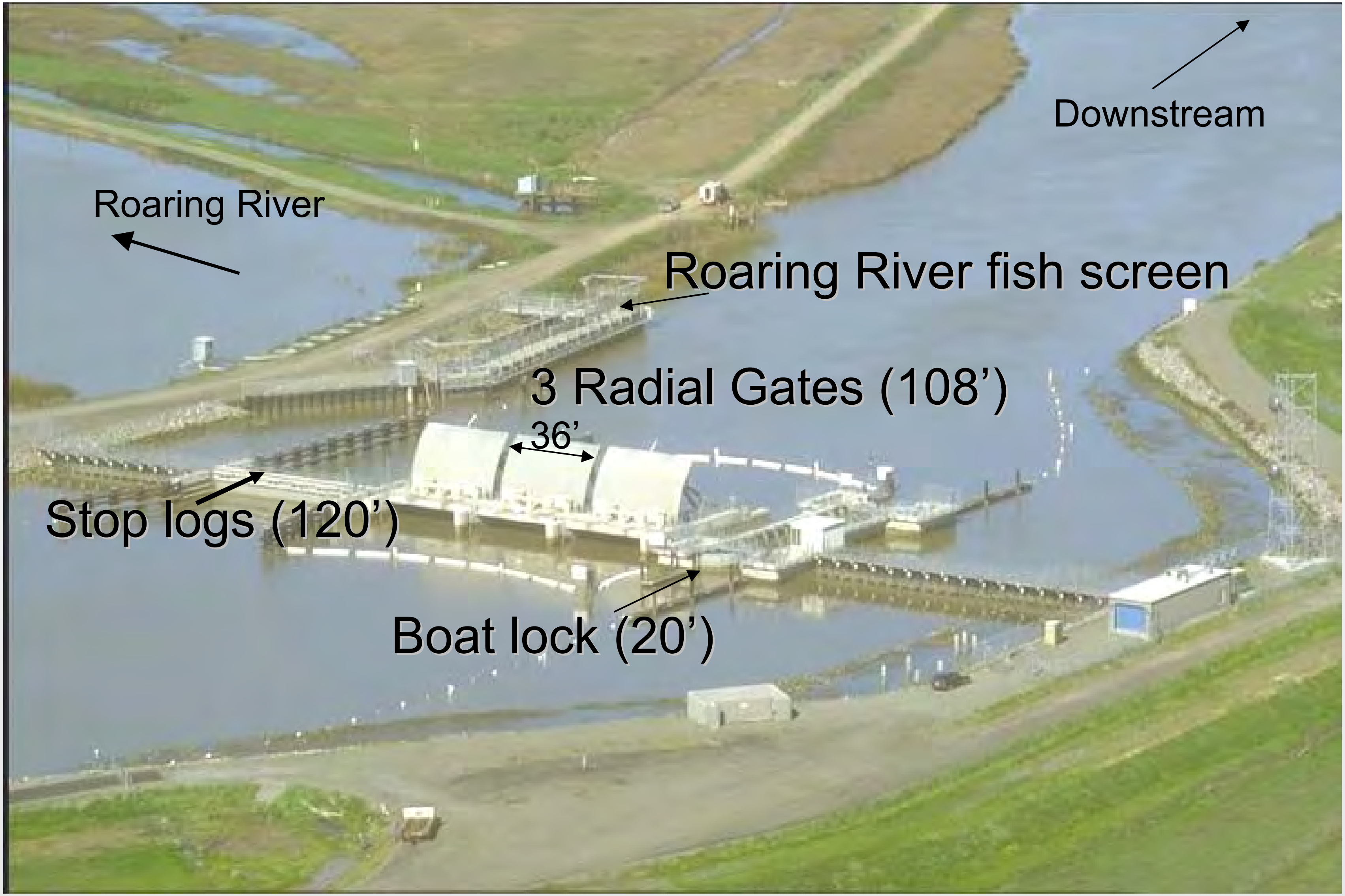


Wetlands and Water Resources- S. Siegel

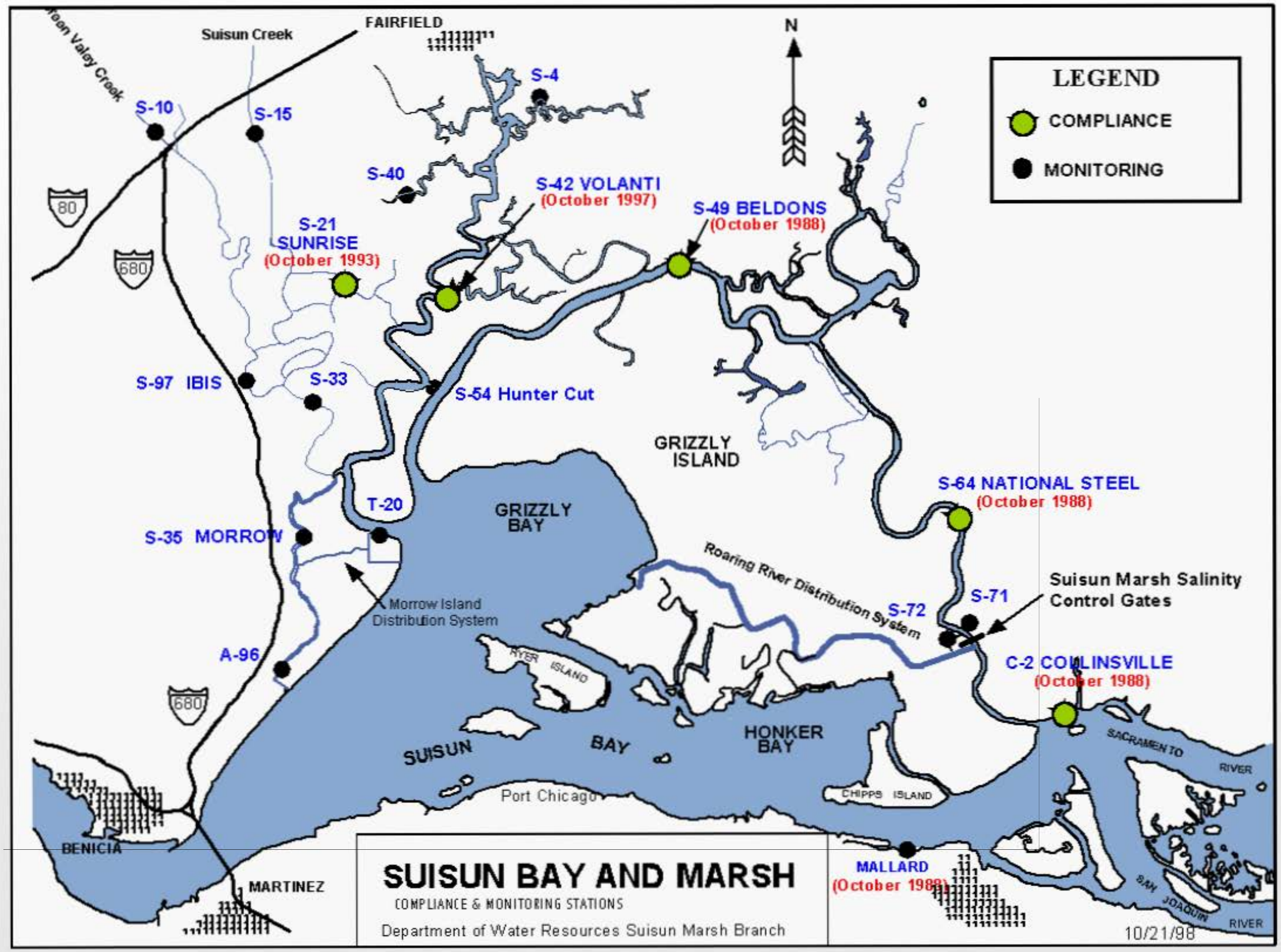
SMCSG:

- Tidal “pump” induces a net downstream flow (~2,800 cfs).
- Opens on ebb tide
- Closes on flood tide

SMSCG Components



Salinity Standard Compliance Locations
Both regulatory and contractual



Looking Upstream (southeast)

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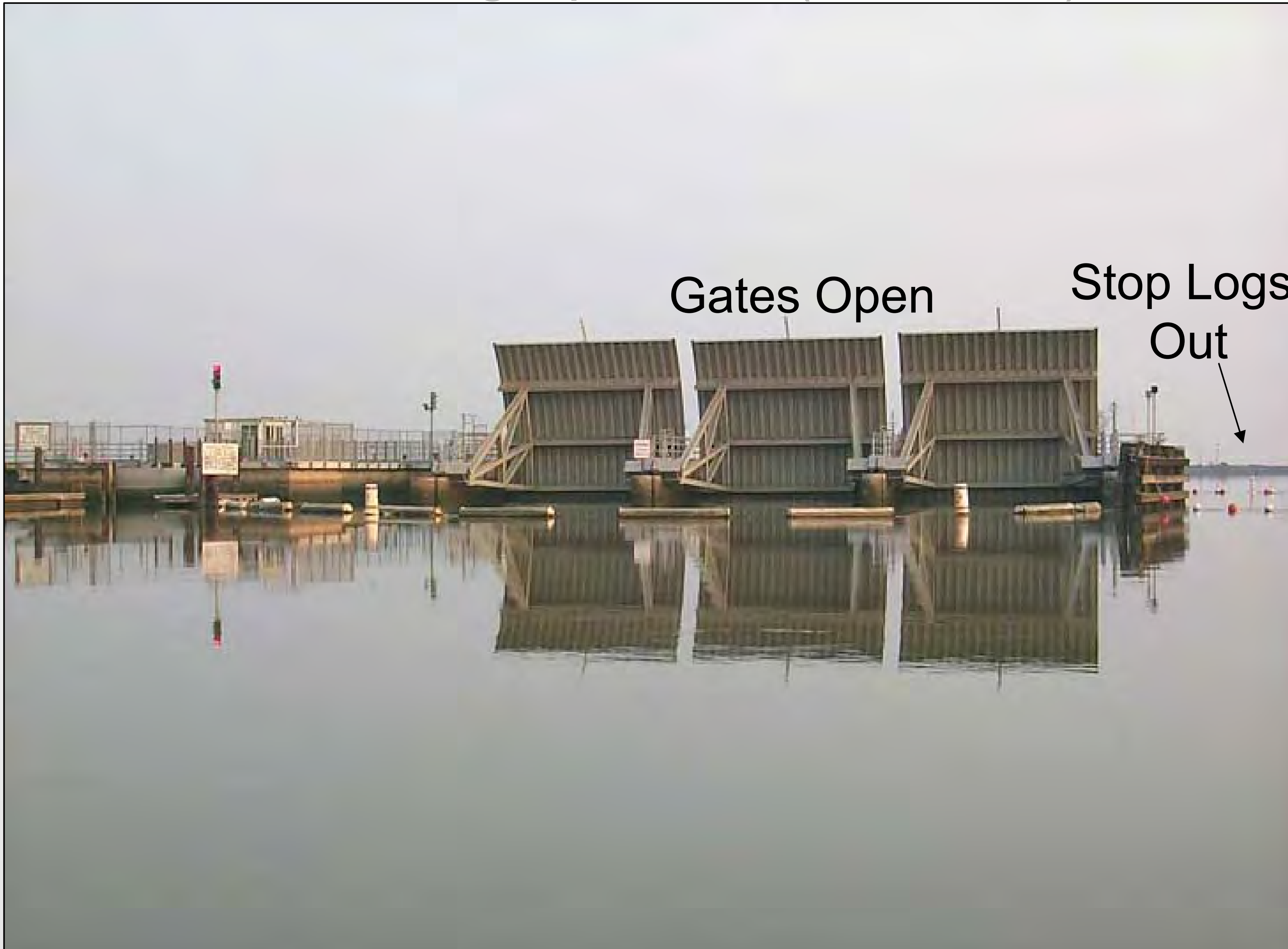

Looking ~Upstream (east)

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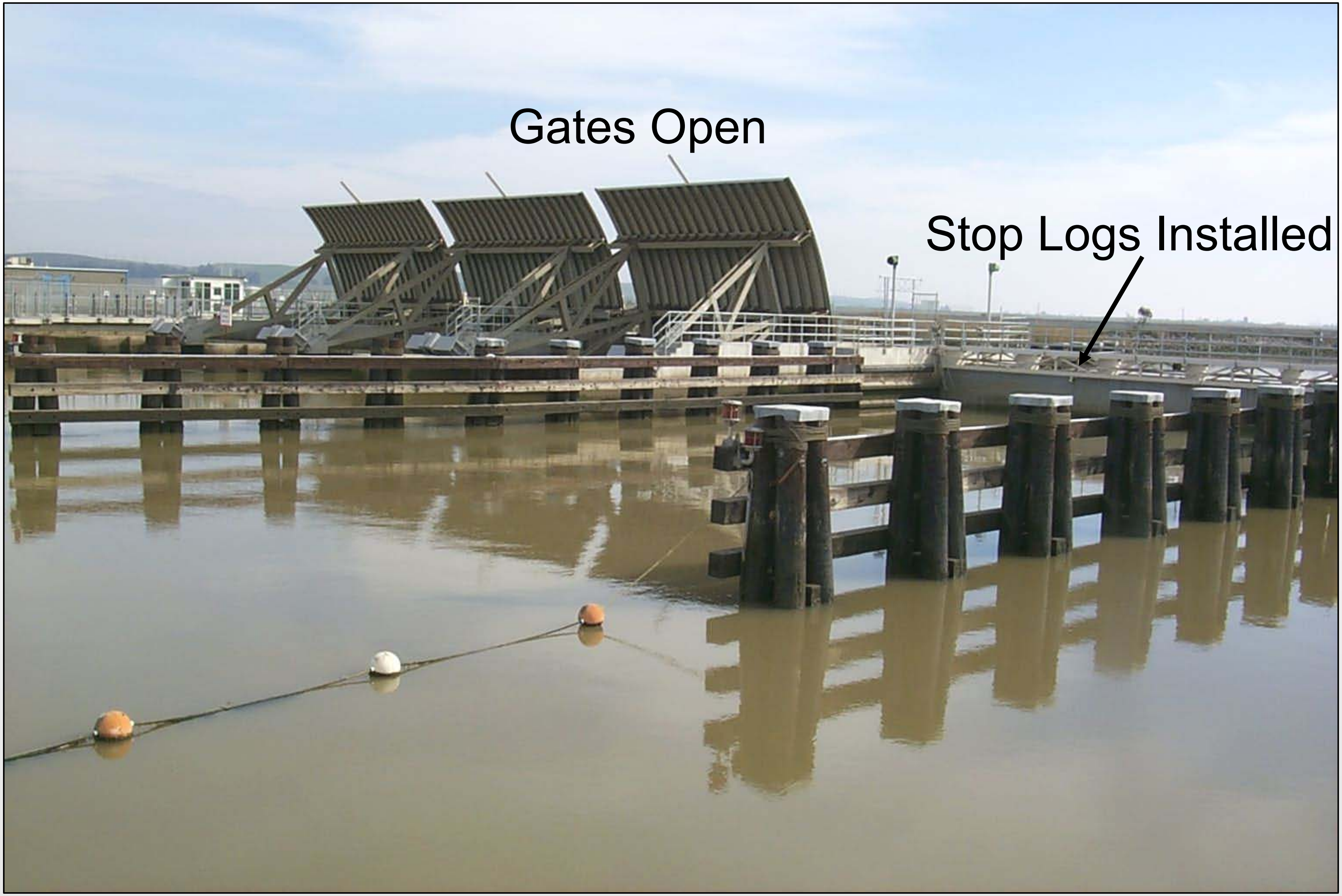

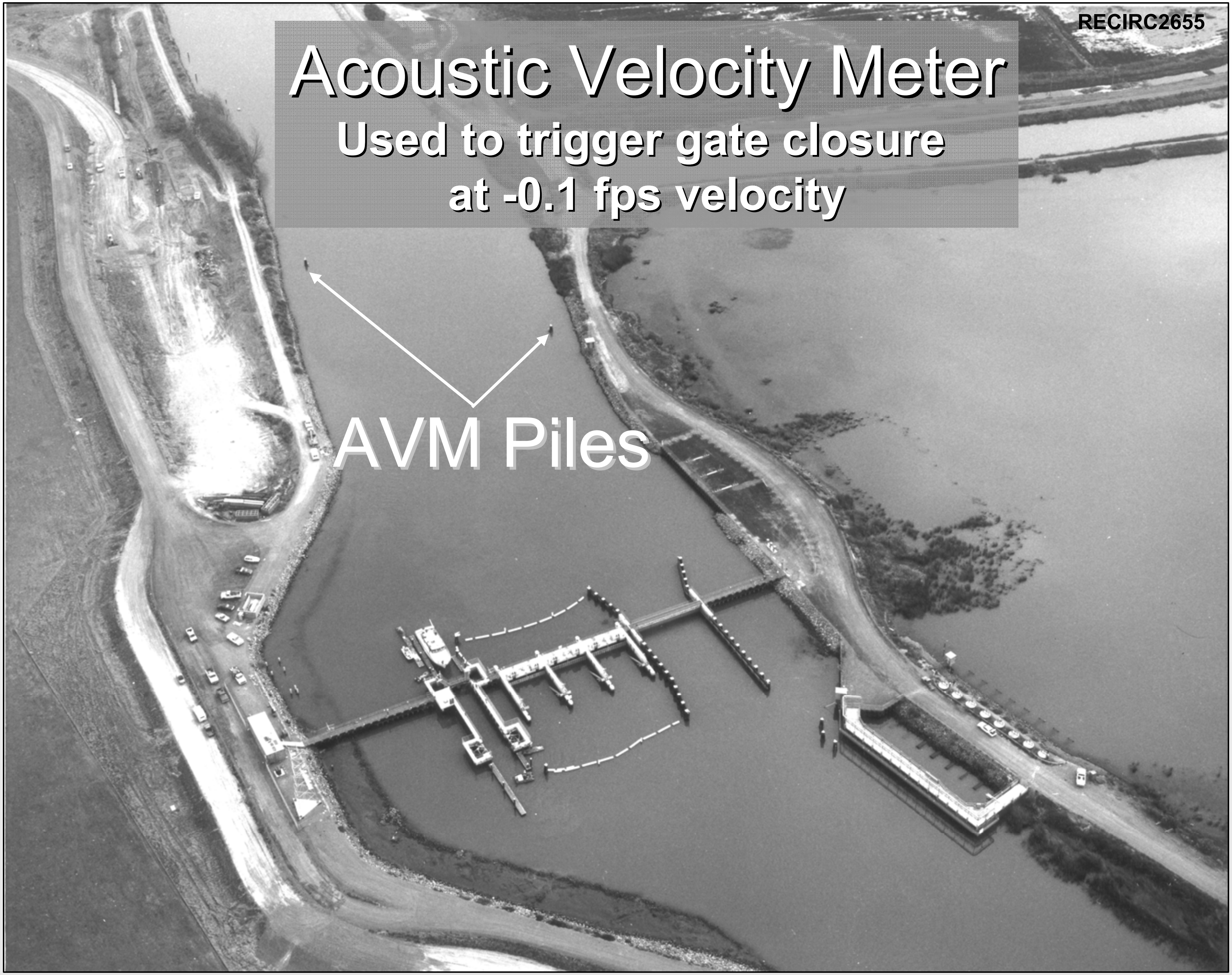
RECIRC2655
Acoustic Velocity Meter
Used to trigger gate closure
at -0.1 fps velocity
AVM Piles

RECIRC2655

SMSCG Boat Lock (looking downstream - flood tide)

RECIRC2655

SMSCG Boat Lock (looking upstream - flood tide)

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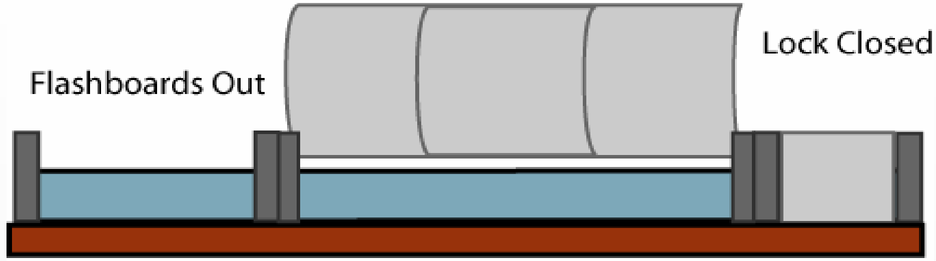
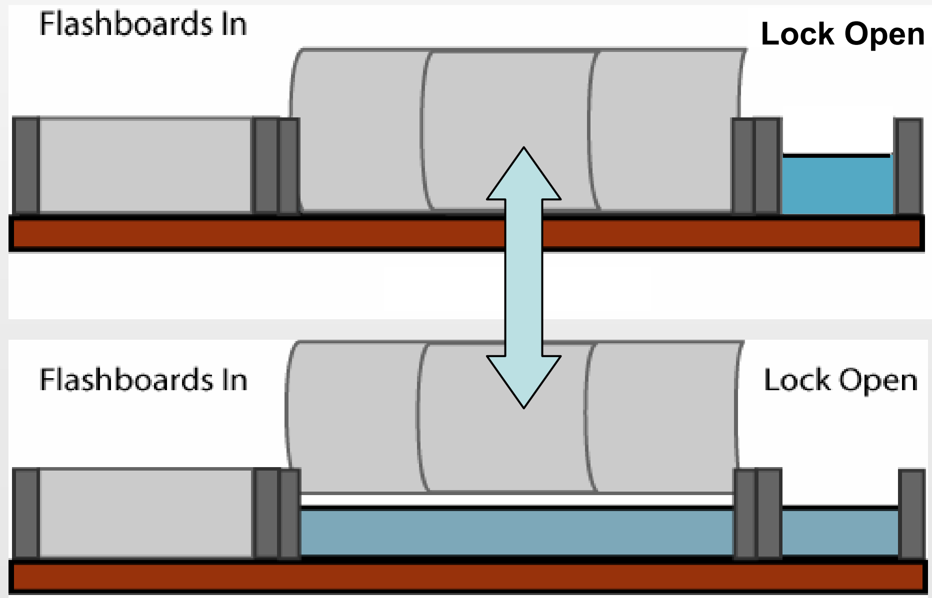
Suisun Marsh Salinity Control Gate Configurations

June → September



SMSCG Not Operating

October → May
(when needed to
meet standards)



SMSCG Operating

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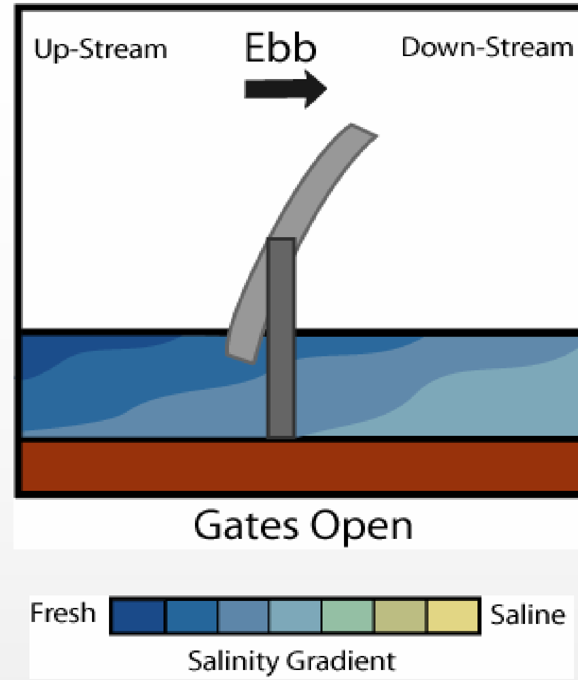
SMSCG Side View



In operation:

- Closes on flood tide when current > -0.1 fps
- Open on ebb tide when upstream water level is 0.3 ft > downstream water level

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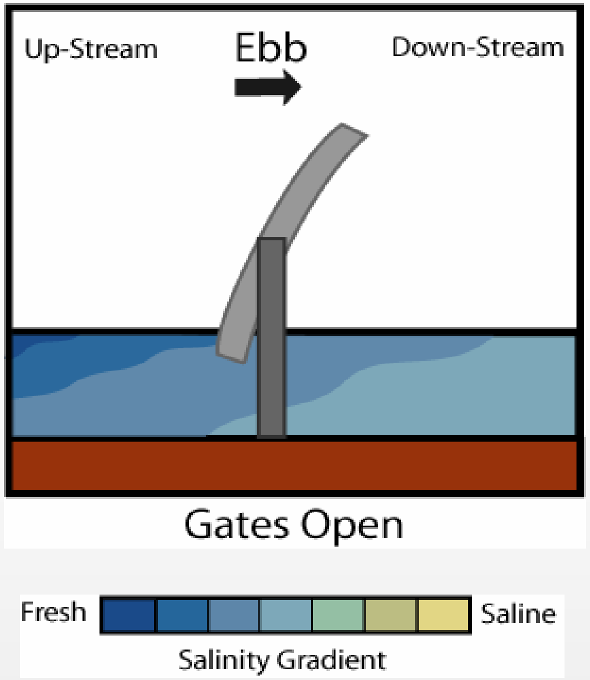
SMSCG Side View



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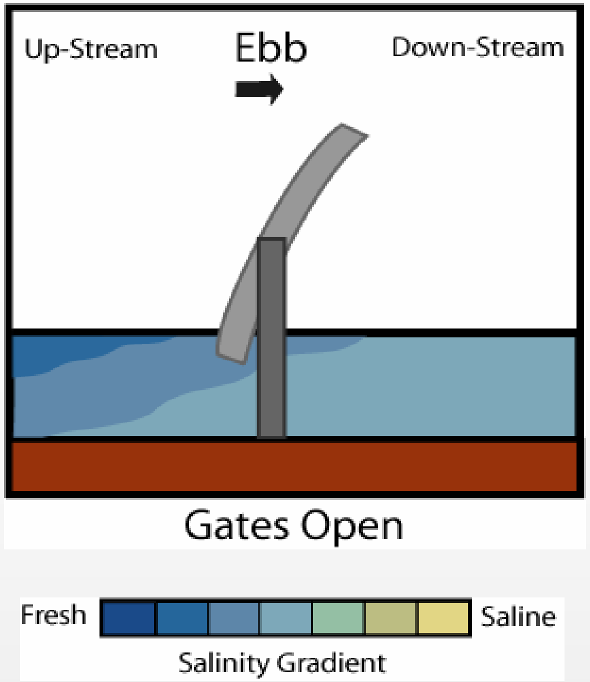
SMSCG Side View



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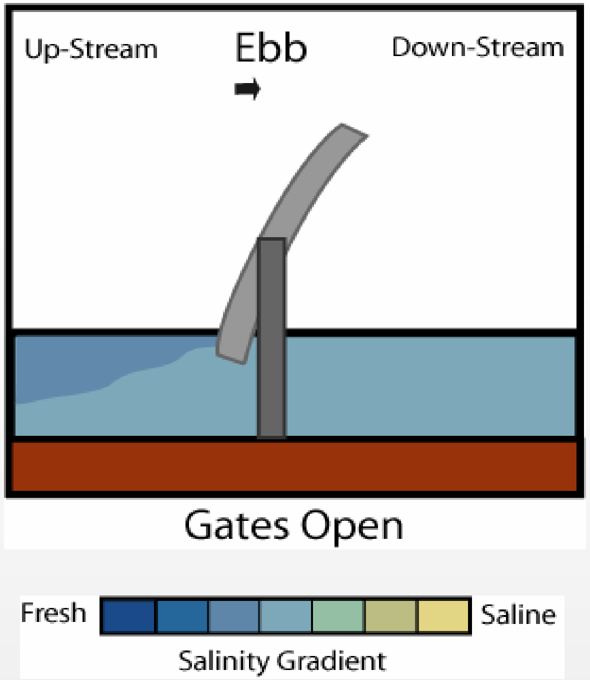
SMSCG Side View



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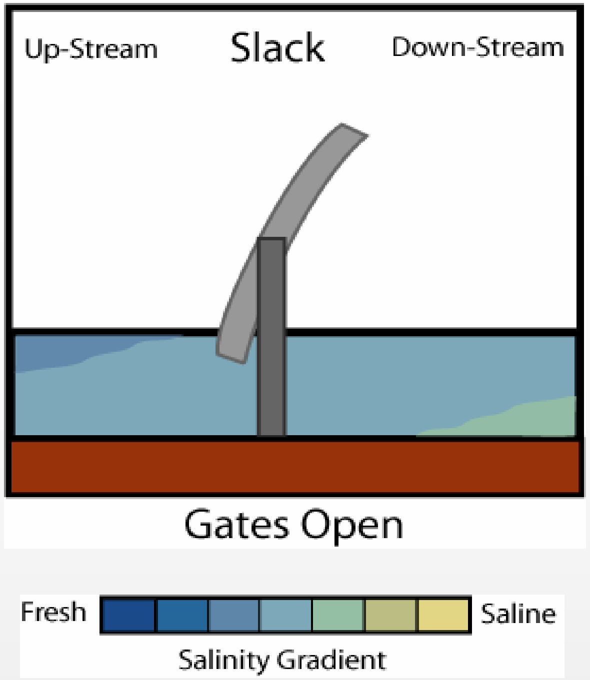
SMSCG Side View



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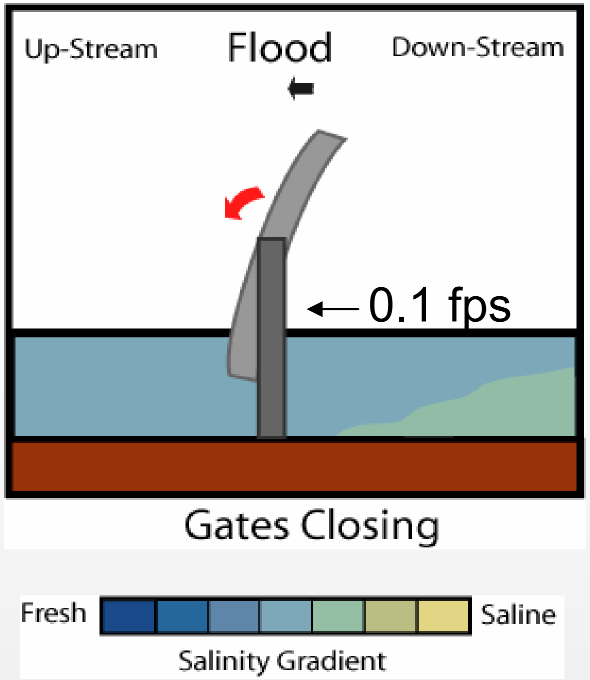
SMSCG Side View



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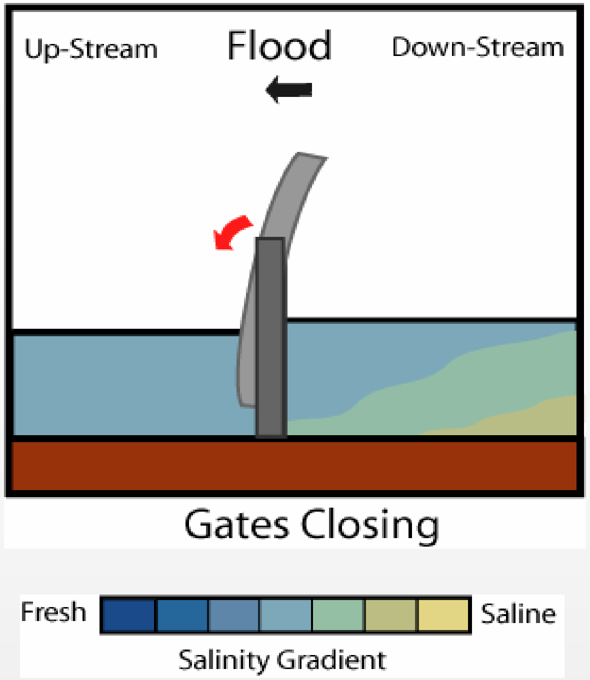
SMSCG Side View



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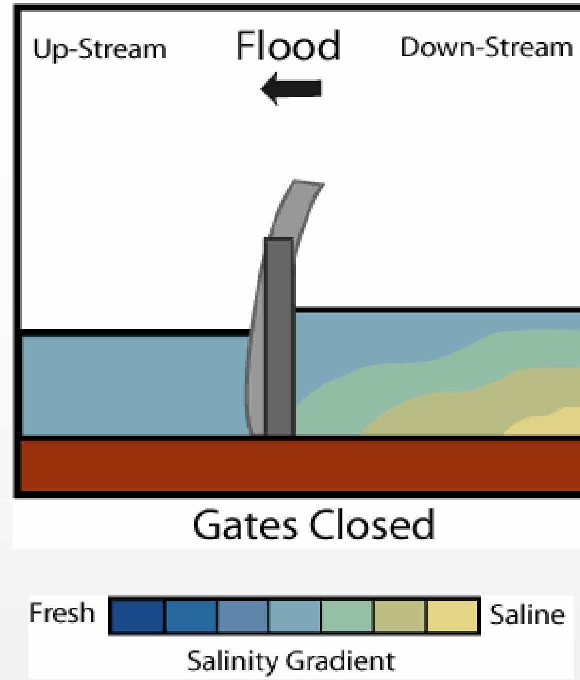
SMSCG Side View



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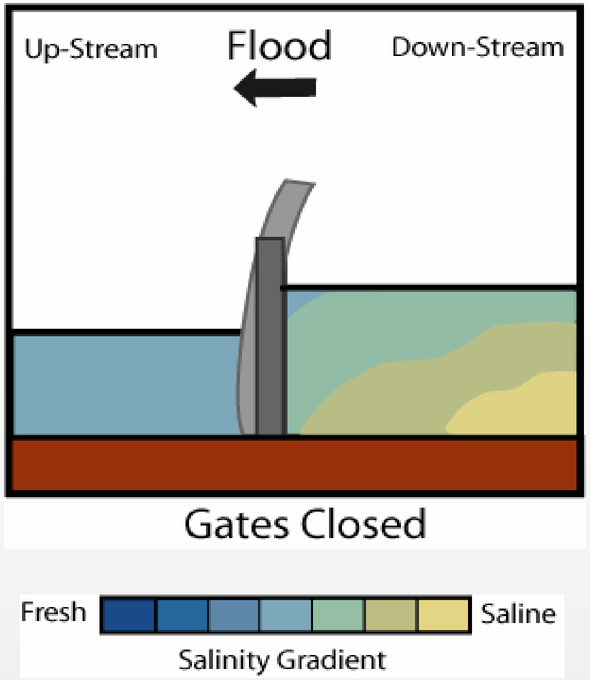
SMSCG Side View



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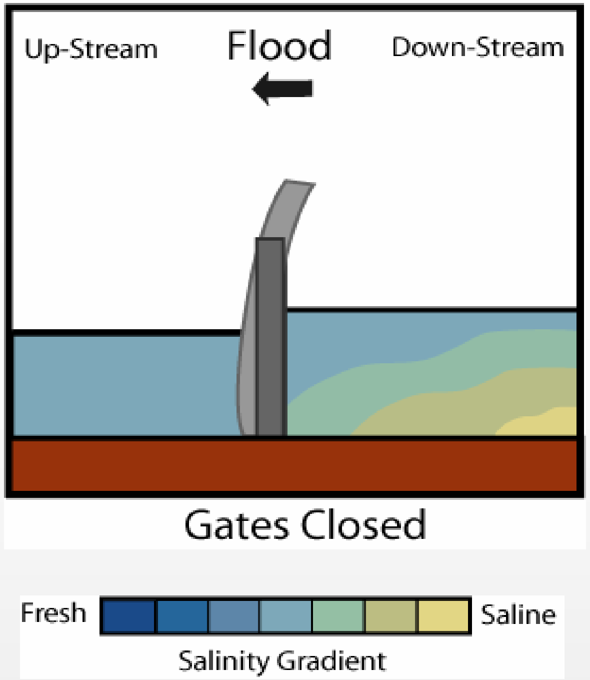
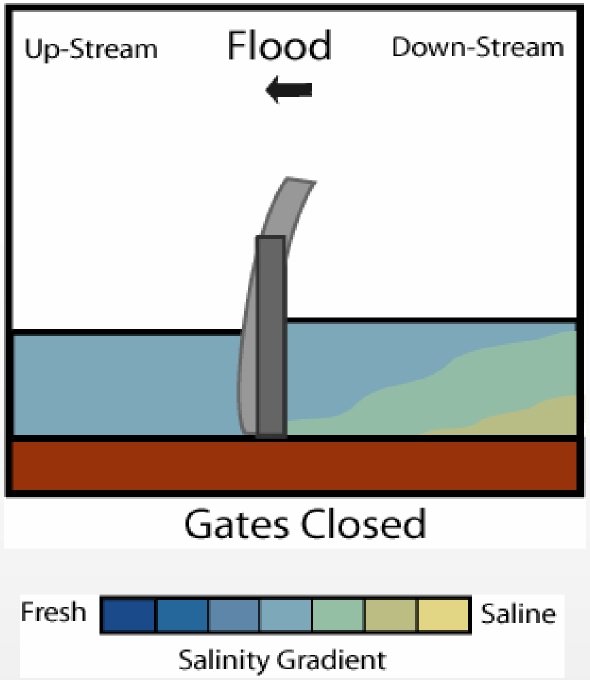
SMSCG Side View



SMSCG Side View



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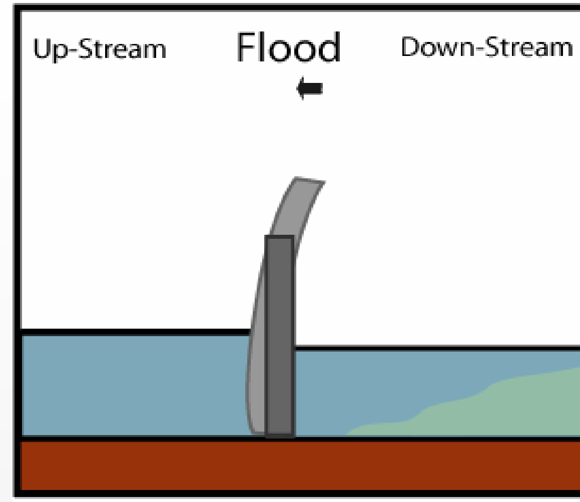
SMSCG Side View



Gates Closed

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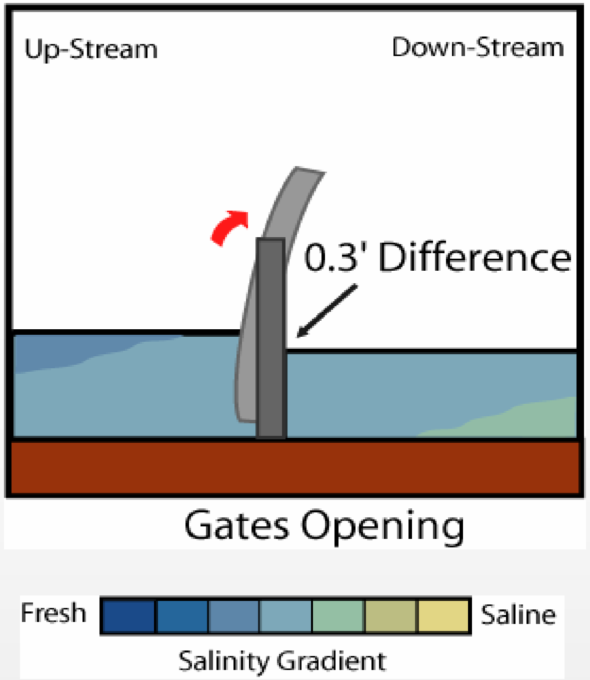
SMSCG Side View



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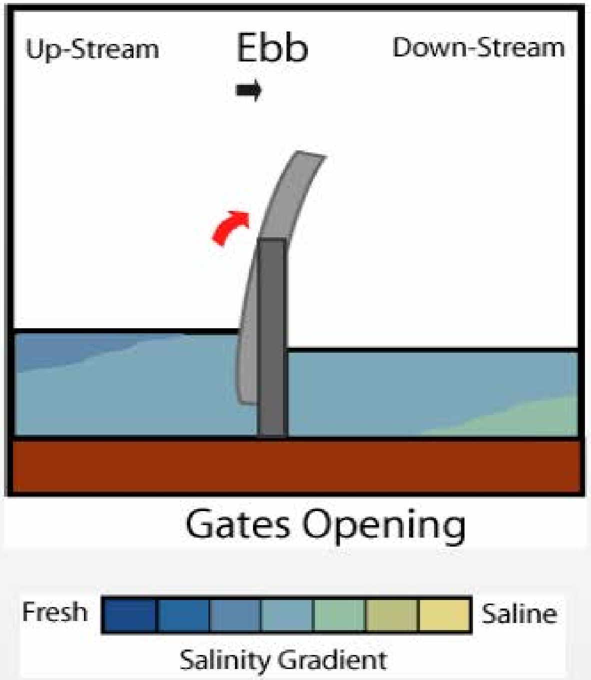
SMSCG Side View



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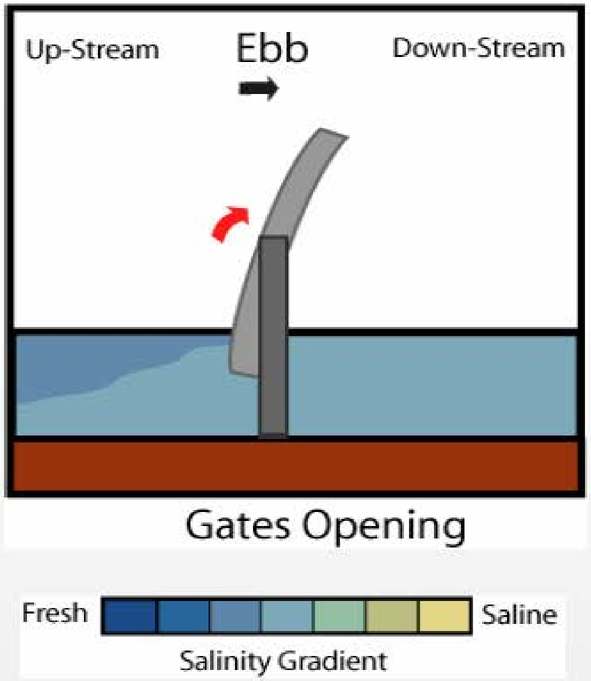
SMSCG Side View



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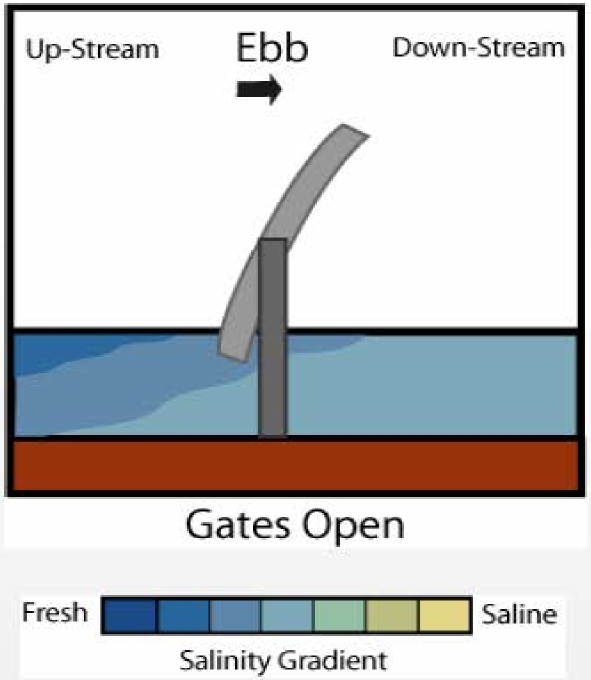
SMSCG Side View



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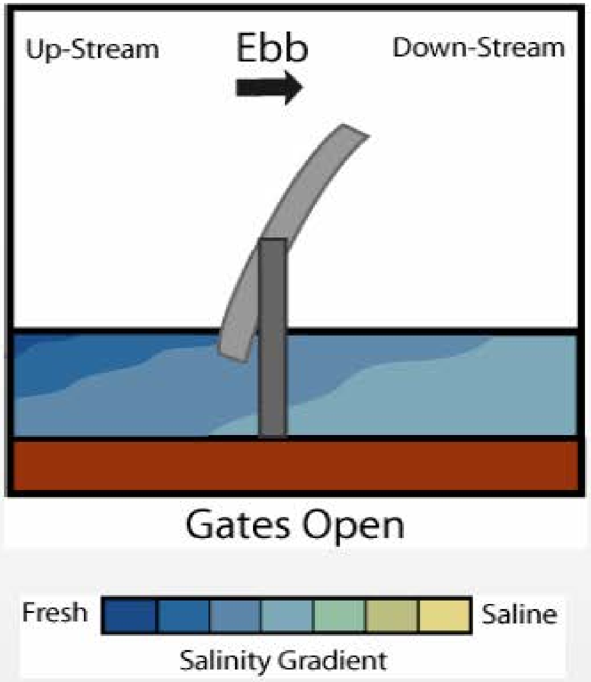
SMSCG Side View



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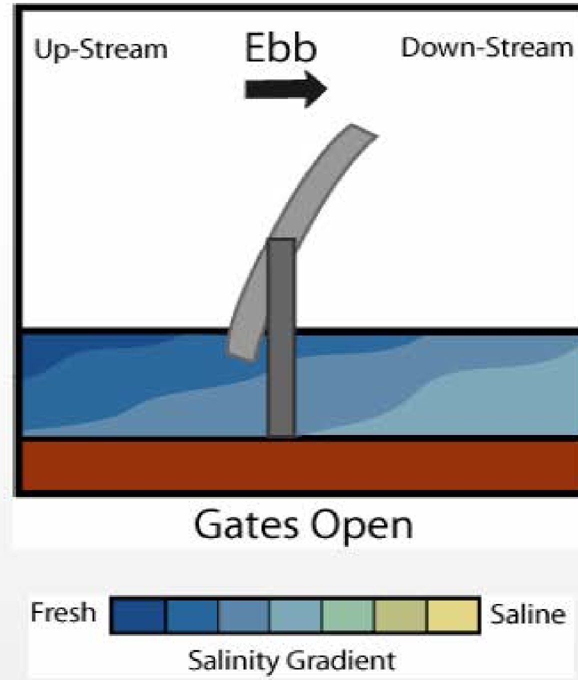
SMSCG Side View



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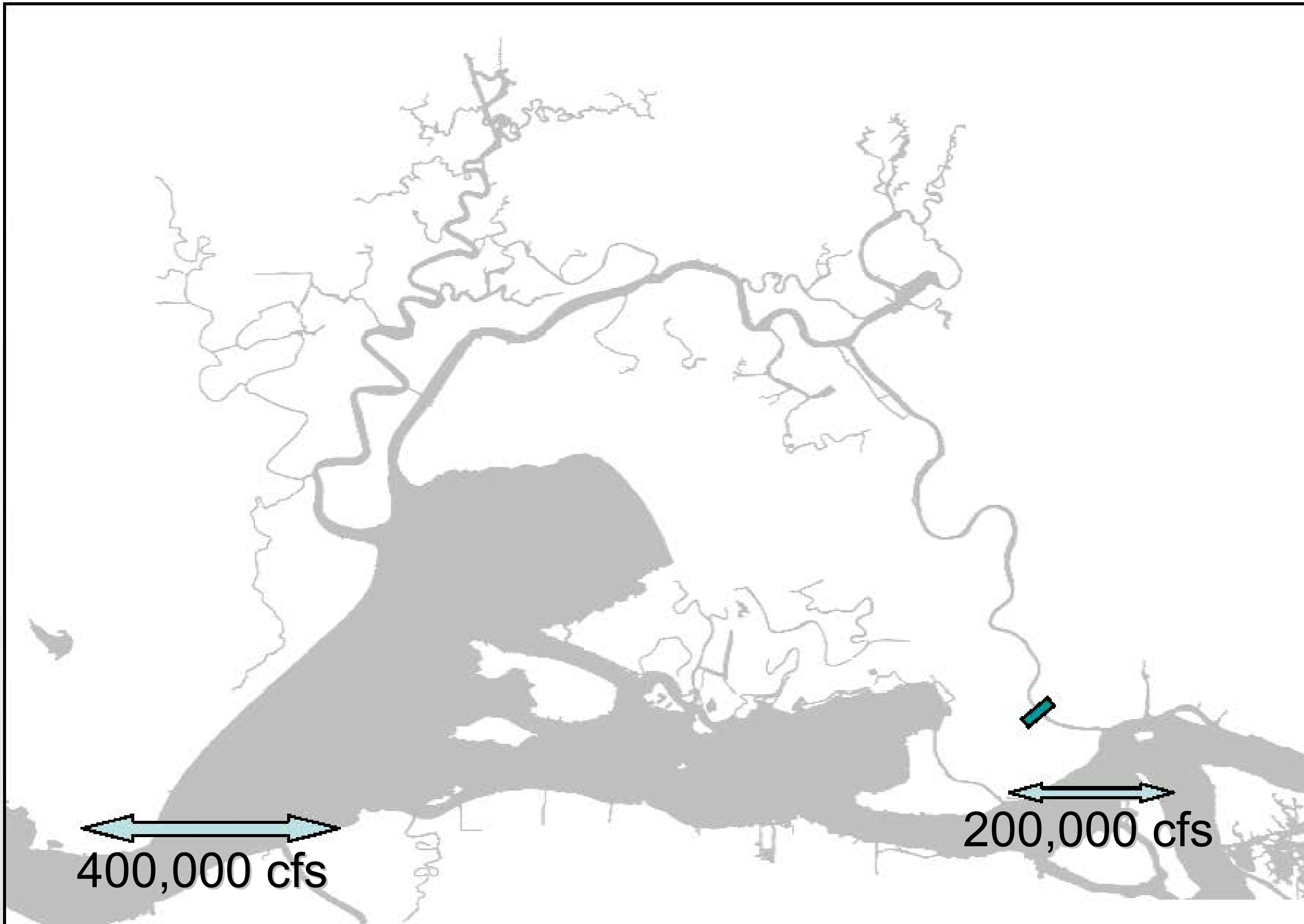
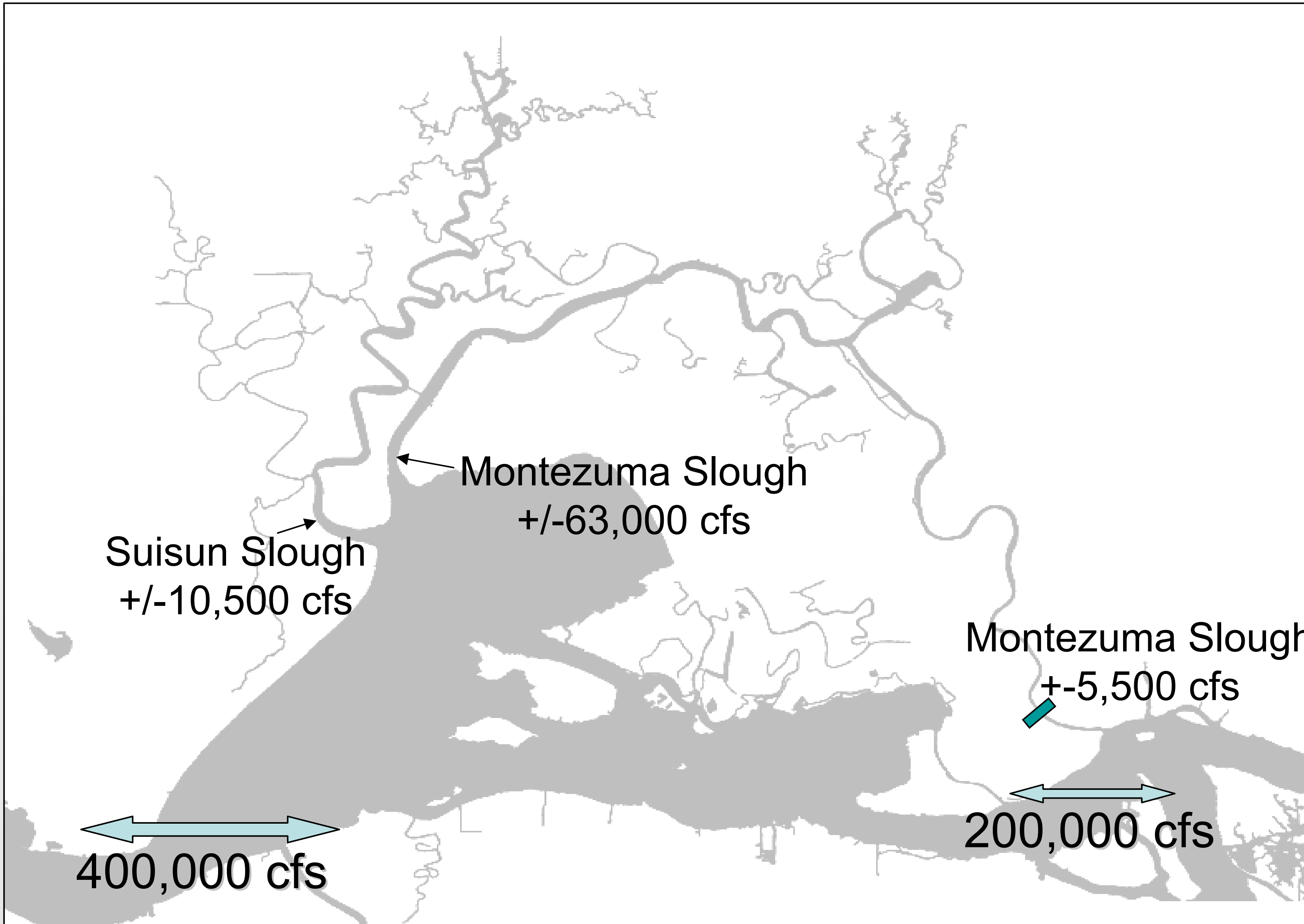
Tidal Time Scale Flows



Tidal Time Scale Flows



Tidal Time Scale Flows

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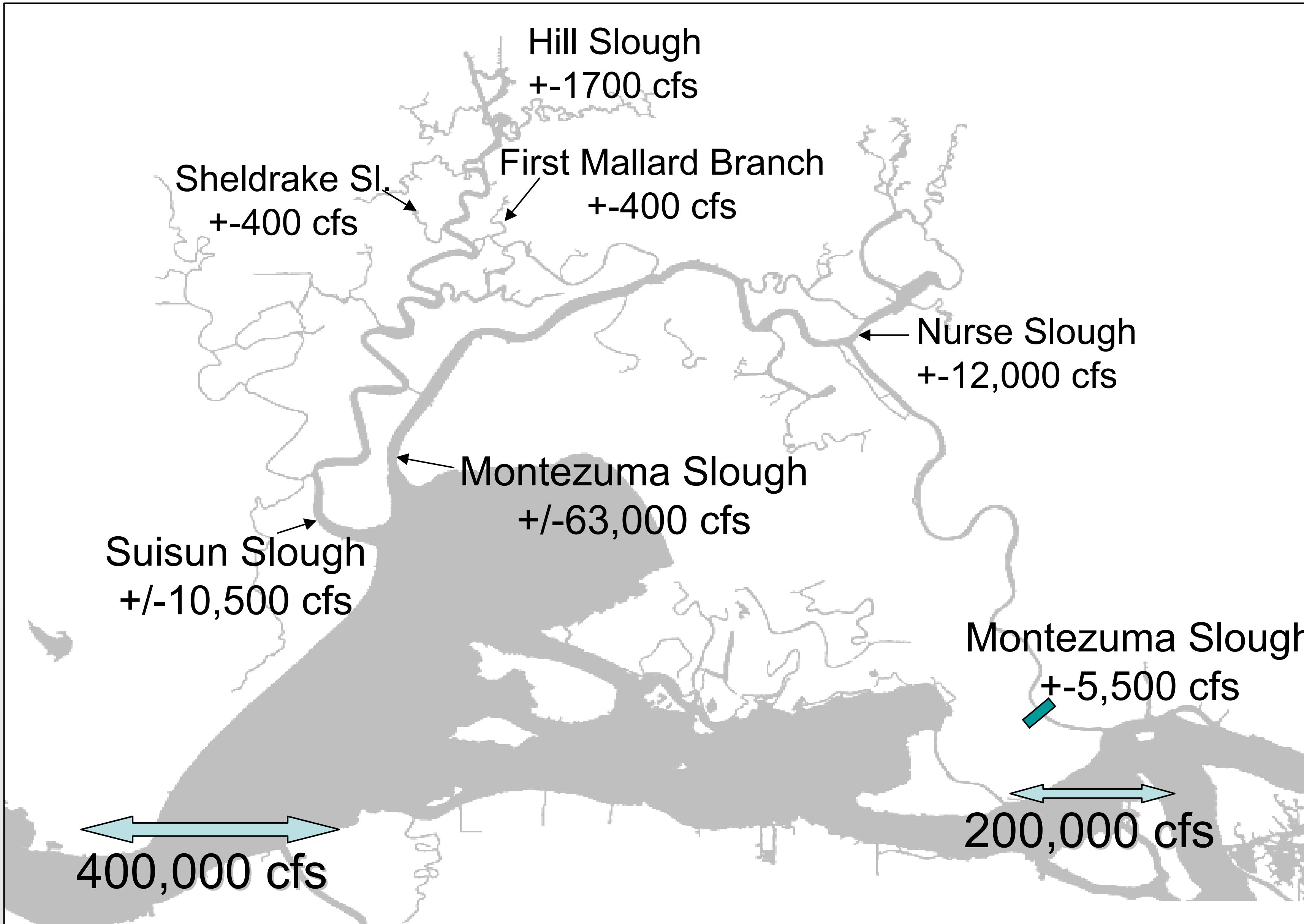

Tidal Time Scale Excursion

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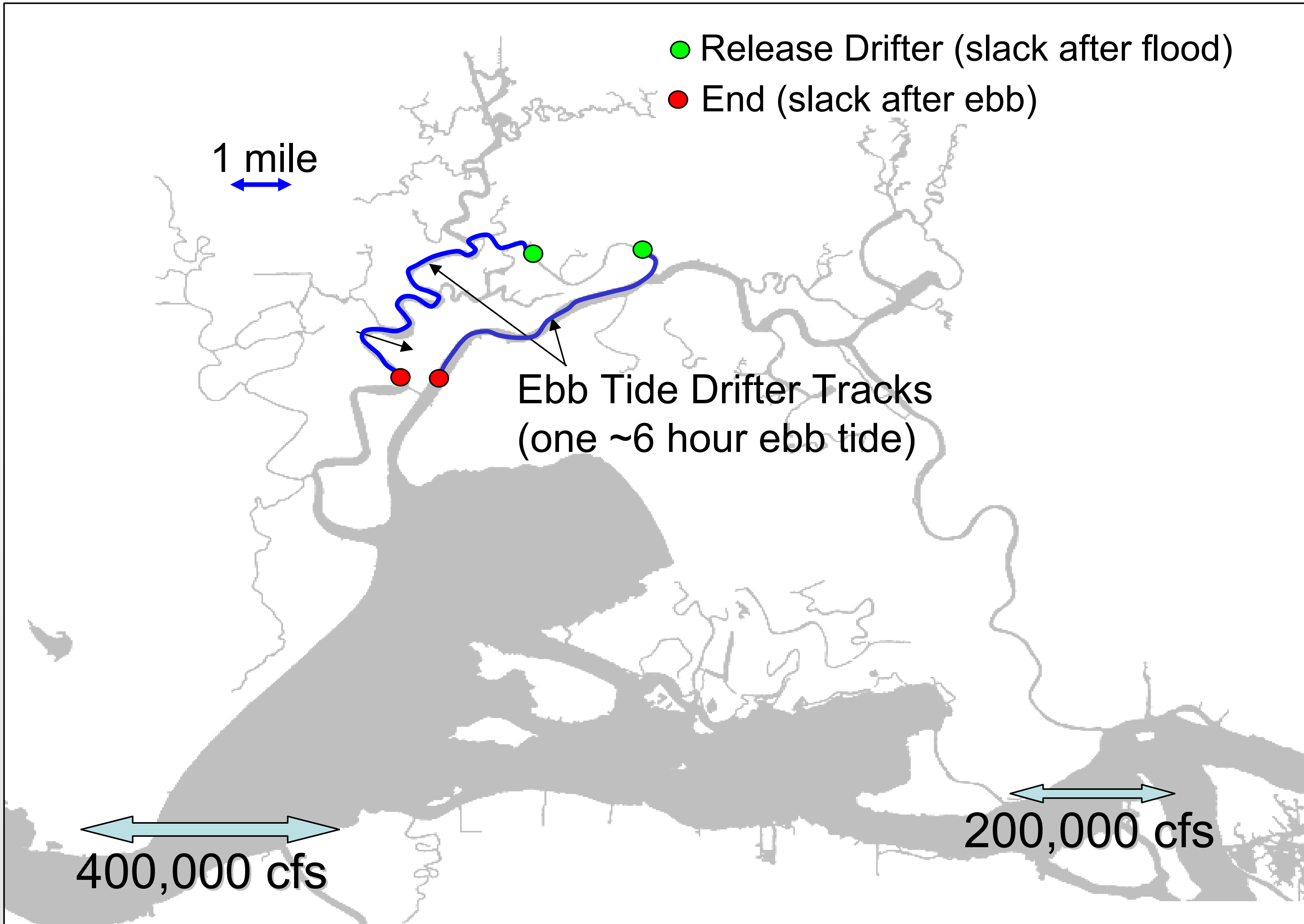
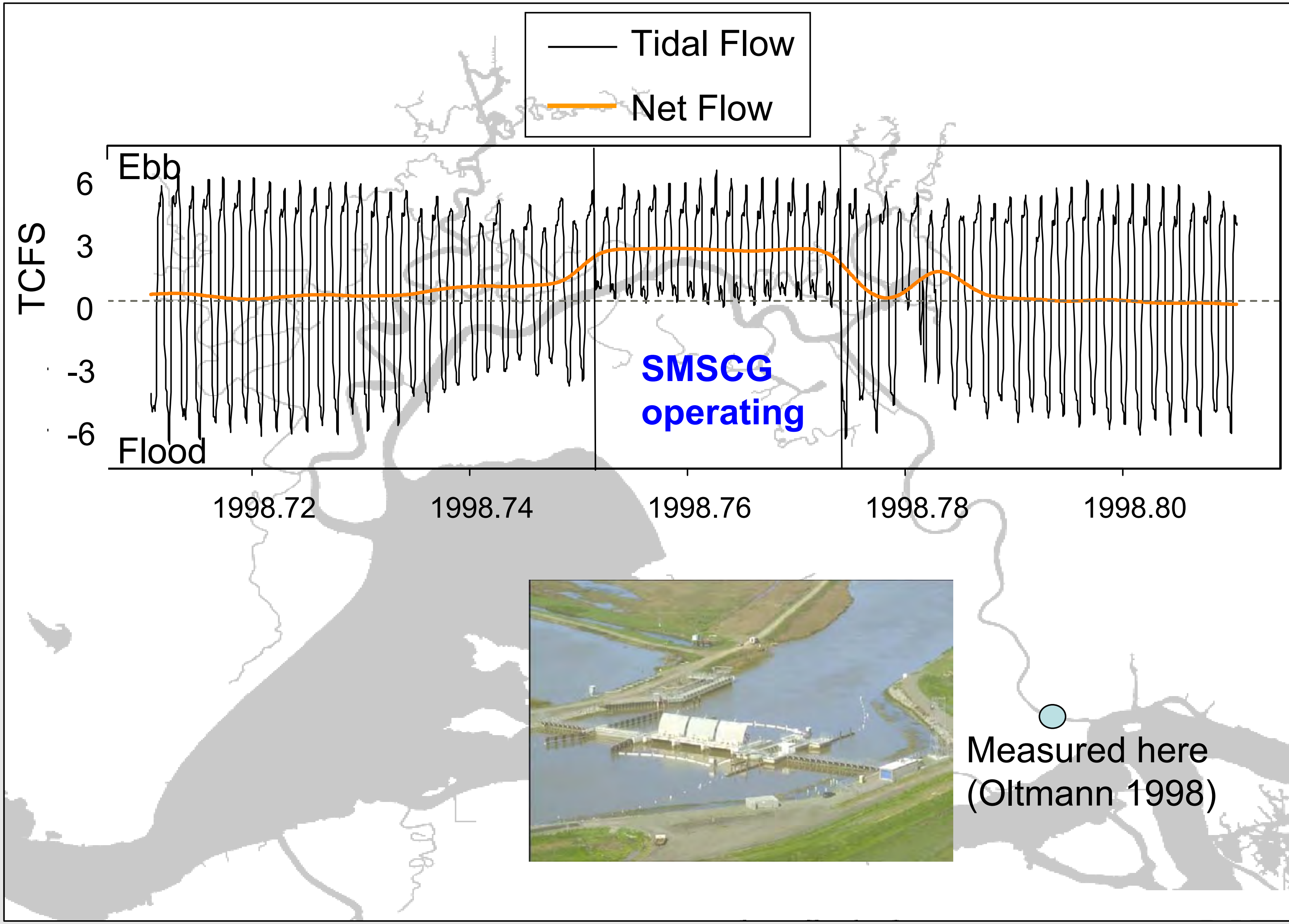
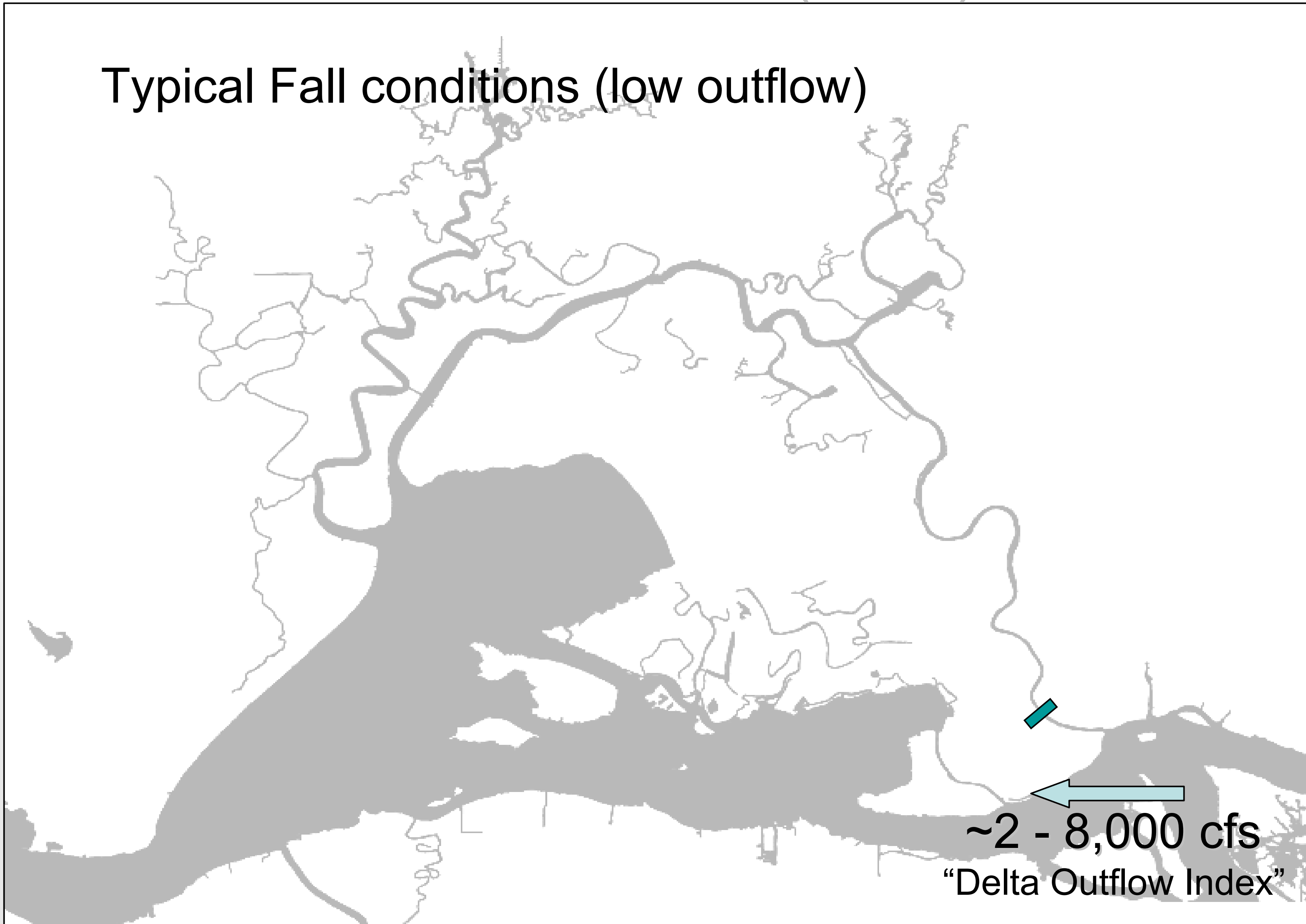


Tidal Time Scale Flows



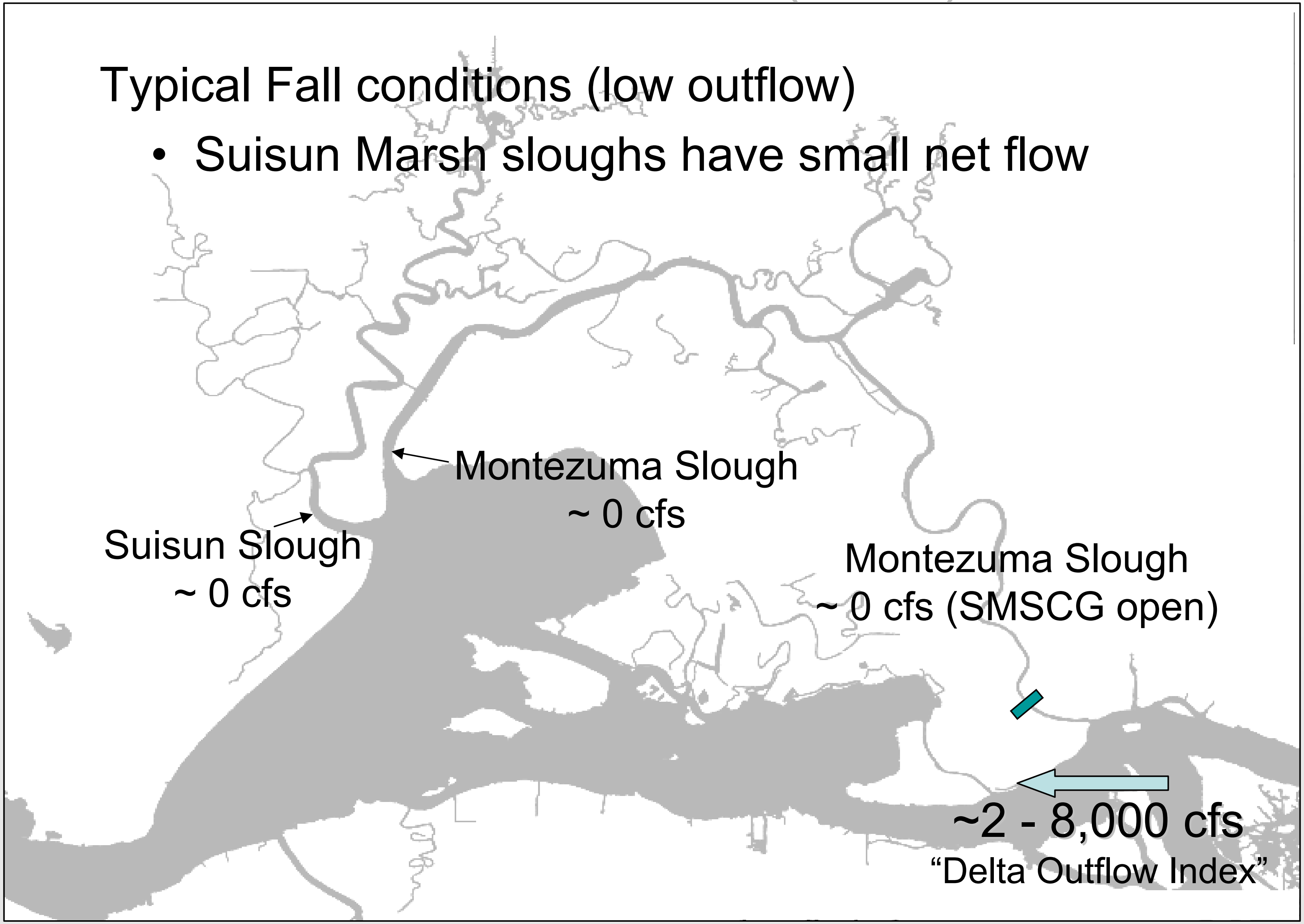
Sub-tidal Time Scale ("Net") Flows



Sub-tidal Time Scale ("Net") Flows

Typical Fall conditions (low outflow)

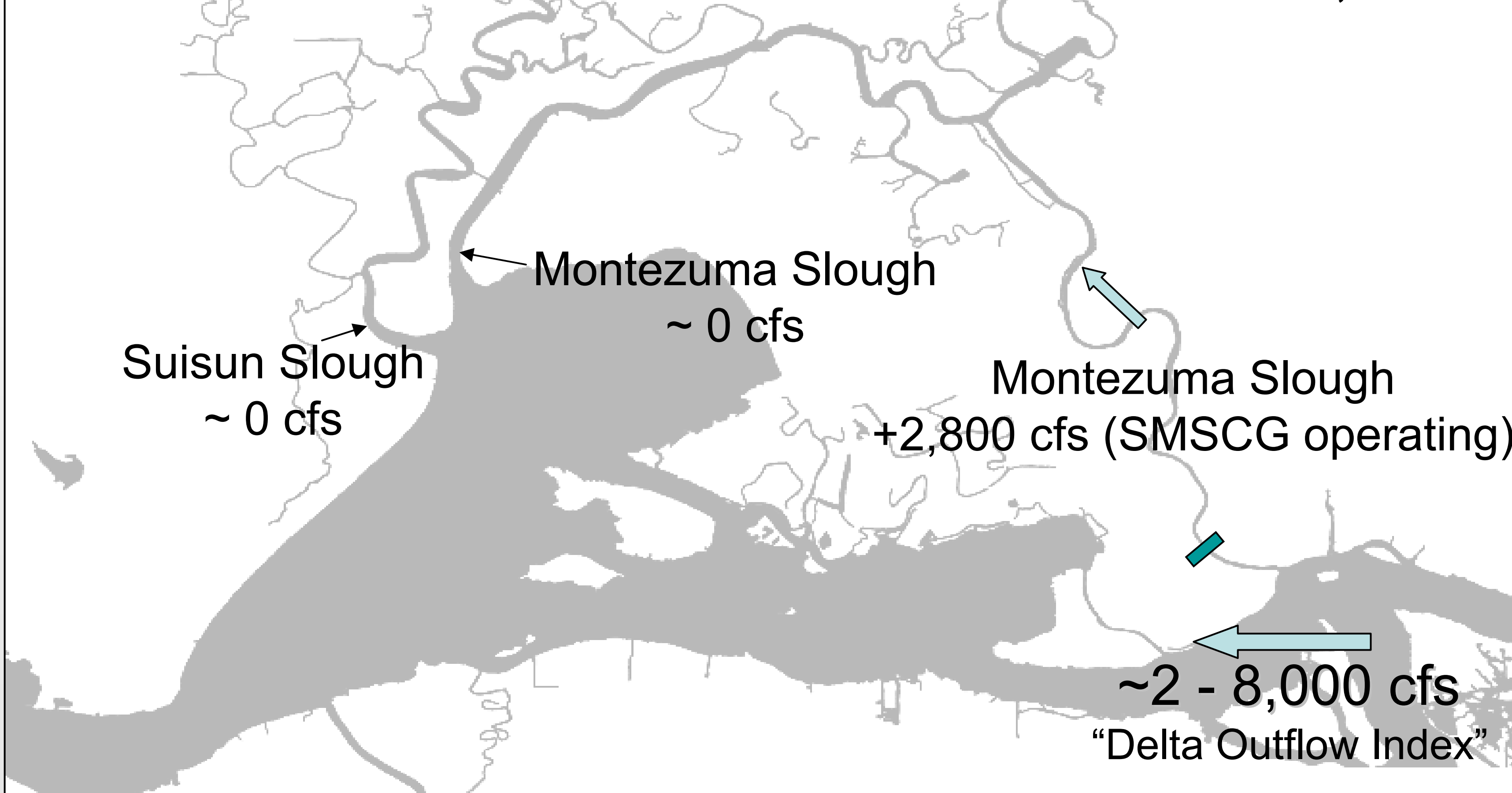
- Suisun Marsh sloughs have small net flow



Sub-tidal Time Scale ("Net") Flows

Typical Fall conditions (low outflow)

- Suisun Marsh sloughs have small net flow
- SMSCG induces net downstream flow of ~ 2,800 cfs



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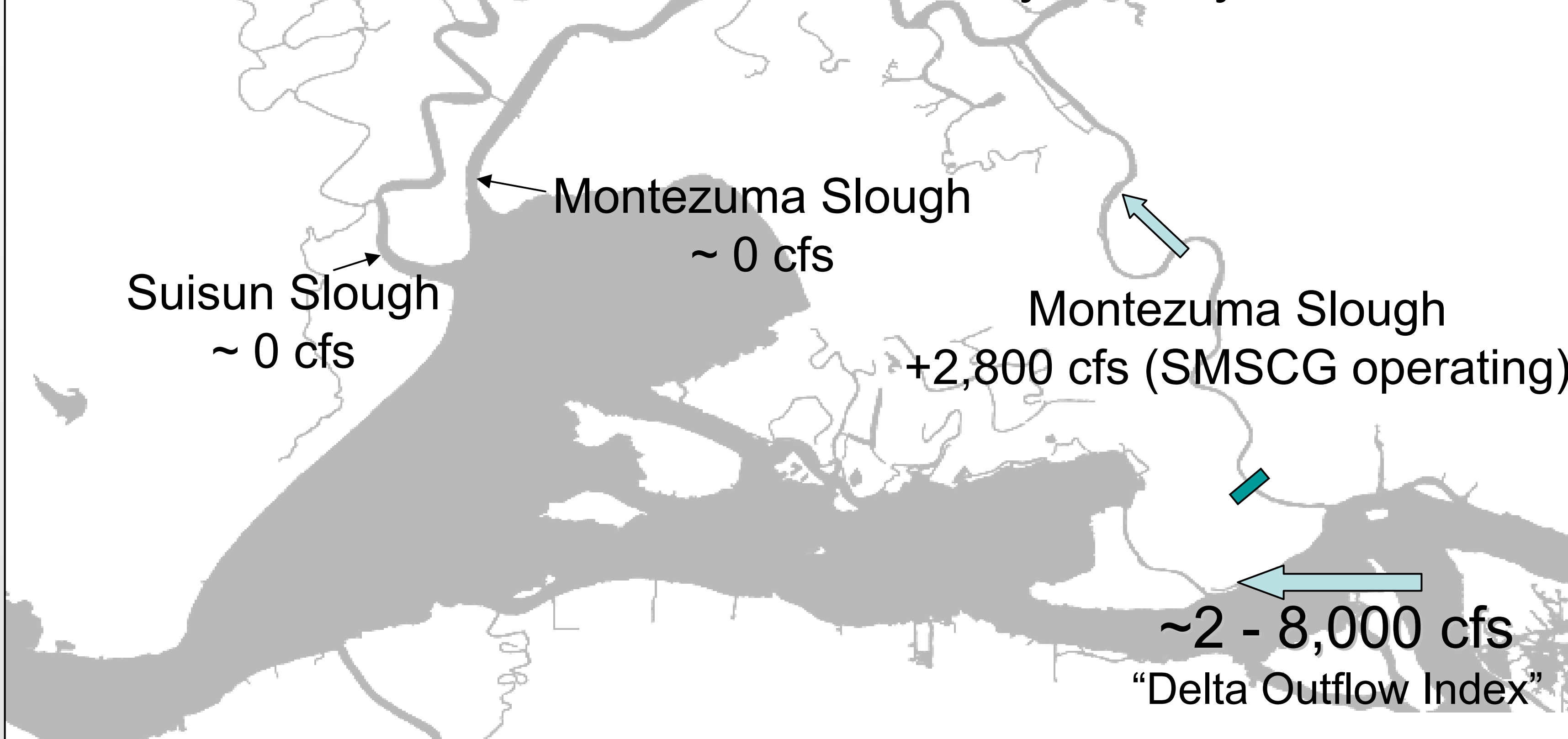
Sub-tidal Time Scale ("Net") Flows

Typical Fall conditions (low outflow)

- Suisun Marsh sloughs have small net flow
- SMSCG induces net downstream flow of ~ 2,800 cfs
- SMSCG affects Marsh and Bay salinity field



Salinity Response to SMSCG Operation

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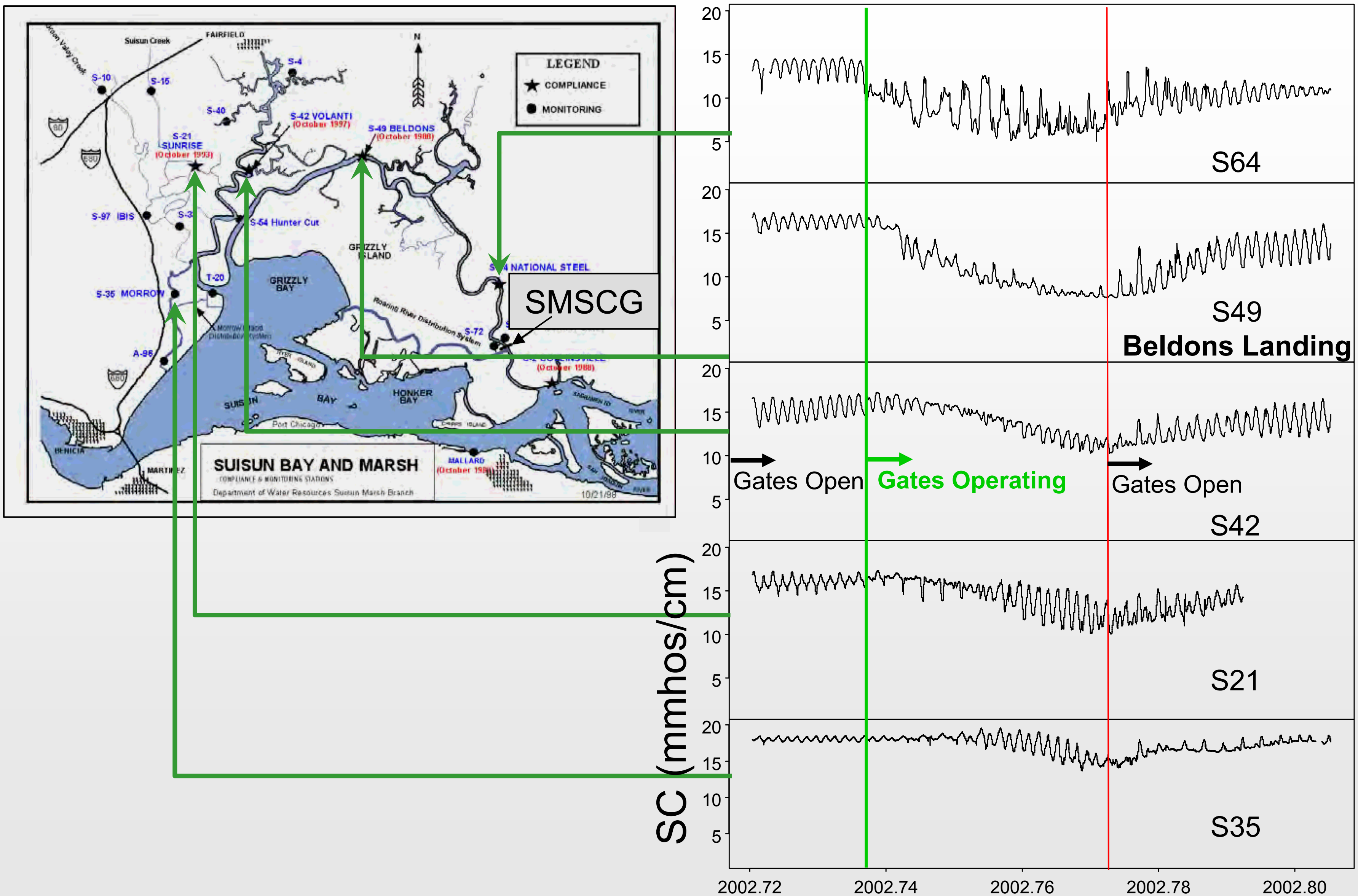
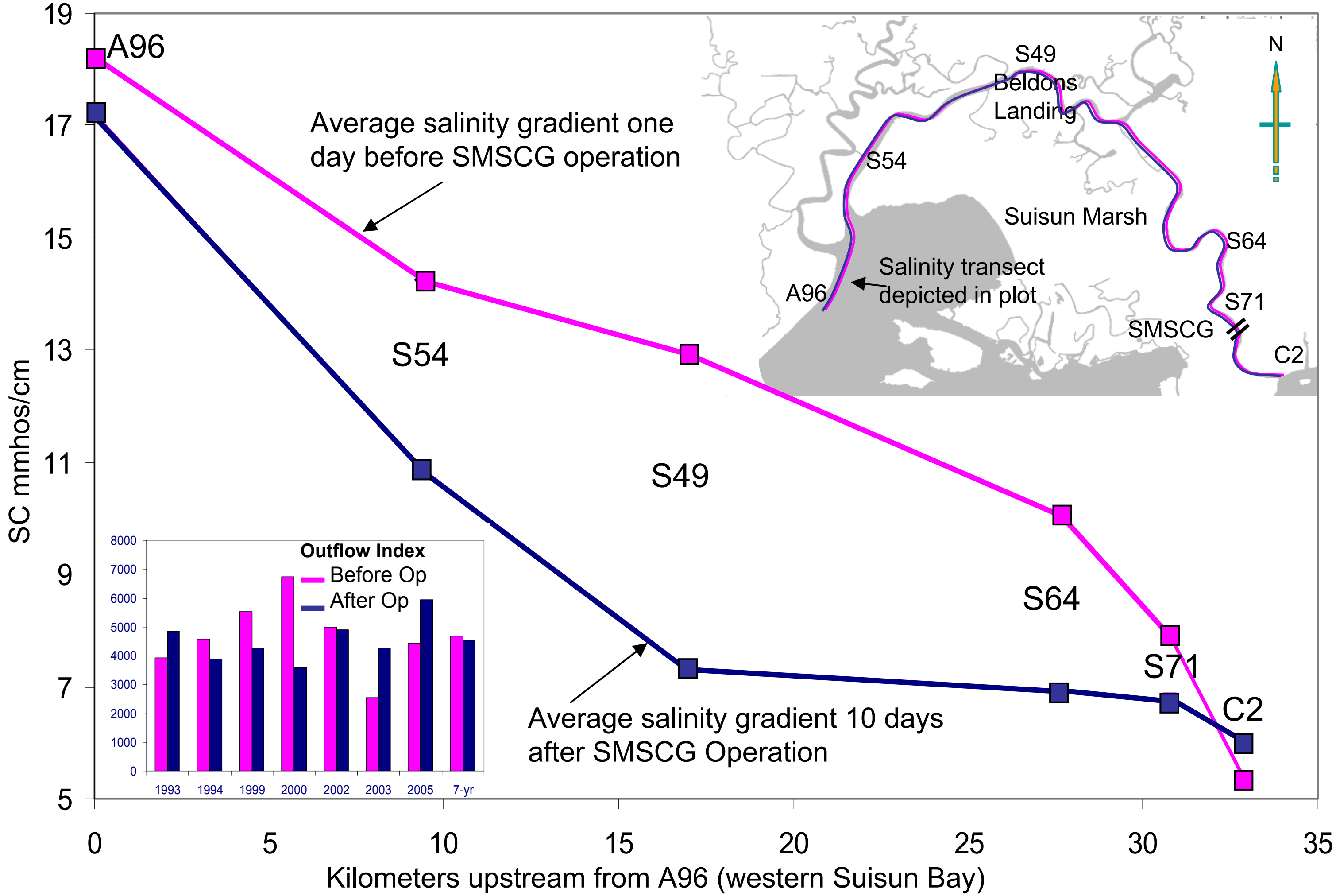
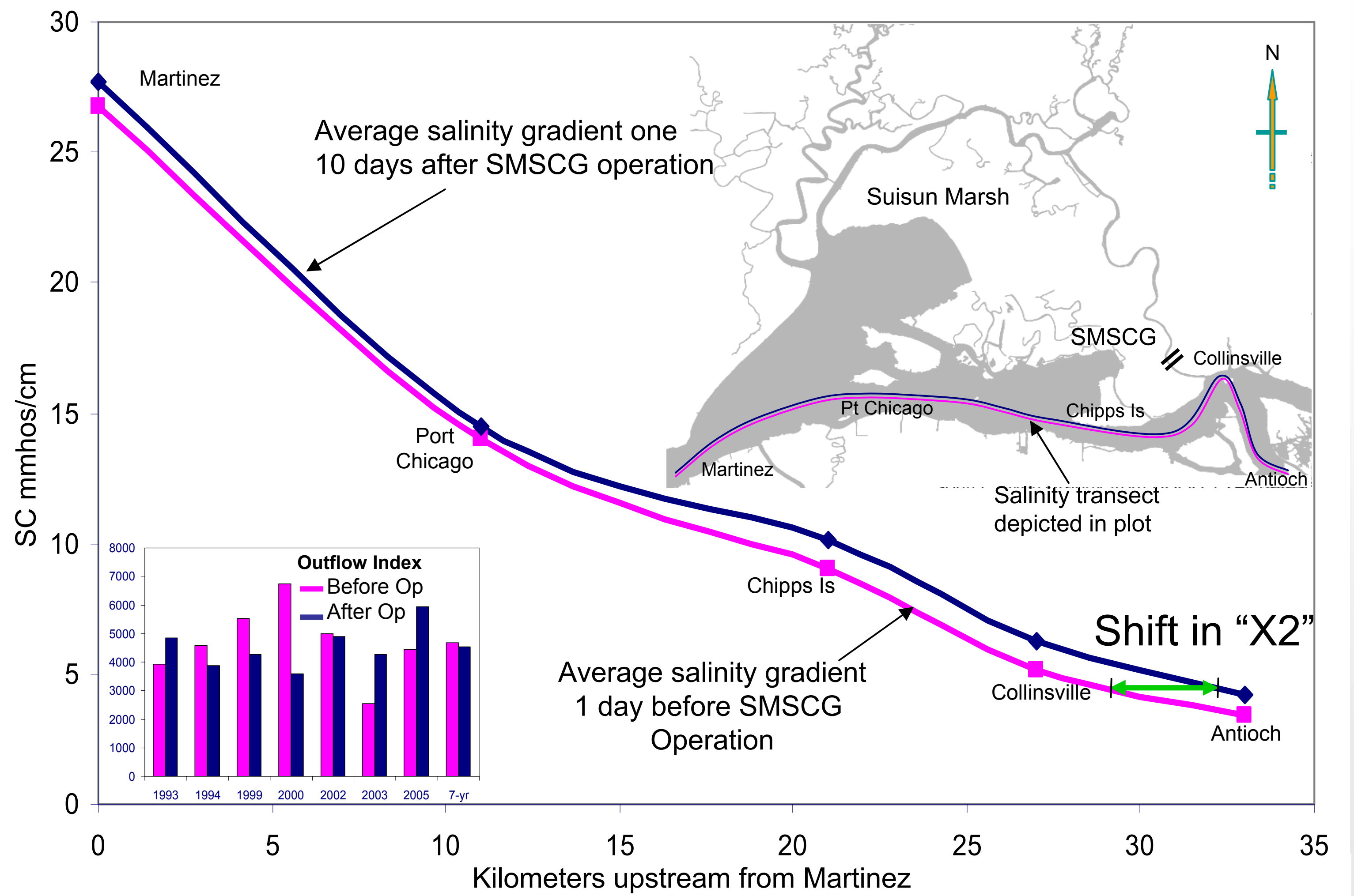


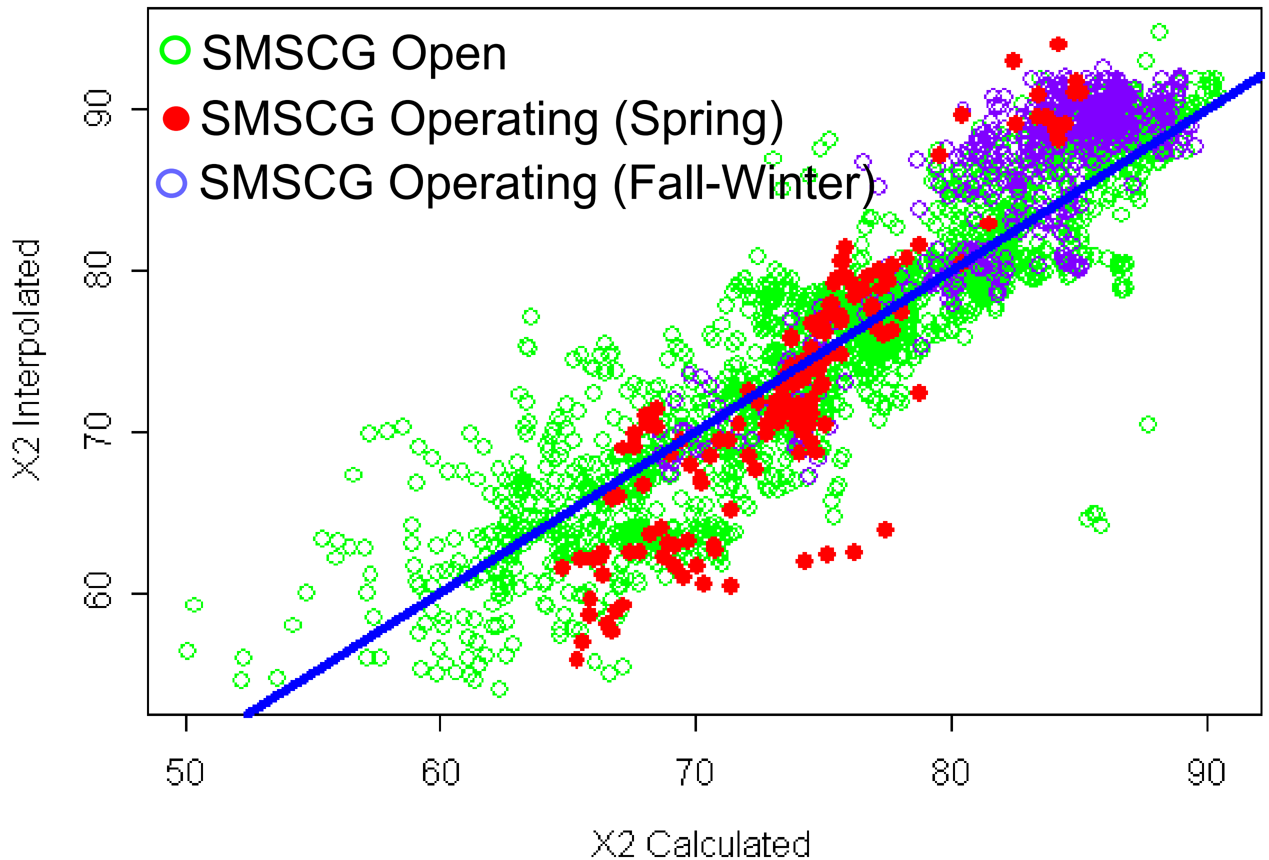
SMSCG effect on Montezuma Slough



SMSCG effect on Suisun Bay



Interpolated and Calculated X2: Effect of Suisun Marsh Gates



Courtesy Wim Kimmerer

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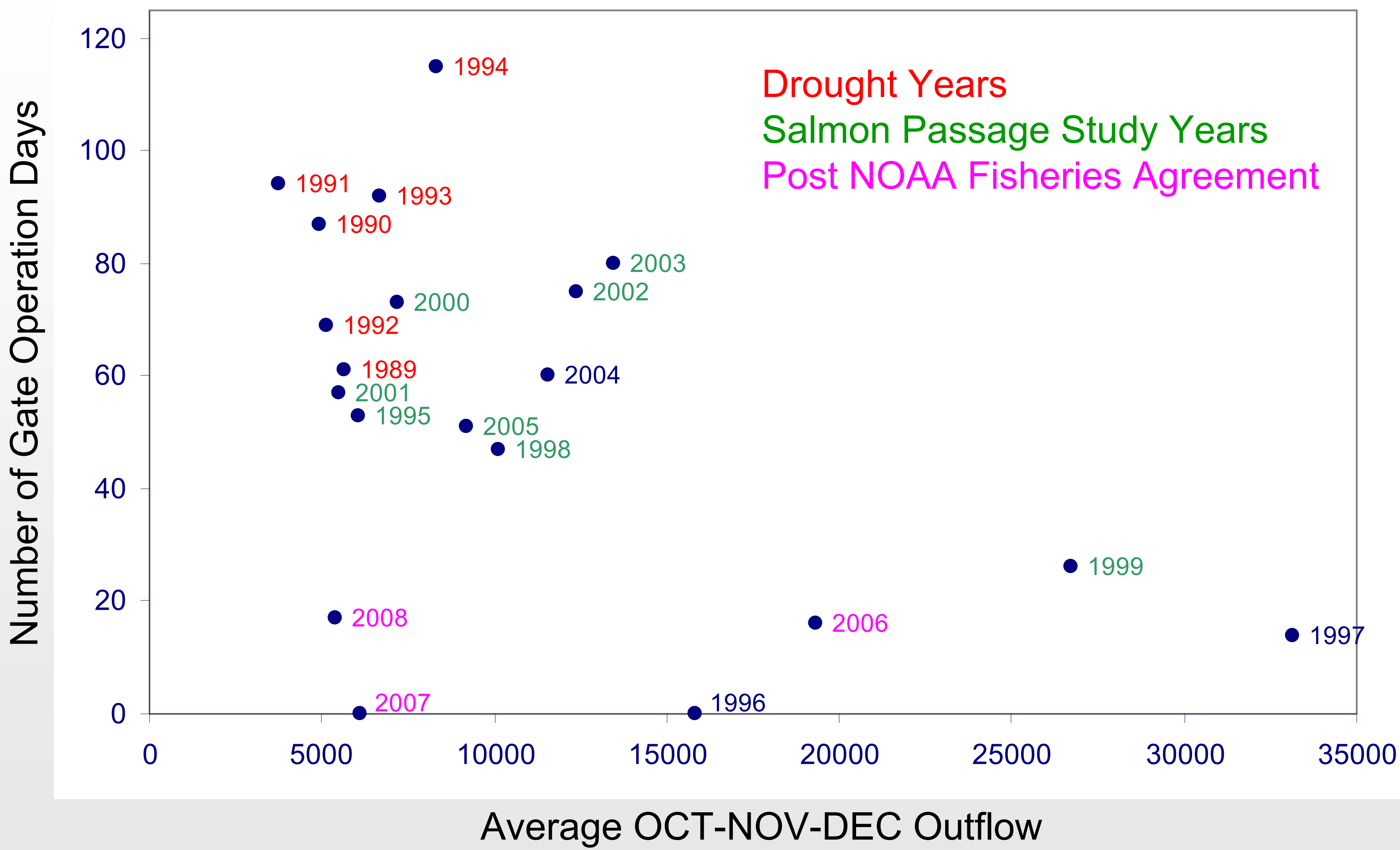
SMSCG Operation Frequency Versus Outflow



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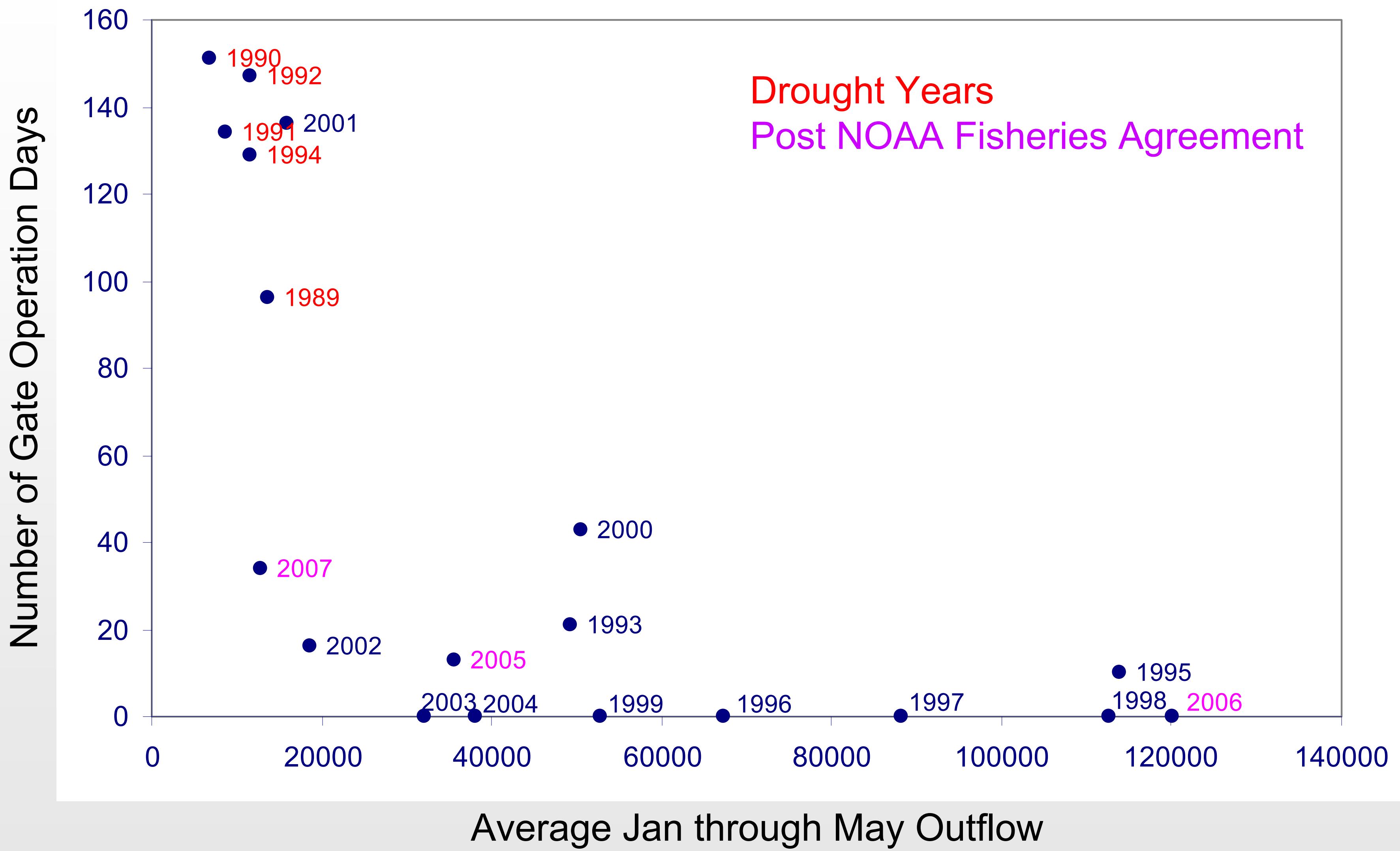
SMSCG Operation Frequency Versus Outflow



Thank You

- Paul Massera
- Jim Sung
- Kate Le
- Brad Tom

Attachment 16

Short-Term Agreement to Guide Implementation of Short-Term Water Management Actions to Meet Local Water Supply Needs and to Make Water Available to the SWP and CVP to Assist in Meeting the Requirements of the 1995 Water Quality Control Plan and to Resolve Phase 8 Issues

To avoid prolonged litigation and to promote better management of California's water resources the Upstream Water Users, Downstream Water Users, the California Department of Water Resources, the United States Bureau of Reclamation, the California Department of Fish & Game, and the United States Fish & Wildlife Service agree to the terms of this Short-Term Settlement Agreement.

1.0 Definitions:

1.1 "1995 Water Quality Plan" means the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary adopted May 22, 1995.

1.2 "Agreement" means this Short-Term Settlement Agreement.

1.3 "AOP" means the Annual Operating Plan to be developed pursuant to the provisions of Article 19.3 hereto.

1.4 "Capacity" as used in Articles 15 and 16 hereto means having the physical capability to produce the volumes of water projected for the respective projects during a designated period of time.

1.5 "CVP" means the Federal Central Valley Project, California.

1.6 "D-1641" means the State Water Resources Control Board Water Rights Decision 1641, dated March 15, 2000.

1.7 "DF&G" means the California Department of Fish and Game.

1.8 "DWR" means the California Department of Water Resources.

1.9 "Downstream Water Users" means collectively the Contra Costa Water District, the State Water Project contractors, and the Central Valley Project contractors that receive water from the Banks or Tracy pumping plants.

1.10 "Effective Date" means the date by which all parties to the Stay Agreement execute this Agreement, but no sooner than December 20, 2002.

1.11 "Long-Term Projects" means projects developed pursuant to the Program that will be implemented under contracts that will have a term that exceeds the ten-year term for Short-Term Projects.

1.12 "Long-Term Settlement Agreement" means the agreement among the Parties dealt with in Article 6.3.

1.13 "Management Committee" means the committee formed pursuant to the provisions of Article 19.1 hereto.

1.14 "Operation and Maintenance" or "O&M" costs means those costs necessary for upkeep, power, operation and environmental mitigation of that portion of fixed assets dedicated to the Program and recurring costs or payments required to obtain consents necessary to make water available under this Agreement. O&M costs will exclude general district overhead charges.

1.15 "Out-of-Pocket Costs" means the incremental costs incurred by a district pursuant to the provisions of Article 16.5.3 to acquire water when the fixed assets of the Short-Term Workplan projects are inadequate to meet the objectives specified in Article 2.0.

1.16 "Parties" or "Parties to this Agreement" means the Upstream Water Users, Downstream Water Users, DWR, Reclamation, DF&G, and USFWS.

1.17 "Phase 8" means the eighth phase of SWRCB water rights hearings associated with allocation of responsibility to meet the objectives in the 1995 Water Quality Control Plan.

1.18 "Program" means the Sacramento Valley Water Management Program described in Article 4.0 hereto.

1.19 "Reclamation" means the United States Bureau of Reclamation.

1.20 "Remedial Workplan" means the workplan described in Article 19.2.4 hereto.

1.21 "Settlement Water" means the water developed from the 92,500 acre feet of Capacity described in Article 15.1 that will be made available for the purposes set forth in Article 16.2.

1.22 "Short-Term Project Implementation Agreement" means the agreements between Upstream Water Users, DWR and Reclamation as specified in Article 6.2 hereto.

1.23 "Short-Term Projects" means projects developed pursuant to the Program that will be implemented under contracts, or through other appropriate arrangements, that will have a term not to exceed ten years.

1.24 "Short-Term Workplan" means the workplan first completed on October 26, 2001 that identified integrated water management projects that will enhance the Upstream Water Users', Downstream Water Users', DWR's and Reclamation's ability to use their existing supplies to meet their existing and future needs and enhance their water management flexibility as it may be augmented over time.

1.25 "Sites Reservoir" means the North of Delta Offstream Surface Water Storage Reservoir generally dealt with in the so-called "Sites Memorandum of Understanding" executed in November 2000, and in the August 28, 2000 CALFED Bay Delta Program Programmatic Record of Decision.

1.26 "Stay Agreement" means the "Agreement Regarding Resolution of Phase 8, Development and Management of Water Supplies, and a Binding Commitment to Proceed Pursuant to Specified Terms" entered into by DWR, Reclamation Mid-Pacific Region, State Water Contractors, San Luis & Delta-Mendota Water Authority, Contra Costa Water District, and Northern California Water Association effective April 26, 2001.

1.27 "SWP" means the California State Water Project.

1.28 "SWRCB" means the California State Water Resources Control Board.

1.29 "Technical Measurement and Monitoring Committee" means the committee formed pursuant to the provisions of Article 19.2 hereto.

1.30 "Upstream Water Users" means those individuals and entities that possess water rights or are water users within the watershed of the Sacramento River and its tributaries, who execute this Short-Term Settlement Agreement by December 15, 2002 or who execute Short-Term Project Implementation Agreements consistent with Article 13.1.

1.31 "USFWS" means the United States Fish and Wildlife Service.

2.0 **Statement of Intent.** In the implementation of this Agreement, the Parties intend to further the following objectives:

2.1 To implement and accomplish the goals and principles of the Stay Agreement, including meeting the flow-related objectives of D-1641, thereby avoiding the need to litigate Phase 8 issues.

2.2 To implement a series of Short-Term Projects, owned and operated by Upstream Water Users, that will: (i) meet unmet demands in the Sacramento Valley, and (ii) provide at least 92,500, and up to 185,000 acre-feet of water to augment SWP and CVP water supplies during certain year types. The objectives described in 2.2(i) and 2.2(ii) will be accomplished in a manner that does not adversely impact water supplies that would, in the absence of this Agreement, otherwise be available to the SWP, CVP, or Upstream Water Users.

2.3 To develop and implement monitoring programs that will provide the necessary technical information to ascertain whether the Short-Term Projects are meeting the objectives set forth in subparagraph 2.2.

2.4 To establish milestones for developing the Long-Term Workplan and a Long-Term Settlement Agreement that will enable the parties to fully meet the terms and conditions of the Stay Agreement.

2.5 To provide procedures to implement remedial actions as necessary to meet these objectives.

2.6 To jointly secure funding for Program implementation.

3.0 **Integration and Coordination.** Except as specifically modified by this Agreement, the Stay Agreement is incorporated herein by reference. The Stay Agreement allowed the SWRCB to issue an order staying Phase 8 of the Bay-Delta water rights hearings, thereby allowing the Parties to work together to develop programs that, if implemented successfully, will avoid the adversarial Phase 8 or similar proceedings. The Stay Agreement was the first of anticipated successive agreements, including this Agreement.

4.0 Sacramento Valley Water Management Program. The Sacramento Valley Water Management Program is an integrated effort by the Upstream Water Users to provide water as a mechanism for meeting the "Goals and Principles" established in the Stay Agreement and the objectives of Article 2.0 of this Agreement and to implement the workplans described in Articles 5.0 and 7.0. The governing boards of directors of the parties to Short-Term Project Implementation Agreements, or their ultimate decision-makers, will retain the final authority to approve or disapprove all subsequent project-specific agreements associated with the Program.

5.0 Short-Term Workplan. Notwithstanding the definition of "short-term projects" provided in the Stay Agreement, the term "Short-Term Project" will hereinafter have the meaning provided in Article 1.22 hereto. In this regard, consistent with the provisions of Article 5(a) of the Stay Agreement, the Parties have developed and approved a Short-Term Workplan related to Short-Term Projects. The Short-Term Workplan, which has been modified, now includes groundwater management and planning, conjunctive management, reservoir re-operation, system improvement and other projects, and may be further augmented and amended as other Short-Term Projects are identified. The Short-Term Workplan, as augmented, will serve as the technical basis for implementing the Program and the Short-Term Projects.

6.0 Successive Agreements. Implementation of the Short-Term Workplan projects and the full Program may involve three types of agreements in addition to the Stay Agreement, which are:

6.1 Short-Term Settlement Agreement. This Agreement is intended to provide guidance for the development of "Short-Term Project Implementation Agreements" and, in this context, guide the implementation of short-term water management actions and projects to meet local water supply needs and to make water available to the SWP and CVP, which, for the purposes of the Short-Term Settlement Agreement, will be jointly responsible for meeting the Sacramento River and its tributaries portion of flow-related requirements of D-1641.

6.2 Short-Term Project Implementation Agreements. Short-Term Project Implementation Agreements will be executed between a local sponsoring Upstream

Water User(s) and DWR and Reclamation. Short-Term Project Implementation Agreements will be executed and implemented in a manner consistent with the provisions of this Agreement. Each Short-Term Project Implementation Agreement will have a provision that both ratifies and incorporates by reference the Stay Agreement and this Agreement. Each Short-Term Project Implementation Agreement will control as to the specific year types and the time when water will be made available and the monitoring program that will be implemented to evaluate the degree to which providing this water meets the objectives set forth in Article 2.0 hereto. Each Short-Term Implementation Agreement will have a provision that describes the ongoing obligation to operate, including terms and conditions associated with operation in the event that this Agreement terminates or the Long-Term Agreement is not executed. Each Short-Term Implementation Agreement that involves reservoir reoperation will include provisions relating to refill criteria. This Short-Term Settlement Agreement will not be interpreted to require any individual water user to provide water until it has executed a Short-Term Project Implementation Agreement. Notwithstanding the specific terms of any Short-Term Project Implementation Agreement, nothing in this Article 6.2 will affect the Upstream Water Users' collective obligation to develop projects to make the required Capacity and quantities of water available under Articles 15 and 16. The sole remedy for failure of the collective obligation will be termination of the Agreement pursuant to Article 11.

6.3 Long-Term Settlement Agreement. A Long-Term Settlement Agreement may be executed among the Parties to this Agreement. The Long-Term Settlement Agreement will be for a term that exceeds the term of this Agreement. Notwithstanding the definitions of "medium and long-term Projects" provided in the Stay Agreement, the term "Long-Term Projects" will hereafter have the meaning provided in Article 1.10 hereto.

7.0 Long-Term Workplan. Notwithstanding the milestones within the Stay Agreement, the workplan for Long-Term Projects is to be completed by March 31, 2005. Long-Term Projects may include projects that are the subject of Short-Term Project Implementation Agreements.

8.0 Additional Reservoir Storage. The Parties recognize that the mix of resources available and, consequently, the form and content of a Long-Term Workplan and a Long-Term Settlement Agreement, pursuant to the provisions of Articles 6.3 and 7.0, hereto, will depend upon whether Sites Reservoir, Enlarged Shasta Dam or other North of Delta surface water storage reservoir(s) are to be built. Accordingly, adherence to milestones and completion dates associated with the Long-Term Workplan and Long-Term Settlement Agreement may need to be adjusted depending on when decisions associated with these reservoirs are, in fact, made.

9.0 Signatories to the Agreement. This Agreement will be effective when all parties to the Stay Agreement execute it, but no sooner than December 20, 2002. This Agreement may be executed by any of the Upstream Water Users that elect to become signatories to this Agreement; provided, however, that such election will occur on or before December 15, 2002. The duty of each of the signatory Upstream Water Users to provide Block 1 or 2 water under Article 16 of this Agreement is expressly conditioned on the execution of a Short-Term Project Implementation Agreement by the Upstream Water User, as specified in Article 6.2.

10.0 Term. The term of this Agreement will be from the Effective Date of this Agreement until December 31, 2014, unless earlier replaced by a Long-Term Settlement Agreement, terminated as set forth in this Agreement and the Stay Agreement, or unless otherwise limited by applicable law.

11.0 Termination. Consistent with the Stay Agreement, this Agreement may be subject to early termination: (i) if the 1995 Water Quality Plan flow objectives are increased or decreased; (ii) if after annual review the Downstream Water Users, DWR or Reclamation determines the objectives of the Program are not being substantially achieved and cannot be revised to do so; or (iii) matters outside this Agreement or Program materially affect the Upstream Water Users' ability to implement this Agreement or the Program, including, without limitation, a failure to renew Sacramento River Settlement Contracts or renewal of such contracts on terms that make performance of this Agreement infeasible. If the USFWS or DF&G determines that its continued participation in this Agreement or successive agreements under Article 6.0 abridges or conflicts with its duties as a trustee or regulatory agency, the USFWS or DF&G may withdraw from this

Agreement after providing the Parties with written notice which allows at least thirty days to resolve the conflict. Withdrawal from the Agreement by USFWS or DF&G will not terminate this Agreement. Consistent with Article 27, issues that may give rise to termination of this Agreement will first be submitted to a mediator to attempt to resolve the issues and avoid termination.

12.0 Extension of Term of Stay Agreement. Article 6(a) of the Stay Agreement is hereby amended to extend the term of the Stay Agreement from December 31, 2010 until December 31, 2014, unless the Stay Agreement is earlier terminated as set forth in this Agreement and the Stay Agreement, or unless otherwise provided by applicable law.

13.0 Additional Milestones. The following are added to the Milestones set forth in Article 5 of the Stay Agreement, and are subject to the termination provisions found at Article 6(c) of the Stay Agreement.

13.1 The relevant parties will negotiate and execute the Short-Term Project Implementation Agreements in a timely manner, but in no case later than a date that will allow for implementation of projects sufficient to meet the schedule established in Article 15.2.

13.2 Notwithstanding the provisions of the Stay Agreement, the Parties will develop a Long-Term Workplan by March 31, 2005.

13.3 The Parties will negotiate and execute the terms of a Long-Term Settlement Agreement, either by amending this Agreement or executing a separate agreement by December 31, 2005.

14.0 Upstream Water Users' Ownership of Projects and Obligations.

14.1 Upstream Water Users' Ownership of Projects. Notwithstanding any other provision of this Agreement, the projects set forth in the Short-Term Workplan and the Short-Term Project Implementation Agreements are local projects to be locally developed and owned by Upstream Water Users. The termination of this Agreement or failure of the Parties to execute a Long-Term Settlement Agreement will have no effect on the ownership of projects by the respective Upstream Water Users. In that event, the respective Upstream Water Users will continue to control the water developed by those facilities subject to the continuing obligation to operate the projects under Articles 14.2 and 16.2.

14.2 Upstream Water Users' Obligations to Continue to Provide Water. In the event that this Agreement is terminated, or in the event a Long-Term Settlement Agreement is not executed, Reclamation and DWR at their discretion may, after consultation with the Downstream Water Users, elect to continue in effect one or more of the Short-Term Project Implementation Agreements, consistent with the provisions of those agreements, for a period not to exceed December 31, 2014. In the event of termination of this Agreement and an election by Reclamation and DWR to continue in effect a Short-Term Implementation Agreement, any Bay-Delta obligation imposed upon the Upstream Water User that continues project implementation to provide water to meet the 1995 Water Quality Plan, will be deemed satisfied during the period of time associated with the continued operation of such project. In the event that this election is not made, the Short-Term Project Implementation Agreement will be terminated.

14.3 Projects to Be Controlled by Upstream Water Users. A project sponsor will have the final decision-making role with respect to the manner in which it operates and manages Program projects to meet, consistent with the AOP as defined in Article 19.3, the requirements of this Agreement. In this regard, the Parties recognize that many of the Short-Term Projects are pilot projects that are intended to assist in determining their long-term capabilities. Consequently, if the Upstream Water User project sponsor determines, after consultation with the Management Committee, that development of water from these projects must be ceased or modified, such determination will be final, but the provisions of Article 14.4 will apply to the operation of that project.

14.4 Obligations in the Event Project Implementation is Ceased or Modified. In the event that a project sponsor, pursuant to the provisions of Article 14.3 of this Agreement, ceases project implementation or modifies the project in a manner that materially diminishes its benefits, and funding was obtained and utilized pursuant to Article 16.5 of this Agreement for the implementation of the project, the project sponsor will nonetheless be responsible to provide its allocated contribution of water sufficient to meet the Article 16.2 obligations; Provided that, if cessation of production or modification of project operation was caused by a legal limitation or documented material adverse impact on the affected groundwater basin, then there will be no further obligation under this sub-article 14.4 during the duration of these limitations. Nothing in this Article 14.4 will affect the Upstream Water Users' collective obligation to develop projects to make the required Capacity and quantities of water available under Articles 15 and 16 or to implement an AOP pursuant to Article 19.3.

15.0 Development of Project Capacity Necessary to Deliver Water and Related Schedule.

15.1 Development of Project Capacity. The Upstream Water Users will implement projects (i.e., the Program and Short-Term Workplan projects) with the Capacity to produce 185,000 acre-feet of water that would otherwise not be available in the Sacramento River. Unless otherwise agreed to in the Short-Term Implementation Agreements, for groundwater projects, this Capacity will be made available during the period June 1 to October 31, and for storage release projects, this Capacity will be made available during the period July 1 to September 30. The Short-Term Project Implementation Agreements may provide for a different delivery period based upon individual project circumstances. Up to 92,500 acre feet of this Capacity will be available as Settlement Water, for the purposes of Article 16.2 hereto. Up to 92,500 acre feet of this Capacity will be available for the purposes of Articles 16.1 and 16.3 hereto. The Parties will work together, including through the development of the Remedial Workplan provided for in Article 19.2.4 hereto, to optimize the benefits associated with the developed Capacity in order to provide 185,000 acre feet of water that otherwise would not be available in the Sacramento River to meet the purposes set forth in Article 16 in a manner consistent with the Article 2.0 objectives. Reclamation and DWR will coordinate operation of the CVP and SWP (and any other project under their respective control) to maximize the water supply benefits associated with developed Capacity under this Agreement and the Short-Term Project Implementation Agreements.

15.2 Schedule for Development of Project Capacity. The Upstream Water Users will develop Capacity necessary to meet the requirements of Article 15.1 on the following schedule:

- 50,000 acre-feet of Capacity by June 1, 2003

- 100,000 acre-feet of Capacity by June 1, 2004
- 185,000 acre-feet of Capacity by June 1, 2005

The Capacity dedicated from Program projects on June 1, 2012 will decrease to that needed to provide 135,000 acre feet and will reduce further on June 1, 2013 to that needed to provide 85,000 acre feet.

15.3 Transition to Long Term Agreement. After the execution of the Short-Term Implementation Agreements, as provided for in Articles 6.2 and 13.0(a), any new Upstream Water Users' projects will be considered projects to be included within the Long-Term Workplan and subject to the Long-Term Workplan. To the extent that water developed from these projects is available prior to the execution of the Long-Term Settlement Agreement, then that water will be devoted first to the actions that may be necessary to address problems identified within the Article 19.2.4 Remedial Workplan process, and then the balance, if any, will be allocated to benefit equally interests associated with the allocations of water provided for within Articles 16.1 and 16.2 as determined by the Management Committee. As part of the Long-Term Agreement, the Parties will negotiate a mutually agreeable limit on the Upstream Water Users' requirement to assist in making water available for the purposes of D-1641.

16.0 Utilization of Program and Short-Term Workplan Project Capacity. The project Capacity developed pursuant to Article 15 will be dedicated and operated consistent with the AOP developed under Article 19.3 to meet the uses specified in Articles 16.1 and 16.2 in below normal, dry, and critical and in accordance with Article 16.4, in above-normal years. Water year types will be determined by the May 1 forecast using the 40-30-30 Sacramento River Index in D-1641.

16.1 Block 1 for Local Use. Fifty percent of the water developed from the Capacity set forth in Article 15 will be dedicated to local use within the entities producing the water. To the extent that water produced through this Capacity is not needed by entities producing the water, as determined by the entity producing the water, it will, consistent with the provisions of Article 16.3 below, be made available for purchase by the Downstream Water Users, DWR or Reclamation under the terms and conditions of this Short-Term Settlement Agreement.

16.2 Block 2 for Water Quality Control Plan Water. Fifty percent of the water developed from the Capacity set forth in Article 15.2 will be made available to the SWP and CVP, which, after consultation with the Downstream Water Users, may, on or before May 1, elect to take and use the water to meet the requirements of D-1641.

16.3 Obligation to Take Block 1 Water. In the event DWR or Reclamation elect to call for all or a portion of Block 2 water, the Downstream Water Users, DWR or Reclamation will be required to purchase an equal amount of Block 1 water if that water is made available for purchase pursuant to Article 16.1.

16.4 Water in Above-Normal Years. During above-normal year types, DWR or Reclamation may, after consultation with the Downstream Water Users, request that the Upstream Water Users make available Block 2 water. No Upstream Water User will be obligated to make such water available if it determines in its sole discretion that such action would have a negative impact on its ability to meet its commitments under this Agreement in below normal, dry or critical years; Provided that, in this event the Upstream Water User will not operate the Short Term Project in connection with any transfer during the relevant above-normal year.

16.5 Finances. To pay for projects and the other actions required by the Program and identified within the Short-Term Workplan, the Parties agree to the following:

16.5.1 Capital Costs. Consistent with the responsibilities of the agencies administering the funds, all steps will be taken to secure funds from Proposition 204, Proposition 13, and other appropriate public sources to pay the full capital expenses associated with Short-Term Workplan projects, including costs of acquiring capital facilities to implement the project, reasonable initial rehabilitation and other related costs associated with existing groundwater wells, and other general costs reasonably incurred to implement the project. The voters have recognized it is in the public interest to fund actions that improve water quality in the Delta and the reliability of supplies. Proposition 204, approved by the voters in 1996, provided $25 million for the purpose of assisting in meeting the 1995 Water Quality Control Plan objectives such as through the implementation of a water rights settlement in the Sacramento Valley. Proposition 13 contains funds for implementation of water management, water use efficiency and planning projects consistent with the projects envisioned here. Nothing herein is intended to preclude projects from proceeding without the type of public funding dealt with in this sub-article.

16.5.2 Funds Not Available. In the event funds identified in Article 16.5.1 are not available in an amount sufficient to pay for the capital costs of Capacity required to make water available under Article 16, the Parties agree that they will together seek alternative funding to pay for these projects under the oversight of the Management Committee consistent with Article 19.

16.5.2.1 Block 2 Water. If sufficient alternative funding is not available to pay for the portion of the capital costs required to make Block 2 water available from a project, the Upstream Water User(s) sponsoring the project will not be obligated to proceed with the development of the project.

16.5.2.2 Block 1 Water. If sufficient alternative funding is not available to pay for the portion of the capital costs of a project required to make Block 1 water available from a project, the Parties will make their best efforts to obtain reasonably equivalent sources of alternative public or private financing for that project for the term of the Short-Term Project Implementation Agreement. If approved by the Upstream Water User sponsoring that project, Reclamation, DWR and/or Downstream Water Users may provide their own funds to make up for any deficiency in funds; provided that those funds will be fully repaid, including interest, as a credit against the payments required in Article 16.5.5 or pursuant to other repayment provisions specified in the Short-Term Project Implementation Agreement. If reasonably equivalent alternative financing for the term of the Short-Term Implementation Agreement is not available for any specific project, or Reclamation, DWR or the Downstream Water Users do not provide funds in accordance with this article 16.5.2.2 for any specific project, the Upstream Water User(s) sponsoring that project, in its discretion, will not be obligated to proceed with that project.

16.5.2.3 Termination. If the failure to implement projects because of the lack of funds results in a reduction in the amount of water otherwise to be provided pursuant to Articles 15 and 16, the early termination provisions of Article 11.0 may be invoked.

16.5.3 Operation and Maintenance ("O&M") Costs for Block 2 Water. O&M expenses for Block 2 water will be paid 50 percent by Upstream Water Users and 50 percent by Downstream Water Users, Reclamation or DWR. In "Critical Years" (as defined in Sacramento River Settlement Contracts), or "drought" years (as defined in Feather River Contracts and as will be applied on the Yuba River) the 50 percent O&M payment obligation will be tied to Out-of-Pocket Costs. The Technical Measurement and Monitoring Committee will confirm the need to rely upon sources other than short-term Workplan sources in "Critical Years" or "drought" years and also confirm the appropriateness of Out-of-Pocket Costs.

16.5.4 Costs Associated with Project Implementation, the Preparation of the Annual Operating Plan, Technical work, and Remedial Workplan. The Parties will seek funds from appropriate public sources to pay for the expenses associated with preparation of the AOP, technical work, remedial workplan preparation and implementation, and monitoring associated with implementation of the Short-Term Projects. To the extent such funds are not obtained for these purposes, the Management Committee will develop a plan for funding the remaining costs consistent with Article 19.0.

16.5.5 Payments for Block 1 Water Made Available to Downstream Water Users, DWR and Reclamation. Downstream Water Users, DWR or Reclamation will pay for Block 1 water made available under the provisions of Articles 16.1 and 16.3, according to year types as determined by the May 1 forecast using the 40-30-30 Sacramento River Index in D-1641, pursuant to the following payment schedule:

$50/acre-foot during years classified as above-normal;

$75/acre-foot during years classified as below-normal;

$100/acre-foot during years classified as dry; and

$125/acre-foot during years classified as critical.

The payments made for Block 1 water will be reduced to reflect the amount of public funds made available pursuant to the funding provisions of Article 16.5.1 hereto, if any, based on a formula assuming a 20-year amortization period at six percent. The payments made for Block 1 water will be modified up or down from the rate noted above based upon changes in actual operation and maintenance costs, assuming a 2002 base year.

16.5.6 Acre-Foot Payments. The costs and payments required by Articles 16.5.3 and 16.5.5 will be paid by the Downstream Water Users, DWR or Reclamation for each acre-foot of water they receive pursuant to Articles 16.1 through 16.3. Payments will be made, to an entity or entities identified by the Upstream Water Users, in any year when water is made available under this Agreement, as provided in the Short-Term Project Implementation Agreement(s).

17.0 System Improvement Projects. System Improvement Projects will be implemented consistent with the Short-Term Workplan. Water use efficiency measures will be implemented to provide maximum environmental benefit and to provide operations and maintenance benefits to participating Upstream Water Users. To the extent that the Management Committee, acting upon the recommendation of the Technical Measurement and Monitoring Committee, determines that these projects meet the objective of Article 2.2, such water will be credited equally toward the requirements in Articles 16.1 and 16.2.

18.0 Sacramento Valley Planning Projects. The planning projects identified in the Short-Term Workplan will be completed. These projects are intended, at least in part, to provide strategic information to Sacramento Valley decision-makers and others to assure that implementation of the Program will protect and enhance the reliability and integrity of Sacramento Valley water supplies.

19.0 Administration. To assure effective administration of this Agreement, the Program will include the following:

19.1 Management Committee. A Management Committee of 14 voting members will be established to provide oversight for the implementation of the Program. The committee will include an equal number of voting representatives of (i) the Upstream Water Users and (ii) the Downstream Water Users, DWR, and Reclamation collectively. Any decision by the Management Committee will require a majority vote of the members of both groups identified in (i) and (ii) above, provided that group (ii)'s majority includes the votes of DWR and Reclamation. The DF&G and the USFWS will each have an ex-officio, nonvoting representative on the Management Committee. The Management Committee may add voting members and ex-officio members, as it deems appropriate. The Management Committee will act in a manner consistent with the Short-Term Project Implementation Agreements and confirm that the form of the Short-Term Project Implementation Agreements is consistent with the provisions of the Short-Term Settlement Agreement. The Management Committee may create additional committees or working groups, as necessary, to assist it in fulfilling its duties.

19.2 Technical Measurement and Monitoring Committee.

19.2.1 General. A Technical Measurement and Monitoring Committee of members with expertise in groundwater and surface water project development and management representing the Parties will be created by the Management Committee. All actions and decisions of the Technical Measurement and Monitoring Committee, including decisions with respect to adoption of procedures associated with the operation of the Committee, will be subject to the approval of the Management Committee. The Technical Measurement and Monitoring Committee will establish procedures to determine whether projects are meeting the Article 2.0 objectives. The Technical Measurement and Monitoring Committee will evaluate the actual performance of the projects identified each year in the AOP prepared pursuant to Article 19.4. The Technical Measurement and Monitoring Committee will develop monitoring programs, analyze data from the monitoring programs, and attempt to resolve technical disputes. The Technical Measurement and Monitoring Committee will also provide recommendations with respect to means by which projects can best achieve the purposes of this Agreement.

19.2.2 Annual Evaluation of Projects. Each year the Technical Measurement and Monitoring Committee will: (a) assess how the Program and Short-Term Workplan projects developed water from the Capacity set forth in Article 15 to meet the Article 16.1, 16.2 and 16.3 obligations; (b) determine whether the water produced the previous year was made available at the time and in the quantities specified in that year's AOP; and (c) analyze and report on the results of the monitoring programs with respect to the timing and source of groundwater recharge resulting from operation of the projects associated with Program and Short-Term Workplan projects.

19.2.3 Annual Progress Report. The Technical Measurement and Monitoring Committee's findings and recommendations will be summarized in an Annual Progress Report submitted to the Management Committee. The Annual Progress Report will also evaluate the performance of projects in the Short-Term Workplan to assess their suitability for inclusion at existing or expanded scale in the Long-Term Workplan.

19.2.4 Remedial Workplan. If, after review of the Annual Progress Report, the Management Committee determines that the water developed from the Capacity set forth in Article 15 is not sufficient to meet the objectives of Article 2.0 and the Article 16.1, 16.2 and 16.3 purposes, it will direct the Technical Measurement and Monitoring Committee to develop a Remedial Workplan to address the identified problems. Remedial actions the Technical Measurement and Monitoring Committee consider may include, but are not limited to, relocation, improvement of Capacity or deepening of wells, and operation timing changes for groundwater and surface projects. To the extent that such actions result in additional expense, the Parties will evaluate such expenses and develop a mutually agreeable equitable distribution of such expenses. Failure to agree on implementation of improvements identified as necessary to provide water pursuant to Article 15.1 will be deemed cause for termination of the Agreement.

19.3 Annual Operating Plan. An AOP will be developed each year to describe how the available Capacity from the projects will be operated to produce water needed for the purpose of Articles 15 and 16. The AOP will be developed each year by the dates shown in the following schedule:

March 1— The Upstream Water Users will develop a draft AOP in coordination with the Technical Measurement and Monitoring Committee, identifying how the Upstream Water Users plan to provide the amount of settlement water identified in Article 16.2. The plan will also disclose the quantity of Block 1 Water that the Upstream Water Users will require to be purchased pursuant to Article 16.3, and will describe the manner of operation and describe the measurement and monitoring program that will be carried out pursuant to Article 19.2;

March 15—DWR and Reclamation will submit comments, if any, on the AOP to the Upstream Water Users;

March 31—The Upstream Water Users will reply to any DWR and Reclamation comments;

May 1—DWR and Reclamation will request the amount of Block 2 water they elect to call for in that year;

May 15—The Upstream Water Users will submit a final AOP that reflects the amount of Block 2 water requested by DWR and Reclamation and the amount of Block 1 water that DWR and Reclamation will be obligated to purchase pursuant to Article 16.3 hereto.

20.0 Unmet Sacramento Valley Demands.

20.1 Recognition of Unmet Sacramento Valley Demands. The Stay Agreement recognizes that Upstream Water User demands may vary and that various enumerated categories of demand will need to be provided for. These categories of demand include:

(i) Urban needs and uses within the watershed of the Sacramento River and its tributaries;

(ii) Needs and uses within the Tehama-Colusa and Corning Canal service areas;

(iii) Needs and uses within the Sacramento River Water Rights Settlement Contractors' collective service area;

(iv) Needs and uses within areas that obtain supply from drains and bypasses within the Sacramento Valley; and

(v) Needs and uses within the areas tributary to the Sacramento, American and Feather Rivers.

The Parties agree that, as an initial step in providing for this identified demand, initial needs within the Tehama-Colusa and Corning Canal service areas ((ii) above) and within the Sutter Bypass ((iv) above) will be addressed. The general terms by which these needs are to be addressed are set forth in sub-articles 20.2 and 20.3 below. As part of the Long-Term Settlement Agreement, means by which additional unmet demands within the upstream areas can be met will be identified and developed. Meeting this upstream demand will be undertaken in a manner that also recognizes the need to increase benefits to Downstream Water Users.

20.2 Sutter Bypass. Notwithstanding the provisions of Article 2.2, during the term of this Short-Term Settlement Agreement or for whatever period is otherwise negotiated, the continued diversion and use of return and tailwater flows by water users in the Sutter Bypass/Butte Slough region will not be challenged by DWR, Reclamation, DF&G, USFWS or the Downstream Water Users. Sutter Bypass/Butte Slough region lands affected by this provision are shown on the map attached hereto and marked as Exhibit "A". The Sutter Bypass/Butte Slough Water Users Association will provide $36,000 annually, on behalf of the water users identified in Exhibit "A", for the benefit of DWR and Reclamation. To receive the benefit of this subarticle, these Sutter Bypass/Butte Slough water users must have this total amount applied as a credit towards the non-Upstream Water Users' share of operation and maintenance cost of Block 2 water pursuant to Article 16.5.3. This provision is self-executing and will create no legal precedent. It is solely for the purpose of addressing unique facts associated with the Sutter Bypass/Butte Slough water users as a part of this overall agreement. During the term of the Short-Term Settlement Agreement, the Sutter Bypass/Butte Slough water users, DWR, Reclamation and other interested parties will develop a long-term plan to accomplish the objectives in Article 20.1 for this region.

20.3 Tehama-Colusa Canal Authority ("TCCA"). Notwithstanding the provisions of Article 2.2, during the term of this Short-Term Settlement Agreement, or for whatever period is negotiated between TCCA, Reclamation and other affected parties, CVP water service contractors served by the TCCA will receive an increased CVP contract supply, not to exceed a combined total of 25,000 acre-feet annually, at water rates based on Reclamation's "ability to pay" criteria. This supply will be made available through the assignment, or in such other manner as TCCA, Reclamation and other affected parties agree, of existing Sacramento River Settlement Contract CVP water supply to TCCA member agencies. This provision will create no legal precedent regarding transfers of base or project water supplies and is solely for the purpose of addressing unique facts associated with TCCA CVP water supply contracting. The general form of the agreement that will be used to implement this subarticle is attached as Exhibit B.

20.4 The provisions of sub-articles 20.2 and 20.3 are not intended to impose any obligation on any Upstream Water User or any Downstream Water User to make water supplies or money available for the benefit of the Sutter-Bypass/Butte Slough region or to the TCCA, except as otherwise agreed to by the affected parties. The provisions of subarticles 20.2 and 20.3 are not intended to impose any obligation on DWR or Reclamation, except as specifically provided in this Article 20.

21.0 Area-of-Origin Claims. Nothing within this Short-Term Settlement Agreement is intended, in any way, to adversely affect or to affirm the area-of-origin claims of Upstream Water Users or any other individual or entity who may be a beneficiary of the area-of-origin provisions of the California Water Code.

22.0 Water Transfers. Nothing herein is intended to prejudice the Parties' respective positions on the transferability of unused base water supply or unused water entitlements nor is it intended to affect the transfer of water that is not otherwise subject to this Agreement.

23.0 Protection of SWP and CVP Supplies. In recognition of the need to protect SWP and CVP supplies from inappropriate use by others, it is agreed as follows:

23.1 Illegal Diversions. The Parties agree that entities that do not hold adequate water rights should be prevented from illegally diverting water from the system. To reduce such diversions, the Parties will cooperate in seeking significantly increased penalties for such illegal diversions and significant increases in resources for enforcement actions by the SWRCB.

23.2 Project Storage Releases. The Parties agree that when releases are required from the SWP and CVP reservoirs to maintain Delta water quality, such releases must be protected from illegal diversions. The Parties affirm the principle that upstream water rights do not extend to use of SWP and CVP storage releases, except in those circumstances where the upstream diverter has a contract with the SWP or CVP that expressly provides for such use.

24.0 Environmental Compliance.

24.1 Preparation of Environmental Documents. In carrying out any actions arising under or which may result from this Agreement, all applicable environmental review, including compliance with the National Environmental Policy Act ("NEPA") and the California Environmental Quality Act ("CEQA"), will be completed.

24.2 Program Environmental Document. DWR will be the lead agency under CEQA and Reclamation will be the lead agency under NEPA for preparing a program/programmatic environmental impact document with respect to actions resulting from this Agreement program documents. DWR and Reclamation will cooperate in preparing a joint program environmental impact document with DWR coordinating such preparation. During preparation and review of the joint program document, other Parties will participate as cooperating agencies pursuant to NEPA and as responsible agencies pursuant to CEQA. As appropriate, DF&G will also participate as a trustee agency pursuant to CEQA.

24.3 Project-Level Documents. Upstream Water Users will be lead agencies under CEQA for preparing and approving project level environmental documentation of their respective projects, as identified in the Short-Term Workplan. However, project-level evaluation of appropriate projects may be included within the program environmental document.

24.4 Compatible Documents. Environmental documents will be compatible with CALFED environmental documents.

24.5 Costs for Environmental Compliance. Costs for such environmental compliance, including preparation of program or project-level environmental documents, will be paid, to the extent feasible, from funds identified in Article 16.5.1, subject to the provisions of Article 16.5.2 and Article 30.0. If such funds are not sufficient to cover necessary costs of preparing the environmental documentation described by this Article, the Parties will cooperate to seek alternative funding to pay such costs.

25.0 Non-Participating Entities. The Downstream Water Users, DWR, Reclamation, DF&G or USFWS will not enter into water purchase or transfer agreements with entities, located in the Sacramento River Hydrologic Region as defined in Bulletin 160 and possessing water rights identified in the Phase 8 hearing process, if the entities are not providing water, or are not committed to provide water, under Articles 16.1, 16.2 or 16.4 pursuant to this Agreement and related Short-Term Implementation Agreements. The provisions of this Article 25.0 will not apply to Upstream Water Users that have resolved Phase 8 issues through separate settlement agreements approved by the SWRCB, or to water purchase or transfer agreements for use within the Sacramento River Hydrologic Region as defined in DWR Bulletin 160, including instream or in-basin environmental purposes. The provisions of this Article 25.0 also will not apply to water purchase or transfer agreements executed prior to October 1, 2002. For purposes of this Agreement the Environmental Water Account will be considered a use outside of the Sacramento River Hydrologic Region.

26.0 Upstream Water Users Who's Rights Are Not Directly at Risk in Phase 8. Any Upstream Water User whose underlying water rights were not identified in the Phase 8 hearing process and who participates in making water available under the provisions of Articles 16.1 and 16.2 will be credited to the extent it continues to provide Block 2 water pursuant to Article 16.2 in any SWRCB Bay-Delta water quality or water rights proceedings that directly implicate those rights and with respect to any action by the SWRCB to increase the 1995 Water Quality Control Plan objectives.

27.0 Resolution of Disputes. Any material dispute arising under this Agreement, including those involving possible termination or those which might cause the initiation of any administrative or judicial proceeding to enforce the Agreement, will be submitted to a mediator. The mediator, who must have experience in water-related disputes, will be selected by the Parties who participate in the mediation. The Parties who participate in the mediation will use their best efforts to resolve the issues within 30 days. The costs of any such mediation will be borne equally among the Parties who participate in the mediation. Initiation of this mediation process will be through written notice to all Parties to this Agreement by any of the Parties hereto.

28.0 Effect of This Short-Term Settlement Agreement on Other Matters. Except as specifically provided in this Agreement, nothing in this Agreement, and nothing incorporated by reference into the terms of this Agreement, is intended or will be construed as a waiver or compromise of any Party's rights or responsibilities under State or Federal law. This Agreement will not be construed as an admission or determination of any Party's responsibility for meeting the requirements of D-1641. This Agreement constitutes a compromise and settlement of legal claims and is inadmissible to establish liability, responsibility or fault in any judicial or administrative proceeding. Execution of this Agreement is not intended and will not be construed as or is it intended to abrogate or limit any regulatory or statutory responsibility that any of the Parties hereto may have. The Agreement is subject to State and Federal Law.

29.0 Allocation of Risk Responsibilities. The Parties will cooperate in reducing, to the greatest extent practicable, the risk of claims arising against the parties from implementing this Agreement.

A. The parties to each Short-Term Project Implementation Agreement will specify in those agreements how they will allocate responsibilities with respect to the legal defense and payment of any settlements or judgments arising from:

(1) Claims involving control, carriage within the boundaries of the Upstream Water User who is implementing the project, handling, use, and disposal, or distribution of water pursuant to this Agreement or any Short-Term Project Implementation Agreement.

(2) Claims arising from activities under the exclusive control of the Upstream Water User who is implementing the project.

(3) Claims with respect to damage from the operation of an Upstream Water User who is implementing a groundwater project.

B. The Upstream Water Users and Downstream Water Users will share equally the responsibility, to the extent permitted by law, for the defense and any settlement of any claims challenging the validity of this Agreement (including reasonable attorneys' fees and litigation costs), or the underlying authority of the parties hereto to implement this Agreement, including claims brought under CEQA, NEPA, the Clean Water Act, state or federal Endangered Species Acts and claims with respect to the programmatic effects of this Agreement.

C. Reclamation, DWR, USFWS, and DFG will cooperate, to the extent permitted by law, in the defense and any settlement of any claims challenging the validity of this Agreement, and the underlying authority of the Parties hereto to implement this Agreement; including claims brought under CEQA, NEPA, the Clean Water Act, state or federal Endangered Species Acts; and claims with respect to the programmatic effects of this Agreement.

30.0 Contingent Upon Appropriations. The expenditure or advance of any money or the performance of any obligation of the United States or the State of California under this Agreement will be contingent upon appropriation and allotment of funds. No liability will accrue to the United States or the State of California in case funds are not appropriated or allotted.

31.0 Public Participation. The Parties will hold periodic public meetings, including SWRCB workshops and legislative hearings, to provide an opportunity for nonparticipating individuals and entities to have input into the planning process.

32.0 Other Agreements. The Parties recognize that as program development progresses there will be a need either to amend this Agreement or to enter into additional agreements. In this regard, the Parties acknowledge that this Agreement will complement other relevant local partnerships and/or CALFED agreements and will, as a consequence, be flexible enough to accommodate those other partnerships and agreements.

33.0 Cooperation. The Parties will cooperate in carrying out the provisions and intent of this Agreement.

34.0 Notices. All notices will be sent to the following:

DWR:	Thomas M. Hannigan, Director Department of Water Resources 1416 Ninth Street, Room 1115-1 P.O. Box 942836 Sacramento, CA 94236-0001
Reclamation:	Kirk C. Rodgers, Regional Director U.S. Department of the Interior Bureau of Reclamation, MP-100 2800 Cottage Way Sacramento, CA 95825
Downstream Water Users:	John C. Coburn, General Manager State Water Contractors 455 Capitol Mall, Suite 220 Sacramento, CA 95814
	Daniel G. Nelson, Executive Director San Luis & Delta-Mendota Water Authority 842 – 6th Street, Suite 7 P.O. Box 2135 Los Banos, CA 93635
	Walter J. Bishop, General Manager Contra Costa Water District 1331 Concord Avenue P.O. Box H2O Concord, CA 94524
Upstream Water Users:	David J. Guy, Executive Director Northern California Water Association 455 Capitol Mall, Suite 335 Sacramento, CA 95814
DF&G:	Robert C. Hight, Director Department of Fish and Game 1416 Ninth Street, Room 1207 Sacramento, CA 95814
USFWS:	Steve P. Thompson, Manager, California-Nevada Operations Office U.S. Fish and Wildlife Service 2800 Cottage Way, Suite W-2610 Sacramento, CA 95825

35.0 Counterparts. This Agreement may be executed simultaneously or in one or more counterparts, each of which will be an original but all of which together will constitute one and the same document.

DEPARTMENT OF WATER RESOURCES

Dated: 12/19/02

By ______________________
Thomas M. Hannigan
Director

U.S. BUREAU OF RECLAMATION

Dated: 1/10/03

By ______________________
Kirk C. Rodgers
Regional Director

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

STATE WATER CONTRACTORS

Dated: 12-18-02.

By ______________________
John C. Coburn
General Manager

SAN LUIS & DELTA-MENDOTA WATER AUTHORITY

Dated: 3/24/03

By ______________________
Daniel G. Nelson
Executive Director

CONTRA COSTA WATER DISTRICT

Dated: 12/24/02

By ______________________
Walter J. Bishop
General Manager

NORTHERN CALIFORNIA WATER ASSOCIATION

Dated: 12-20-02

By ______________________
David J. Guy
Executive Director

DEPARTMENT OF FISH AND GAME

Dated: 12-20-02

By ______________________
Robert C. Hight
Director

U.S. FISH AND WILDLIFE SERVICE

Dated: 12-18-2002

By ______________________
Steve P. Thompson
Manager
California-Nevada Operations Office

Additional Upstream Water User
Signatories Pursuant to Article 9.0:

ANDERSON-COTTON IRRIGATION DISTRICT

Dated: 12-12-02

By Dee E. Swearingen
Dee E. Swearingen
General Manager

BROWNS VALLEY IRRIGATION DISTRICT

Dated: 12-12-02

By R Winchester
Robert Winchester
President
Board of Directors

BUTTE WATER DISTRICT

Dated: 12-17-02

By Robert C. Waller
Robert Waller
President of the Board

FEATHER WATER DISTRICT

Dated: Dec 16, 2002

By Neill L Mitchell
Neill Mitchell
President

GARDEN HIGHWAY MUTUAL WATER COMPANY

Dated: 12/16/02

By A G Montna
Alfred G. Montna
President/Manager

Dated: 12/15/02

By Jill A. Leal
Jill Leal
Secretary

Glenn-Colusa Irrigation District

Dated: 3/25/03

By Donald R Bransford
Donald R.Bransford
President

RECIRC2655

MAXWELL IRRIGATION DISTRICT

Dated: 12/10/02

By DB McGeoghegan
Douglas McGeoghegan
Chairman
Board of Directors

MERIDIAN FARMS WATER COMPANY

Dated: 12-13-02

By Harold Webster
Harold Webster
General Manager

NATOMAS MUTUAL WATER COMPANY

Dated: December 11, 2002

By Peter J Hughes
Peter Hughes
Manager

ORLAND-ARTOIS WATER DISTRICT

Dated: 12/17/02

By John Enos
John Enos
President

ORLAND UNIT WATER USERS' ASSOCIATION

Dated: 12·13·02

By Steve Butler
Steve Butler
President

By
Joe Gilmore
Secretary

Oroville-Wyandotte Irrigation District

Dated: 11·26·02

By Michael Glaze
Michael Glaze
General Manager

PELGER MUTUAL WATER COMPANY

Dated: 12/15/02

By Scott C Tucker

Title President

Placer County Water Agency

Dated: 6.03.03

By
Dave Breninger
General Manager

PLEASANT GROVE-VERONA MUTUAL WATER COMPANY

Dated: Dec. 14, 02

By
Brett Scheidel
President

Plumas Mutual Water Co.

Dated: 9/16/03

By
Name Neil Mitchell
Title Vice President and
Acting President

Princeton-Codora-Glenn Irrigation District

Dated: 12-11-02

By
David Alves
Chairman
Board of Directors

PROVIDENT IRRIGATION DISTRICT

Dated: 12-10-02

By Elwood Weller
Elwood Weller
President
Board of Directors

RECLAMATION DISTRICT NO. 108

President

Secretary

Dated: 12-11-02

RECLAMATION DISTRICT 1004

By:
Jack Baber
Chairman
Board of Trustees

RIVER GARDEN FARMS COMPANY, a partnership

Dated: 12-13-02

By

Title Canterbury Farms, Inc., by Les Canter, President

RIVER GARDEN FARMS COMPANY, a partnership

Dated: 12/13/2002

By

Title VICE PRESIDENT OF GENERAL PARTNER KSA INDUSTRIES INC.

Sutter Bypass-Butte Slough Water Users Association

Dated: 3/15/03

By
Nicole Montna Van Vleck
Chairman of the Board

SUTTER EXTENSION WATER DISTRICT

Dated: 12-13-02

By Paul Russell
Paul Russell
Secretary

SUTTER MUTUAL WATER CO.

Dated: 12/9/02

By David Richter
David Richter
President

Tehama Colusa Canal Authority

Dated: April 15, 2003

By Bob Williams
Bob Williams
Chairman of the Board

Tudor Mutual Water Co.

Dated: 9/16/03

By Stephen F. Danna
Name Stephen F. Danna
Title President

YUBA COUNTY WATER AGENCY

Dated: Dec. 12, 2002

By Bill Simmons
Bill Simmons
Chairman
Board of Directors

Deer Creek Irrigation District

Dated: 11-19-03

By John V Edson
John Edson
President

RECIRC2655

Attachment 17

The Sacramento Valley Water Management Agreement

September 2001

The Sacramento Valley Water Management Agreement is a grassroots, collaborative effort to increase water supplies for farms, cities, and the environment

Sacramento Valley Water Resources

Sacramento Valley at a Glance

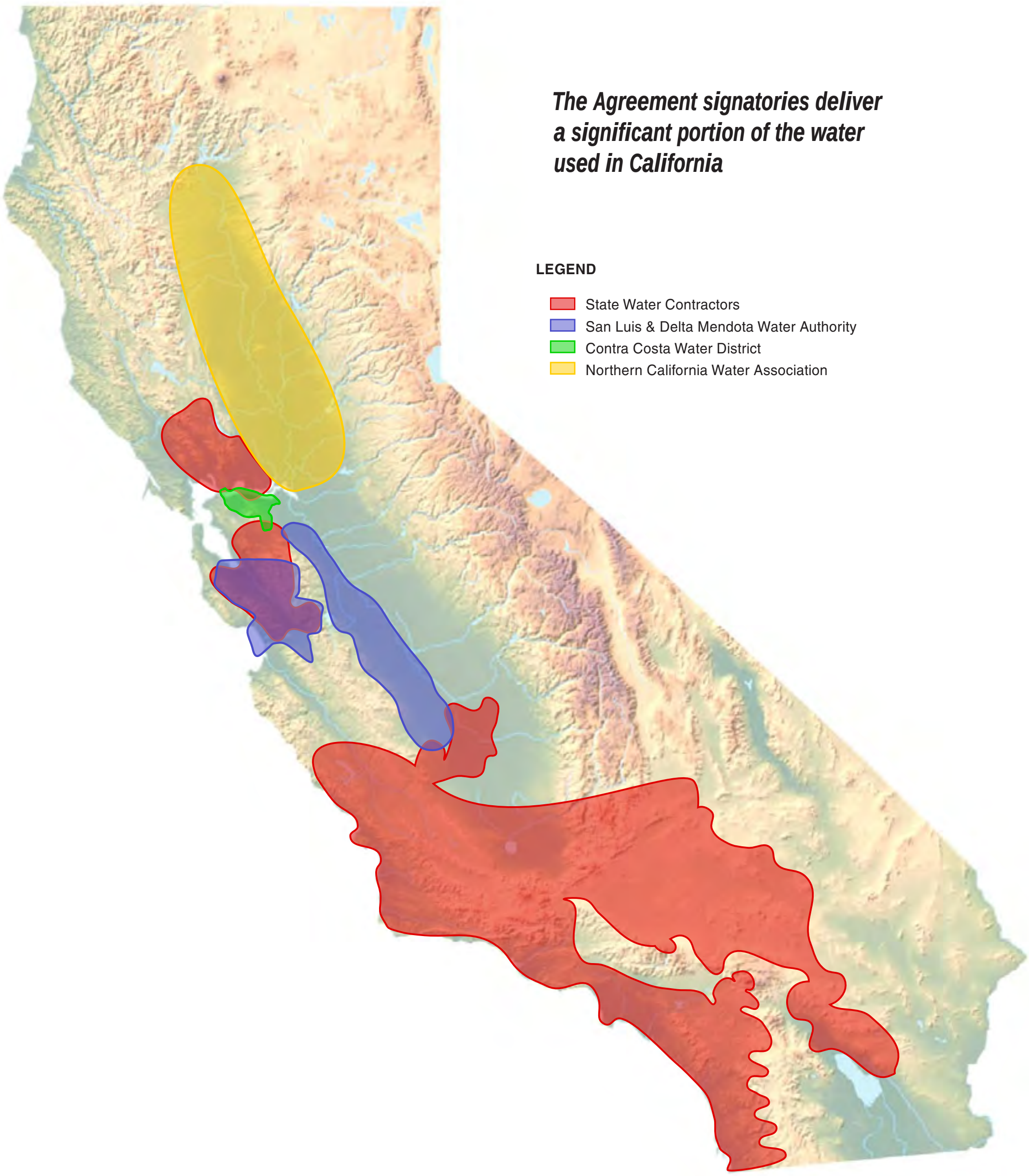
- The Sacramento River supplies 80 percent of the water flowing into the Delta.
- The Sacramento River and its tributaries are major habitat and spawning grounds for threatened and endangered fish species.
- The Sacramento Valley has more than 20 percent of California's total irrigated acreage.
- Sacramento Valley water shortages are predicted to continue for both average and drought years.
- The Sacramento Valley is a major resting point for millions of migratory waterfowl on the Pacific Coast Flyway.
- The Sacramento Valley is home to 2 million people.

The Sacramento Valley Water Management Agreement

Contents

The Sacramento Valley Water Management Agreement

In April 2001, more than 100 organizations reached an unprecedented agreement to manage water in a way that meets water supply, water quality, and environmental needs in the Sacramento Valley and throughout California.



Agreement Benefits

Increased supplies for all uses

Through integrated water management strategies, upstream and export water users will be able to optimize existing water supplies, enhance water quality, and develop additional supplies. This will enable them to meet existing and future water needs and enhance their water management flexibility.

Sustainable solution

The Sacramento Valley Water Management Agreement (Agreement) calls for solutions to complex problems, rather than stopgap measures. Solutions will be implemented in two tiers, based on how quickly the project can be implemented and begin providing benefits.

Timely resolution

The Agreement provides firm milestones to complete a joint workplan for short-term projects within the first 180 days. These projects will provide benefits for the 2002 and 2003 water years; a long-term workplan will be completed within 1 year.

Environmental restoration

The programs and projects provided for in the Agreement will avoid unmitigated impacts to Delta water quality and the environment and will be developed and implemented to provide environmental benefits, including benefits to fish and wildlife, in the Sacramento River watershed.

Water quality standards will be met

The California Department of Water Resources and the U.S. Bureau of Reclamation will continue to voluntarily meet the requirements in the State Water Resources Control Board 1995 Water Quality Control Plan to protect the Bay-Delta until a long-term solution is negotiated as a part of the Agreement.

Consistent with other water management activities

The projects implemented under this Agreement are consistent with the August 2000 CALFED Bay-Delta Program Record of Decision and with the CALFED Integrated Storage Investigation.

A 40-Year Struggle for
Bay-Delta Water Quality

1959
Delta Protection Act passed.

1971
State Water Resources Control Board (SWRCB) issues Delta Water Right Decision 1379.

1973
California Department of Fish and Game (DFG) conclude Peripheral Canal best Delta water facility.

1974
Department of Water Resources (DWR), DFG, U.S. Bureau of Reclamation (USBR) and U.S. Fish and Wildlife Service (USFWS) sign statement of intent that agencies will provide protection of Delta fish and

1977
California experiences driest year on record.

1978
SWRCB issues Water Right Decision 1485 (D-1485) requiring Central Valley Project (CVP) and State Water Project (SWP) operations to meet Delta water quality standards.

1979
USBR announces CVP will voluntarily comply with D-1485 until mandatory compliance is resolved.

1982
Voters defeat Proposition 9 – the Peripheral Canal Measure.

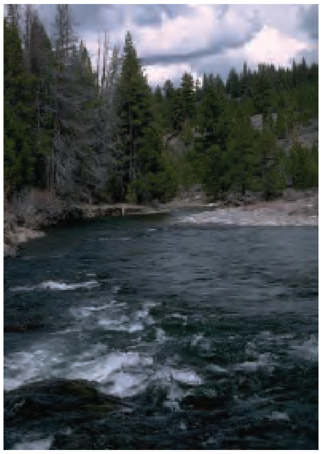
1986
Racanelli Appellate Court Decision requires SWRCB to revise water rights and water quality process.

Historic USBR-DWR Coordinated Operation Agreement authorized by Congress.

California's Sacramento Valley is rich in agricultural and environmental resources and serves as a major resting point for millions of migratory waterfowl on the Pacific Coast Flyway. The Sacramento River is the lifeblood of this Valley. The Sacramento River and its tributaries are major habitat and spawning grounds for threatened and endangered fish species and supply more than 80 percent of the inflows to the Sacramento-San Joaquin Delta. The Delta is the largest estuary on the west coast and serves as the hub for California's water system.

Competing agricultural, environmental, and urban uses create serious water management challenges within the Sacramento Valley. Current forecasts predict continuing statewide water shortages in both average and drought years. Water managers are striving to ensure that the water supply is of both adequate quantity and quality for the many uses.

For nearly 40 years, the State of California has struggled to develop the appropriate water quality standards for the Bay-Delta and to determine which water sources are required to meet those standards. This struggle has involved years of contention and litigation and has been elevated to the United States Supreme Court.



A major breakthrough occurred in late 1994 with the so-called Bay-Delta Accord (Accord). The Accord set water quality standards and required the State Water Resources Control Board (Board) to determine which water users would be responsible to meet these standards. In 1995 the Board adopted the Water Quality Control Plan (Plan) as a tool to implement the Accord. The California Department of Water Resources (Department) and the U.S. Bureau of Reclamation (Bureau) have been voluntarily meeting the Plan's water quality standards on an interim basis. Meanwhile, the Board held water rights proceedings to determine final responsibility for meeting the standards.

1987
SWRCB begins proceedings to revise D-1485 upon U.S. Environmental Protection Agency (USEPA) declaration that it is inadequate to protect Bay-Delta water quality.

1988
Senate Bill 34 passes, providing $120 million over 10 years for Delta levee maintenance.

1991
SWRCB releases new salinity control plan for Bay-Delta.

USEPA calls for more stringent standards.

1992
President George Bush signs CVP Improvement Act, requiring among other things, 800,000 a.f. of water annually for the environment.

1993
Delta smelt declared federal threatened species. SWRCB resumes work on permanent Delta Water Quality Standards.

USEPA proceeds with setting federal Bay-Delta standards.

1994
Bay-Delta Accord signed. CALFED formed.

Sacramento River winter-run chinook salmon listed as federal endangered species.

1995
SWRCB adopts new water quality standards and begins water rights proceedings.

1997
Steelhead listed as federal threatened species.

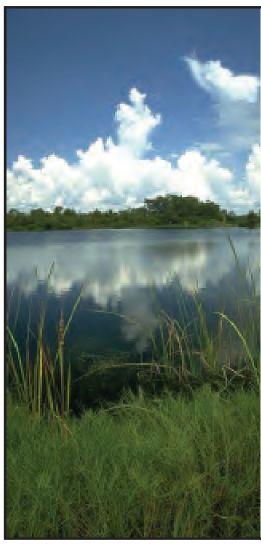
1998
CALFED released programmatic draft EIS/EIR offering three alternatives for Delta restoration.

1999
Splittail minnow and spring-run chinook salmon listed as federal threatened species.

2000
CALFED Record of Decision.

San Joaquin River Agreement.

2001
Sacramento Valley Water Managment Agreement.



Bay-Delta Water at a Glance

- More than 22 million people depend on the Delta for drinking water.
- More than 750 species of plants and animals call the Bay-Delta home, making it the richest ecosystem on the west coast.
- Seven million acres of the nation's most productive agricultural lands depend on Bay-Delta water to irrigate crops and water livestock.
- The Delta is a critical source of freshwater to blend with high salinity waters in other areas of the state to provide safe water for agricultural, environmental, and urban uses.

Phases 1 through 7 of the water rights proceedings involved the San Joaquin Valley and other Delta issues. After completion of these phases, the contentious Sacramento Valley issues (Phase 8) loomed over the State's water users.

In Phase 8, the Department and the Bureau claim that certain water rights holders in the Valley must cease diversions or release water from storage to help meet Delta water quality standards. Sacramento Valley water users believe their use has not contributed to water quality problems in the Delta; and as senior water right holders and water users within the watershed and counties of origin, they contend they are not responsible for meeting these standards. The Phase 8 process would ultimately determine which entities and individuals (if any) would be responsible for meeting water quality standards.

Agreement Partners

California Department of Water Resources
U.S. Bureau of Reclamation
State Water Contractors

San Luis & Delta-Mendota Water Authority
Contra Costa Water District
Northern California Water Association

San Luis & Delta-Mendota Water Authority includes the following:

Banta-Carbona Irrigation District
Broadview Water District
Central California Irrigation District
Centinella Water District
City of Tracy
Columbia Canal Company
Del Puerto Water District
Eagle Field Water District
Firebaugh Canal Water District
Fresno Slough Water District
Grassland Water District
James Irrigation District
Laguna Water District
Mercey Springs Water District
Oro Loma Water District
Pacheco Water District
Pajaro Valley Water Management Agency
Panoche Water District
Patterson Irrigation District
Plain View Water District
Pleasant Valley Water District
Reclamation District 1606
San Benito County Water District
San Luis Canal Company
San Luis Water District
Santa Clara Valley Water District
Tranquility Irrigation District
Tummer Island Water District
West Side Irrigation District
West Stanislas Irrigation District
Westlands Water District
Widren Water District

Northern California Water Association includes the following:

Brophy Water District
Browns Valley Irrigation District
Cordua Irrigation District
Feather Water District
Garden Highway Mutual Water Company
Glenn-Colusa Irrigation District
Joint Water Districts Board
- Biggs-West Gridley Water District
- Butte Water District
- Richvale Irrigation District
- Sutter Extension Water District

Maxwell Irrigation District
Natomas Mutual Water Company
Pelger Mutual Water Company
Plumas Mutual Water Company
Princeton-Codora-Glenn Irrigation District
Provident Irrigation District
Ramirez Water District
Reclamation District 108
Reclamation District 1004
South Sutter Water District
South Yuba Water District
Sutter Bypass-Butte Slough Water UA
Sutter Mutual Water Company
Tehama-Colusa Canal Authority
- Colusa County Water District
- Corning Water District
- Cortina Water District
- Davis Water District
- Dunnigan Water District
- 4-M Water District
- Glenn Valley Water District
- Glide Water District
- Holthouse Water District
- Kanawha Water District
- Kirkwood Water District
- LaGrande Water District
- Myers-Marsh Mutual Water Co.
- Orland-Artois Water District
- Proberta Water District
- Thomes Creek Water District
- Westside Water District

Thermalito Irrigation District
Tudor Mutual Water Company
Western Canal Water District
Yuba County Water Agency

State Water Contractors includes the following:

Alameda County Flood Control and Water Conservation District Zone 7
Alameda County Water District
Antelope Valley-East Kern Water Agency
Casitas Municipal Water District
Castaic Lake Water Agency
Central Coast Water Authority
City of Yuba City
Coachella Valley Water District
County of Kings
Crestline-Lake Arrowhead Water Agency
Desert Water Agency
Dudley Ridge Water District
Empire-West Side Irrigation District
Kern County Water Agency
Littlerock Creek Irrigation District
Metropolitan Water District of Southern California
Mojave Water Agency
Napa County Flood Control and Water Conservation District
Oak Flat Water District
Palmdale Water District
San Bernardino Valley Municipal Water District
San Gabriel Valley Municipal Water District
San Gorgonio Pass Water Agency
San Luis Obispo County Flood Control and Water Conservation District
Santa Clara Valley Water District
Solano County Water Agency
Tulare Lake Basin Water Storage District

DEPARTMENT OF WATER RESOURCES
DATED: 3/23/01
By: Thomas M. Hannigan
Director

UNITED STATES BUREAU OF RECLAMATION
MID-PACIFIC REGION
DATED: 4/16/01
By: Lester A. Snow
Regional Director

STATE WATER CONTRACTORS
DATED: 4/3/01
By:
General Manager

SAN LUIS & DELTA-MENDOTA WATER AUTHORITY
DATED: 3/30/01
By: Daniel G. Nelson
Executive Director

CONTRA COSTA WATER DISTRICT
DATED: 4/3/01
By: Walter J. Bishop
General Manager

NORTHERN CALIFORNIA WATER ASSOCIATION
DATED: 4/4/01
By: David J. Guy
Executive Director

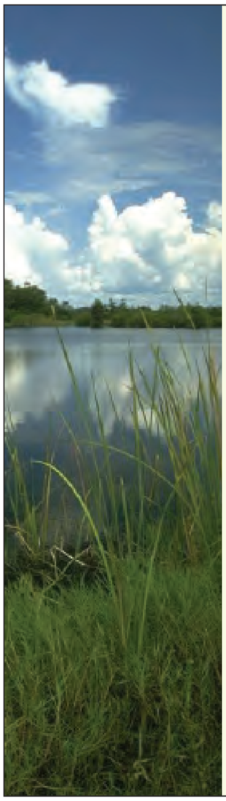
Unprecedented Cooperation

The Sacramento Valley Water Management Agreement is a grassroots, collaborative effort to increase water supplies to farms, cities, and the environment.

Proceeding with Phase 8 could involve litigation and judicial review for nearly 10 years. This extended process could result in adverse impacts to the environment and undermine progress on other statewide water management initiatives. To avoid the consequences of delay, the Sacramento Valley water users, the Department, the Bureau, and export water users developed the Sacramento Valley Water Management Agreement (Agreement). This Agreement establishes a framework to meet water supply, water quality, and environmental needs in the areas of origin and throughout California in an unprecedented cooperative spirit. The Board on April 26, 2001, issued an order to postpone and possibly dismiss Phase 8 of its Bay-Delta water rights proceedings and allow implementation of the Agreement, thus providing an amicable way to resolve these contentious issues.

Regional Strategy Based on Collaboration

The cornerstone of the Agreement is that it was achieved and will be implemented through a collaborative process including Sacramento Valley water users, the Department, the Bureau, and export water users. This will include active participation by water district managers, technical consultants, and local political leaders. The Agreement provides the foundation for a regional strategy to ensure that local water needs are fully met while helping improve water supplies throughout the state.



Agreement Principles

- The state and federal export projects will continue to meet water quality standards in the Delta until a long-term solution is negotiated as a part of the Agreement.
- The parties fully commit to an integrated water management and water supply development program for the Sacramento Valley that will meet 100% of the water needs in the Sacramento Valley, improve the water supplies and quality for other areas of the state, and provide water for environmental purposes.
- The parties will work together to secure public funding for water management and supply projects in the Sacramento Valley that will help assure environmental restoration, optimize the use of existing water supplies and enable local interests to develop additional water supplies in areas of origin.
- By the end of 2001, the parties will prepare a joint workplan for short-term Sacramento Valley water management projects to implement the Agreement. Workplans on longer-term projects will follow in 2002.
- The parties will evaluate the projects and workplans against the Agreement's goals and principles on an ongoing basis to ensure that water needs are being met.

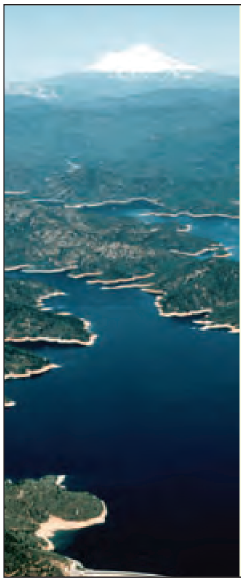
Next Steps: Workplans for Implementation

To implement the Agreement, the parties are preparing joint workplans. The workplans will describe certain Sacramento Valley projects and provide an estimate of the quantity of water or other water management benefits that can be realized by implementing these projects. The short-term workplan will provide benefits for 2002 and 2003 and will be completed by the end of 2001. The long-term workplan will be completed by May 2002.

The workplans will identify a palette of voluntary water management measures that will lead to an integrated water management program. The program will include the coordinated use of storage facilities, management and recovery of tailwater through major drains, water conservation, conjunctive management of surface water and groundwater, and transfers and exchanges among Sacramento Valley water users and other water users in the state. Furthermore, the Agreement contains a commitment to implement Sites Reservoir as an integral component of the water management and water supply development program for the Sacramento Valley.

The workplans are being developed through the process illustrated in Figure 1. It is a locally driven process, with

Figure 1 **Project Development Process**



Management Tools

Implementation of voluntary water management measures are key to accomplishing the goals of this Agreement. These include:

- Coordinated use of storage facilities
- Conjunctive management of surface water and groundwater
- Management and recovery of tailwater through major drains
- Water conservation
- Transfers and exchanges among Sacramento Valley water users and other water users in the state
- Increased surface storage

extensive involvement by all stakeholders. More than 50 stakeholders completed detailed questionnaires to propose projects for the short-term workplan. The proposed projects will be screened on the basis of a broad range of potential benefits and broad geographic coverage in the Valley.

Those projects will then be reviewed and evaluated on the basis of more detailed project summaries. From that review, projects will be selected for inclusion in the short-term workplan and implementation plans will be developed.

The next steps will be:
- Conduct environmental review and obtain necessary permits
- Secure appropriate funding
- Provide for public participation

Environmental review is a part of all projects, even those that will generate positive net effects on the environment. Environmental documentation will be prepared for all projects, and cumulative impacts will be addressed.

Funding will be pursued from a number of sources. As most of the projects will provide multiple benefits to various participants, cost-sharing arrangements will be negotiated to reflect those benefits. Many of the projects will also provide public benefits, primarily environmental, and efforts will be made to obtain state and federal funds to support those benefits. Potential funding sources include Proposition 13, Proposition 204, and state and federal funding through the CALFED program.

Public support will be crucial to successful development of the projects. Public meetings will be held to provide opportunities for full input into the planning process.

Appendix A

AGREEMENT REGARDING RESOLUTION OF PHASE 8 ISSUES, DEVELOPMENT AND MANAGEMENT OF WATER SUPPLIES, AND A BINDING COMMITMENT TO PROCEED PURSUANT TO SPECIFIED TERMS

This Agreement is in furtherance of a resolution of Phase 8 of the State Water Resources Control Board's (hereinafter "SWRCB") current Bay-Delta Water Rights Hearings. The Parties will work together to settle issues related to obligations or potential obligations to meet existing Bay-Delta water quality and flow objectives by developing a cooperative water management partnership among (a) those south of the Sacramento-San Joaquin Delta who possess water rights or are State Water Project ("SWP") or Central Valley Project ("CVP") water users; (b) the Contra Costa Water District and those who derive SWP water from the North Bay Aqueduct (hereinafter (a) and (b) for the purposes of this Agreement referred to collectively as "Export Water Users"); (c) those who possess water rights or are water users within the watershed of the Sacramento River and its tributaries (hereinafter "Upstream Water Users"); (d) the California Department of Water Resources (hereinafter "DWR"); and (e) the United States Bureau of Reclamation on behalf of the CVP (hereinafter "Reclamation"), all of which are hereafter referred to as the Parties.

Now therefore, it is mutually agreed as follows:

1. Goals and Principles

The Parties hereto agree to the following statement of goals and principles that shall guide the implementation of all aspects of this Agreement, including development of a cooperative water management partnership. This Agreement, during its term, is intended to:

(a) Provide the mechanism for satisfying the flow-related objectives of the SWRCB's 1995 Bay-Delta Water Quality Control Plan (hereinafter the "1995 WQCP");
(b) Be implemented in lieu of proceeding with Phase 8 of the SWRCB's Bay-Delta process;
(c) Facilitate the development of integrated water management strategies that will enhance the Upstream and Export Water Users' abilities to optimize use of their existing supplies, enable them to develop additional supplies to meet their existing and future water needs, and enhance their water management flexibility;
(d) Facilitate the development of protections to ensure that water stored and released by the SWP and the CVP is available for meeting downstream flow-related objectives and for SWP and CVP purposes, including exports from the Delta;
(e) Be implemented in a manner compatible with CALFED's goals;
(f) Facilitate the development of new near- and long-term water supplies through agreements among the Parties, and through the Governor's drought contingency plan, in ways that do not detract from the ability to meet the existing and future needs of Upstream Water Users;
(g) Avoid unmitigated impacts to Delta water quality or the environment;
(h) Provide net water quality benefits for Upstream Water Users, Export Water Users, and the Delta;
(i) Be implemented in a manner that provides that the comprehensive program will, among other factors, be cost effective, financially feasible, and affordable; and
(j) Result in state-wide water resource and environmental benefits and, therefore, receive funding from state and federal sources where appropriate.

2. Initial Elements of the Cooperative Management Partnership.

It is intended that the Goals and Principles adopted with this Agreement be implemented through the development of specific programs and projects. The development of these programs and projects will be an ongoing process and may, over time, involve numerous entities not signatories to this Agreement. These may include agencies of the state or federal government including, but not limited to, the United States Fish & Wildlife Service ("USFWS"), the National Marine Fisheries Service ("NMFS"), and the California Department of Fish and Game ("CDFG"), and may also include in-Delta water users. Moreover, over time, the Parties may decide to employ a facilitator or mediator to assist them in moving forward with project development and implementation. In this light, the following specific matters are intended only as the initial scope of work under this Agreement, with future work to be developed and implemented as appropriate. Future work plans, if appropriate, can become amendments to this Agreement or can be the subject of subsequent related agreements.

(a) *Quantifying Water Demands and Supplies*. The Parties recognize a need to develop reliable estimates of the quantities of water that are currently being used, present unmet demands and projected future demands within the watershed of the Sacramento River and its tributaries. The Parties also need to develop estimates of the quantities of new water supplies that could be made available to Upstream areas, Export areas, and to meet the 1995 WQCP standards based on the measures included in the programs and projects described below. The Parties agree to establish a technical committee to begin immediately to develop, collect and analyze this information.
(b) *Unmet and Future Demands in the Upstream Areas.* The Parties recognize that Upstream Water User demands may vary and that the following approximates the categories of upstream demands that will be provided for:

(i) Urban needs and uses within the watershed of the Sacramento River and its tributaries.

(ii) Needs and uses within the Tehama-Colusa and Corning Canal service areas.

(iii) Needs and uses within the Sacramento River Water Rights Settlement Contractors' collective service area.

(iv) Needs and uses within areas that obtain supply from the drains and bypasses within the Sacramento Valley.

(v) Needs and uses within the areas tributary to the Sacramento, American, and Feather Rivers.

(c) *Export Water Supplies.* The Parties recognize that Export Water Users have experienced water supply reductions as a result of regulatory and other actions. The programs and projects provided for in this Agreement will improve the water supplies on both a short- and long-term basis, and improve the water quality.

(d) *Environmental Benefits.* The Parties recognize that programs and projects provided for in this Agreement will be developed and implemented not only to meet the needs of Upstream and Export Water Users and the flow-related objectives of the 1995 WQCP, but also to provide environmental benefits, including benefits to fish and wildlife, in the watershed of the Sacramento River.

(e) *Role of Sites Reservoir.* The Parties recognize that new off-stream surface storage is an essential part of the long-term water management program, and agree that Sites Reservoir is a potentially significant off-stream surface-water storage project that could help meet the goals and objectives of this Agreement, including providing capacity to increase the reliability of water supplies for Upstream and Export Water Users, flexibility during critical fish migration periods on the Sacramento River, and storage benefits for other CALFED programs. Work being undertaken pursuant to CALFED's Sites MOU will be integrated into this Agreement and the Parties will work with CALFED to accelerate feasibility studies and completion of appropriate environmental and permitting processes for the reservoir.

(f) *Enlarged Shasta*. The Parties agree that other significant surface water storage opportunities may exist, including the enlargement of Shasta Reservoir. The Parties shall take all appropriate efforts to advance these other opportunities and shall integrate the benefits associated with these projects into the programs provided for in this Agreement.

(g) *Role of the Basin-Wide Management Plan.* Reclamation and certain Upstream Water Users are currently developing a Basin-Wide Management Plan for the purpose of improving water management within portions of the Sacramento Valley. The Basin-Wide Management Plan that Reclamation and certain Upstream Water Users are developing shall serve as a model for implementation of this Agreement and could be expanded to incorporate other areas of the watershed of the Sacramento River and its tributaries, as appropriate.

(h) *Management Tools for this Agreement.* A key to accomplishing the goals of this Agreement will be the identification and implementation of a "palette" of voluntary water management measures (including cost and yield data) that could be implemented to develop increased water supply, reliability, and operational flexibility. Some of the measures that may be included in the palette are:

(i) Basin-Wide Water Management Plan identified above;
(ii) Conjunctive uses of surface water and groundwater;
(iii) Coordinated use of storage facilities;
(iv) Management and recovery of tailwater through major drains;
(v) Transfers and exchanges among Upstream Water Users and with the CVP and SWP water contractors, either for water from specific reservoirs, or by substituting groundwater for surface water;
(vi) Substitution of water from potential north of Delta reservoirs, such as Sites Reservoir, for groundwater, or river diversions, or maintaining water quality in the Delta; and
(vii) Water conservation.

3. Resolution of Phase 8 Issues

(a) The Parties agree that while this Agreement remains in effect, DWR and Reclamation shall assume responsibility for meeting the Sacramento River and its tributaries' portions of flow-related objectives established in the 1995 WQCP. Upstream Water Users shall have no obligation to release stored water, extract groundwater or forego diversions in order to help implement the flow-related objectives included in the 1995 WQCP.

(b) In conjunction with the SWRCB, the Parties shall jointly develop a program to prevent unauthorized diversions, provided that the program is consistent with this Agreement.

(c) The Export Water Users, DWR, and Reclamation agree that while this Agreement is in effect they shall take no action before the SWRCB or elsewhere, nor shall they support any such action to insert Term 91, or its regulatory equivalent, into existing water rights permits or licenses, or modify riparian or pre-1914 water rights through the application of the regulatory equivalent of Term 91. The Parties recognize that the SWRCB will continue to implement Term 91 according to its existing terms.

(d) Notwithstanding the foregoing, nothing herein shall be interpreted as waiving the Parties' legal positions or rights in the event that the SWRCB proceeds with the Phase 8 hearings or otherwise attempts to determine the legal obligations of water users to meet adopted water quality or flow standards in the Bay-Delta or in streams tributary to the Bay-Delta. In addition, the Parties acknowledge and agree that nothing herein shall limit their ability to initiate a new or additional water right or water supply, transfer an existing water right, or change or modify an existing water right or a contract relating to a water supply; nor shall a Party be precluded from arguing that Term 91 should be applied or not applied by the SWRCB in any of these proceedings or that a new water right, transfer, or change or modification of an existing water right will or will not cause injury to a lawful water user.

(e) This Agreement shall become effective on the day the SWRCB enters an order that:

- (i) Provides for a Stay of Phase 8 of the current Bay-Delta water rights proceeding pending development and approval of the Workplans described in Paragraphs 5(a) and 5(b) of this agreement;
- (ii) Provides that, should either of the Workplans not be completed or approved, and this Agreement is therefore terminated, the Parties shall immediately notify the SWRCB and the SWRCB will lift the stay and proceed with Phase 8;
- (iii) Under the circumstances provided for in sub-paragraph 3(e)(ii), extends the expiration of the SWP's and CVP's obligations under Conditions 1 and 2 of the Order in Revised Decision 1641 to the earlier of the completion of a resumed Phase 8 or one year from the date of a notice to the SWRCB of termination of this Agreement; and
- (iv) Provides that, should the Workplans described in Paragraphs 5(a) and (b) both be completed and approved, Notice of the approval provided to the SWRCB (a) automatically dismisses the Phase 8 proceedings and (b) further extends the expiration of the SWP's and CVP's obligations under Conditions 1 and 2 of the Order in Revised Decision 1641 to one year after the Notice of the termination of this Agreement to the SWRCB or such sooner time as a water rights proceeding allocating the responsibilities to meet Bay-Delta standards is completed; and
- (v) Provides that the dates set forth in sub-paragraphs 3(e)(iii) and (iv) above may be extended for up to one year if after notice and hearing the SWRCB determines that the additional time is necessary for it to fully consider and decide the matter.

4. Resolution of Related Issues

The Parties acknowledge that there are a number of administrative, regulatory, legislative and judicial actions currently ongoing or reasonably to be anticipated that could have major effects on the Parties' ability to implement the terms of this Agreement.

In this regard, the Parties acknowledge and agree that developments in any of these or other matters may have a material effect on any Party's ability to implement this Agreement and meet the Milestones set forth in Paragraph 5 below. The Parties agree that they will work together to attempt to deal with the factual/legal situation that then exists in order to allow the Parties to proceed with the programs identified in this Agreement. Nonetheless, failure to meet Milestones, for whatever reason, shall remain a cause for the termination of this Agreement.

5. Milestones

(a) *Short-Term Projects.* Within one hundred eighty days of the Effective Date of this Agreement, the Parties shall, working together, prepare a joint work plan listing short-term projects that can be used to implement this Agreement. Such projects are defined as those which can provide benefits for the 2002 and 2003 water years.

(b) *Medium and Long-Term Projects.* Within one year of the Effective Date of this Agreement, the Parties shall, working together, prepare a joint work plan listing medium- and long-term projects that can be used to implement this Agreement. Medium-term projects are defined as those which will be operational by December 31, 2005. Long-term projects are defined as those which are operational by December 31, 2010.

(c) *Workplan Standards.* For each project identified in the respective Workplan, the appropriate Workplan shall:

- (i) Briefly describe the project, including expected 10 net benefits and their proposed allocations;
- (ii) Provide a preliminary estimate of the quantity of water or the nature of other water management benefits that can be realized by implementing the project;
- (iii) Provide a preliminary estimate of the cost of the project;
- (iv) Identify any major environmental issues associated with the project; and
- (v) Describe how the project could best be implemented (including a plan for financing for the project).

Each Workplan shall also provide a timetable for implementation of identified projects, which shall then constitute additional Milestones for this Agreement.

(d) *Funding.* The Parties shall immediately jointly seek funding for the development of the two Workplans identified above from general state and/or federal sources. In addition, the Parties shall also seek funding, pursuant to Proposition 204 and other possible funding sources, to cover the cost of implementing programs identified within the respective Workplans. Milestones identified within this Agreement may need to be adjusted in order to provide ample time for the Parties to secure adequate state and federal funding to allow work to proceed. Such adjustments must be accomplished pursuant to mutual agreement of all Parties. The Parties shall not seek to acquire funds that are obligated to other programs within CALFED, and shall not seek funding that may otherwise conflict with funding commitments under the Central Valley Project Improvement Act Restoration Fund.

(e) *Workplan Updates.* The Parties shall review and update the medium/long-term Workplan annually to incorporate information learned as a result of the cooperative process contemplated by this Agreement or as a result of other efforts.The Parties may also revise the list of projects contained in the medium/long-term Workplan, the estimates of the water supply or other benefits associated with such projects, the cost estimates for such projects, the environmental issues associated with such projects, and the implementation plan for each project. The Parties may review and update the medium/long-term Workplan as necessary in the event that circumstances identified in Paragraph 4 above occur.

(f) *Sites Reservoir Milestones.* Because of the potential significance of Sites Reservoir or other north of Delta offstream storage to achieving the

goals of this Agreement, the following additional specific Milestones shall be adhered to:
- (i) finalize a Purpose and Needs Statement for the project satisfactory to the Parties no later than March 9, 2001;
- (ii) initiate initial scoping sessions associated with appropriate environmental review by April 9, 2001;
- (iii) initiate negotiations on all relevant Planning Agreements called for within the Sites MOU, including addressing issues dealt with in Paragraphs 7.4, 7.5 and 7.6 of the Sites MOU, by January 31, 2001;
- (iv) complete all environmental and planning documentation for the project not later than August 2004;
- (v) make a final decision with respect to the implementation and construction of the project, including obtaining all relevant permits/ biological opinions, including compliance with Clean Water Act section 404(b)(1) or 404(r) by August 2005; and
- (vi) assuming a decision to proceed, initiate project construction not later than August 2006.

6. Term and Termination

(a) *Term.* Except as may be otherwise expressly provided, the term of this Agreement shall be until December 31, 2010.

(b) *Annual Reviews.* The Parties shall agree upon the Workplan identified in Paragraph 5(a) of this Agreement within 60 days of its completion. A failure to do so shall cause the immediate termination of this Agreement. The Parties shall agree upon the Workplans identified in Paragraph 5(b) of this Agreement within 60 days of their completion. A failure to do so shall cause the immediate termination of this Agreement. Assuming approvals of the Workplans identified in Paragraphs 5(a) and 5(b), the Parties shall thereafter, on an annual basis as scheduled by the Parties, jointly review the status of development and implementation of all Workplans, as well as the meeting of Milestones provided for herein and in the Workplans. Each annual review shall include a detailed examination of the status of Workplan and Milestone implementation including, without limitation, project feasibility and design, environmental review, permitting and funding. Except as provided for above, this Agreement may only be terminated following an annual review performed in accordance with this Paragraph 6.

(c) *Termination for Failure to Meet Milestones.* Any Party may terminate this Agreement if, following an annual review and after the mediation provided for in Paragraph 7 of this Agreement, it determines:
- (i) that either reasonable progress in achieving the Milestones established under this Agreement or in the Workplans cannot be made through the exercise of reasonable diligence by the Parties; or the Milestones established under this Agreement or in the Workplans have not been substantially achieved; and
- (ii) that the Milestones established under this Agreement or in the Workplans cannot be revised to result in the reasonable achievement of the Milestones of this Agreement.

(d) *Termination on Modification in 1995 WQCP.* In the event the flow-related objectives contained in the 1995 WQCP are increased or decreased, the Parties shall meet and, if necessary, employ the process outlined in Paragraph 7 of this Agreement, in an attempt to address the changed circumstances associated with modified flow-related objectives. A failure to reach agreement shall cause the termination of this Agreement.

(e) *Petition on Termination.* In the event the Workplans are not completed or approved or this Agreement is terminated, the Parties shall immediately petition the SWRCB to conduct a water rights hearing to consider the issues described in the SWRCB's Revised Notice of Phase 8 Hearing dated May 6, 1998.

7. Resolution of Disputes

Resolution of disputes, and issues which a Party believes may subject this Agreement to termination shall first be submitted to a mediator, mutually selected by the Parties, with experience in water-related disputes. The Parties will use their best efforts to resolve the issues within 30 days. The costs of any such mediation will be borne equally among the Parties.

8. Effect of this Agreement on Other Matters

Nothing in this Agreement, and nothing incorporated by reference into the terms of this Agreement, is intended or shall be construed as a precedent or other basis for any argument that the Parties to this Agreement have waived or compromised their rights which may be available under State or Federal law except as to the matters addressed in this Agreement, nor shall it be construed as an admission or determination of any Party's responsibility for meeting the requirements of the 1995 WQCP.

9. Contingent Upon Appropriations

The expenditure or advance of any money or the performance of any obligation of the United States under this Agreement shall be contingent upon appropriation or allotment of funds. No liability shall accrue to the United States in case funds are not appropriated or allotted.

10. Technical and Management Committees

The Parties shall form two committees. The first shall be a technical committee which shall have the initial responsibility to develop the Workplans and related Milestones. The second shall be a management committee which shall provide policy direction to the technical committee and review and approve Workplans and Milestones. The committees shall together, in a manner that they determine, be responsible for the implementation of the Workplans. Each Party to this Agreement shall appoint one or more representatives to each of these committees.

11. Public Participation

The Parties shall hold periodic public meetings to provide an opportunity for nonparticipating individuals and entities to have input into the planning process.

12. Other Agreements

The Parties recognize that as program development progresses there will be a need to either amend this Agreement or to enter into additional agreements. In this regard, the Parties acknowledge that this Agreement will complement other relevant local partnerships and/or CALFED agreements and shall, as a consequence, be flexible enough to accommodate those other partnerships and agreements.

13. Environmental Compliance

In carrying out actions which may ultimately result from this Agreement, its amendments or subsequent agreements, the Parties hereto are committed to completing all required environmental review including all procedures and documents required by the National Environmental Policy Act and the California Environmental Quality Act, and to complying with all applicable statutes, including the federal and state Endangered Species Act. The costs of funding this environmental work and compliance shall be among the funding issues dealt with herein. Nothing contained herein is intended to affect DWR's and USBR's compliance with regulatory constraints that are imposed under the Federal Endangered Species Act, the Central Valley Project Improvement Act, the Federal Clean Water Act, or any other applicable state or federal law or regulation, including those incorporated into Tier 1 in the CALFED Record of Decision dated August 28, 2000.

14. Counterparts

This Agreement may be executed simultaneously or in one or more counterparts, each of which shall be an original but all of which together shall constitute one and the same document.

15. Notices

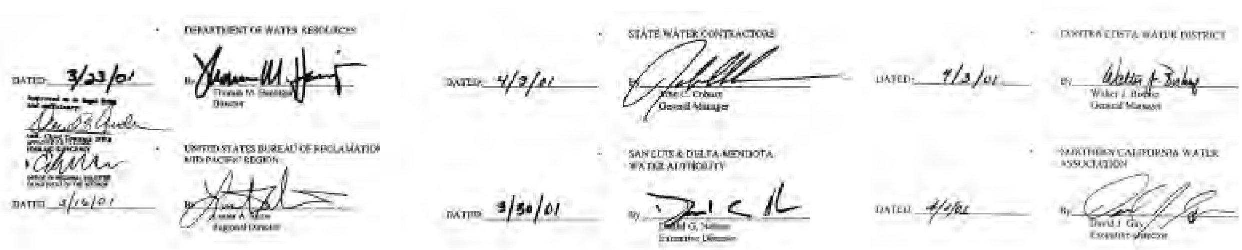
All notices shall be sent to the following: DWR: Thomas R. Hannigan Director Department of Water Resources P.O. Box 942836 Sacramento, CA 94236-0001 Reclamation; Lester Snow Regional Director United States Department of the Interior Bureau of Reclamation, MP-100 2800 Cottage Way Sacramento, CA 95825; Export Water Users: John Coburn, General Manager, State Water Contractors, 455 Capitol Mall, Sacramento, CA 95814; Daniel Nelson, General Manager, San Luis & Delta-Mendota Water Authority, 842 – 6th Street, Suite 7, P.O. Box 2135, Los Banos, CA 93635, Walter J. Bishop, General Manager, Contra Costa Water District, 1331 Concord Avenue, P.O. Box H2O, Concord, CA 94524; Upstream Water Users: David J. Guy Executive Director Northern California Water Association, 455 Capitol Mall, Suite 335, Sacramento, CA 95814.

16. Cooperation

The Parties shall cooperate in carrying out the Mutual Goals and Principles contained herein and the provisions and intent of this Agreement.

17. Effective Date

This Agreement shall become effective upon its full execution by all of the Parties hereto and the satisfaction of the conditions set forth in Paragraph 3(e) of this Agreement.


DEPARTMENT OF WATER RESOURCES

DATED: 3/23/01 By: Thomas M. Hannigan, Director

UNITED STATES BUREAU OF RECLAMATION MID-PACIFIC REGION

DATED: 3/16/01 By: Lester A. Snow, Regional Director

STATE WATER CONTRACTORS

DATED: 4/3/01 By: John C. Coburn, General Manager

SAN LUIS & DELTA-MENDOTA WATER AUTHORITY

DATED: 3/30/01 By: Daniel G. Nelson, Executive Director

CONTRA COSTA WATER DISTRICT

DATED: 4/3/01 By: Walter J. Bishop, General Manager

NORTHERN CALIFORNIA WATER ASSOCIATION

DATED: 4/2/01 By: David J. Guy, Executive Director

Appendix B

United States Department of the Interior

BUREAU OF RECLAMATION
Mid-Pacific Regional Office
2800 Cottage Way
Sacramento, California 95825-1898

IN REPLY
REFER TO:
MP-100
WTR-4.00

APR 25 2001

Mr. Harry M. Schueller
Chief, Division of Water Rights
State Water Resources Control Board
PO Box 2000
Sacramento CA 95812-2000

Dear Mr. Schueller:

In a separate letter dated April 20, 2001, the United States Bureau of Reclamation (USBR) and the California Department of Water Resources (DWR) submitted comments to the Draft Order for the San Francisco Bay/Sacramento-San Joaquin Estuary, dated April 11, 2001, by the State Water Resources Control Board (SWRCB). On March 16, 2001, and March 23, 2001, respectively, the USBR and the DWR executed the "Agreement Regarding Resolution of Phase 8 Issues, Development and Management of Water Supplies, and a Binding Commitment to Proceed Pursuant to Specified Terms." The Agreement was later executed by the remaining settlement parties.

The USBR and DWR hereby agree to an extension of Conditions 1 and 2 of the Water Right Decision 1641, provided that the SWRCB adopts a final order in accordance with its Draft Order of April 11, 2001, including the proposed modifications to the Draft Order contained in the April 20, 2001, comments of USBR and DWR. A copy of the April 20, 2001, comments is attached hereto and incorporated herein by reference.

Concur:

Lowell F. Ploss
for Kirk C. Rodgers
Acting Regional Director
Mid-Pacific Region
U.S. Bureau of Reclamation

Thomas M. Hannigan
Director
California Department of Water Resources

Attachment

Appendix C

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

ORDER WR 2001 - 05

In the Matter of
Implementation of Water Quality Objectives
for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary,
Amending License 1986 (Application 23) and Permits 11315, 11316, 11885, 11886, 11887, 11967, 11968, 11969, 11970, 11971, 11972, 11973, 12364, 12721, 12722, 12723, 12725, 12726, 12727, 12860, 15735, 16597, 16600, and 20245 (Applications 13370, 13371, 234, 1465, 5638, 5628, 15374, 15375, 15376, 16767, 16768, 17374, 17376, 5626, 9363, 9364, 9366, 9367, 9368, 15764, 22316, 14858A, 19304, and 14858B, respectively) of the United States Bureau of Reclamation and Permits 16478, 16479, 16481, 16482, and 16483 (Applications 5630, 14443, 14445A, 17512, and 17514A, respectively) of the Department of Water Resources.

Sources: Sacramento and San Joaquin Rivers and their tributaries, and the Sacramento-San Joaquin Delta Estuary

ORDER STAYING AND DISMISSING PHASE 8 OF THE BAY-DELTA WATER RIGHTS HEARING AND AMENDING REVISED DECISION 1641

By The Board:

1.0 Introduction

By this order, the State Water Resources Control Board (SWRCB) takes actions to facilitate negotiations that may lead to a settlement of the potential responsibilities of numerous water users to implement the objectives in the *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary*, adopted May 22, 1995 (1995 BayDelta Plan).[1]

In the absence of this order, the SWRCB would promptly convene the remainder of Phase 8 of the Bay-Delta Water Rights Hearing to consider the water users' potential responsibilities that have not yet been determined.

This order stays the resumption of Phase 8 for eighteen months from the date of this order. This order automatically dismisses Phase 8 at the end of eighteen months, unless the SWRCB receives notice from the Department of Water Resources (DWR) or the United States Bureau of Reclamation (USBR), within eighteen months, requesting resumption of Phase 8. This order extends the responsibilities of the DWR and the USBR under Conditions 1 and 2 to meet the water quality objectives in the 1995 Bay-Delta Plan. Unless the SWRCB issues a further order after notice and an opportunity for a hearing, the extension of their responsibilities will expire no later than one year after the DWR or the USBR requests a hearing. Upon request of the DWR or USBR, the SWRCB will resume Phase 8, or, after dismissal, will commence a new hearing. The SWRCB will expedite any hearing conducted pursuant to this order, to issue a decision within two years after receiving a request from the DWR or the USBR.

The SWRCB will, at least every six months, commencing not later than October 1, 2001, conduct a public informational workshop. The purpose of these workshops will be to provide the public and the SWRCB with information regarding the then-current status of negotiations and plans to implement the flow-dependent objectives, including information about the opportunities for non-parties to the negotiations to provide input.

2.0 Background

2.1 Procedural History

This order is part of a series of actions by the SWRCB to protect the beneficial uses of water in the Bay-Delta Estuary against the adverse effects of water diversions. In the BayDelta proceedings, the SWRCB adopts water quality objectives that, when implemented, will protect the beneficial uses. The SWRCB implements the objectives through water right orders and by requesting or directing that other agencies take appropriate actions including water quality control measures to be implemented by the Regional Water Quality Control Boards.

The 1995 Bay-Delta Plan contains the current water quality objectives. D-1641 and Order WR 2000-10 contain the current water right requirements to implement the BayDelta flowdependent objectives. D-1641 includes both long-term and temporary implementation requirements. Order WR 2000-10 requires partial implementation that will remain in effect up to thirtyfive years. In D-1641 and in Order WR 2000-10, the SWRCB assigned responsibilities, for specified periods, to water users (including the USBR and the DWR in D-1641, and the DWR in Order

WR 2000-10) in the watersheds of the San Joaquin River upstream of Vernalis, the Mokelumne River, Putah Creek, Cache Creek, within the boundaries of the North Delta Water Agency, and within the Bear River watershed. These responsibilities need not be revisited in the near future. These responsibilities require that the water users in these watersheds will contribute specified amounts of water, and that the DWR and/or the USBR will ensure that the objectives are met in the Delta.

To meet the potential responsibilities that are not yet assigned, but may be assigned to water users in areas not yet addressed, D-1641, in Conditions 1 and 2 on page 146 thereof, requires that the DWR and the USBR temporarily implement the objectives. Conditions 1 and 2 also require that the DWR and USBR meet certain objectives that the SWRCB does not contemplate assigning to other parties, such as export limits and gate closure requirements. D1641 provides that Conditions 1 and 2 will remain in effect only until the SWRCB makes further decisions establishing the responsibilities of water right holders in the areas where the potential responsibilities have not yet been determined. D-1641 sets these conditions to expire no later than November 30, 2001.

The SWRCB considered and heard comments on earlier drafts of this order at a Board meeting on March 7, 2001 and at a Board meeting on April 4, 2001.

2.2 Physical Setting

The Bay-Delta Estuary includes the Sacramento-San Joaquin Delta, Suisun Marsh, and the embayments upstream of the Golden Gate. The Delta and Suisun Marsh are located at the confluence of the Sacramento and San Joaquin rivers, which converge to flow westward through San Francisco Bay. The watershed of the Bay-Delta Estuary produces water that is used in much of the state for municipal, industrial, agricultural, and environmental purposes. The watershed is a source of drinking water for two-thirds of the state's population. The State Water Project, operated by the DWR, and the Central Valley Project, operated by the USBR, store water upstream of the Delta, release the stored water into the Delta, and export both the stored water and uncontrolled flows[2] from the Delta. The two projects export water from the Delta to areas south and west of the Delta through a system of water conveyance facilities.

Fish, wildlife, and other public trust resources also use the waterways of the Bay-Delta Estuary and its tributaries. Some of the fish that reside in the estuary or migrate through it are protected under the state or federal Endangered Species Act. Additionally, migratory birds and other animals use the marshlands of the estuary for food and habitat.

3.0 Discussion

It is the policy of the SWRCB in the Bay-Delta proceedings to encourage the parties to resolve among themselves the responsibilities for meeting the objectives in the 1995 Bay-Delta Plan, and to bring their joint proposals for establishing responsibilities to the SWRCB for approval.

The DWR, the USBR, some of their water supply contractors, and the members of the Northern California Water Association approached the SWRCB at a workshop on January 11, 2001, with a draft of an agreement among these parties. The parties proposed that the SWRCB adopt an order staying Phase 8 of the Bay-Delta Water Rights Hearing and automatically dismissing Phase 8 after the parties to the agreement complete and approve work plans for developing water supply projects. The parties presented an executed agreement to the SWRCB on April 4, 2001. The agreement includes a commitment by the DWR and the USBR to meet the objectives implemented under Conditions 1 and 2 in D-1641 so long as the agreement remains in effect, and for a period thereafter. This order is not based on the commitment in the agreement.

At the April 4, 2001, meeting, the SWRCB informed the parties to the agreement that, to be able to dismiss Phase 8 as requested, the SWRCB would need an independent commitment from the DWR and the USBR to meet the flow-dependent objectives for an interim period, and that the commitment could not be dependent on the agreement or on progress in implementing water supply projects pursuant to the agreement. The SWRCB further informed the parties that if it received the two projects' independent commitment to meet the objectives for an indefinite interim period and accept an indefinite extension of Conditions 1 and 2, it would (1) stay Phase 8 of the Bay-Delta Water Rights Hearing for up to eighteen months, (2) automatically dismiss Phase 8 after eighteen months had passed, (3) upon request of the DWR or the USBR at any time during the stay or after dismissal of Phase 8, convene a hearing to consider allocating responsibilities to meet the flow-dependent objectives to other parties, (4) set Conditions 1 and 2 to expire no later than two years after the request for hearing unless the SWRCB issues a further order after notice and opportunity for hearing, and (5) expedite the hearing to issue a decision within two years after the request for hearing.

The SWRCB has received the necessary commitment from the DWR and the USBR, by letter dated April 25, 2001. This order is based on that commitment. During the interim period, the SWRCB assumes that the DWR, the USBR, and other parties will conduct further negotiations. The SWRCB will take no part in the negotiations, and takes no position with respect to the direction of such negotiations.

After the DWR or the USBR requests a hearing to determine the responsibilities of the parties to meet the flow-dependent objectives, a hearing is likely to require two years or more. Therefore, an extension of Conditions 1 and 2 after the request for a hearing will help ensure that any necessary additional environmental documentation can be prepared and will ensure that the implementation of the objectives does not lapse. During any further hearing, the objectives in the 1995 Bay-Delta Plan must be met. A lapse in implementation could have serious consequences for the beneficial uses the objectives are intended to protect.[3] In the absence of a hearing, the SWRCB could not place responsibility for meeting the objectives on a party or parties other than the DWR and the USBR.[4] Accordingly, the most reasonable approach is to retain the existing responsibilities to meet the objectives until the SWRCB is able to complete a hearing and make a decision after the hearing.[5]

A stay is appropriate for eighteen months, with the DWR and the USBR meeting the objectives. A dismissal after the stay is appropriate only if the objectives will be met for a reasonable, albeit interim, period. The DWR and the USBR will meet the objectives for an adequate period. Therefore, this order stays and dismisses Phase 8, effective eighteen months after the date of this order, unless either the DWR or the USBR requests, within eighteen months, that the SWRCB resume Phase 8. The stay and subsequent dismissal apply to proceedings to determine the responsibilities of the water right holders and water users within the watersheds of the Sacramento, Calaveras and Cosumnes Rivers to meet the flow-dependent objectives in the 1995 Bay-Delta Plan.

The administrative record of this order includes the entire evidentiary hearing record of the BayDelta Water Rights Hearing, from July 1, 1998, through April 12, 2000, and the notices and correspondence sent or received by the SWRCB regarding Phase 8 through the date of this order.

4.0 Environmental Considerations

Under the California Environmental Quality Act (CEQA) (Pub. Resources Code §§ 21000, et seq.), the SWRCB is the lead agency for preparation of environmental documentation for this order. The SWRCB has prepared and certified a final *Environmental Impact Report for the Implementation of the 1995 Bay-Delta Water Quality Control Plan* (BayDelta EIR). The BayDelta EIR fully analyzes the effects of several alternatives for assigning responsibility to water right holders in the watershed of the Bay-Delta Estuary, including Flow Alternative 2, under which the DWR and the USBR are jointly responsible for meeting all of the flowdependent objectives in the 1995 Bay-Delta Plan. D-1641 adopts Flow Alternative 2 as an interim measure, by including Conditions 1 and 2 in the water rights of the DWR and the USBR. This order amends Conditions 1 and 2 of D-1641 by extending the periods for which the requirements set forth in those conditions are effective.

CEQA contemplates that agencies may make serial decisions relying on a single EIR. (Cal. Code Regs., tit. 14, §§ 15165, 15168.) This order is one in a series of orders relying on the Bay-Delta EIR.

Except as applied to the Joint Point of Diversion and the San Joaquin River Agreement, the findings set forth in D-1641 in sections 14.3.1, 14.3.4, 14.3.5, 14.3.6, 14.3.7, 14.3.8, and 14.4 are applicable to the inclusion of Conditions 1 and 2 in the permits of the DWR and the USBR for an extended period. Those findings are incorporated herein by reference to the extent that they are applicable to this order. The SWRCB will file a Notice of Determination under CEQA after it adopts this order, and the Notice of Determination will state that this order relies on the BayDelta EIR.

ORDER

A. IT IS HEREBY ORDERED that Phase 8 of the Bay-Delta Water Rights Hearing is stayed for a period of eighteen months from the date of this order. Phase 8 will be automatically dismissed at the end of eighteen months from the date of this order unless the DWR or the USBR notifies the SWRCB in writing, before the end of the eighteen month period, that it is requesting the SWRCB to resume Phase 8.[6] The purpose of the stay and dismissal is to allow water right holders whose rights might be amended after Phase 8 to negotiate toward a mutual settlement of their responsibilities to meet the flow-dependent objectives in the 1995 Bay-Delta Plan. If the DWR or the USBR requests in writing a hearing to allocate responsibilities to meet the flow-dependent objectives to other parties, the SWRCB expeditiously will convene a water right hearing, will determine whether the water right holders in the watersheds of the Sacramento, Cosumnes, and Calaveras Rivers have responsibility to meet the flow-dependent objectives in the 1995 Bay-Delta Plan, and will determine the amount of such responsibility in a decision or order.

B. IT IS HEREBY ORDERED that License 1986 (Application 23) and Permits 11315, 11316, 11885, 11886, 11887, 11967, 11968, 11969, 11970, 11971, 11972, 11973, 12364, 12721, 12722, 12723, 12725, 12726, 12727, 12860, 15735, 16597, 16600, and 20245 (Applications 13370, 13371, 234, 1465, 5638, 5628, 15374, 15375, 15376, 16767, 16768, 17374, 17376, 5626, 9363, 9364, 9366, 9367, 9368, 15764, 22316, 14858A, 19304, and 14858B, respectively) of the United States Bureau of Reclamation and Permits 16478, 16479, 16481, 16482, and 16483 (Applications 5630, 14443, 14445A, 17512, and 17514A, respectively) of the Department of Water Resources shall be amended by revising Conditions 1 and 2 in SWRCB Decision 1641 as follows.

1. Licensee/Permittee shall ensure that the water quality objectives for municipal and industrial beneficial uses and agricultural beneficial uses for the western Delta, interior Delta, and export area as set forth in Tables 1 and 2, attached, are met on an interim basis until the Board adopts a further decision assigning responsibility for meeting these objectives. Unless it is renewed pursuant to a further order after notice and an opportunity for hearing, this condition shall expire no later than one year after the DWR or the USBR requests in writing that the SWRCB convene a water right proceeding to determine whether to replace this condition with another condition that meets the objectives in Tables 1 and 2. Any extension hearing shall be for the limited purpose of determining whether additional time is necessary, and shall not include consideration of changes in allocation of responsibility. The SWRCB shall expedite any proceeding it conducts to assign long term responsibility to meet the objectives in Tables 1 and 2, in an effort to keep the proceeding under two years. This condition does not mandate that the Licensee/Permittee use water under this license/permit if it uses other sources of water or other means to meet this condition.

2. Licensee/Permittee shall ensure that the water quality objectives for Delta outflow and for Sacramento River flow at Rio Vista for fish and wildlife beneficial uses as set forth in Table 3, attached, are met on an interim basis until the Board adopts a further decision in the BayDelta Water Rights Hearing assigning responsibility for meeting these objectives. Any extension hearing shall be for the limited purpose of determining whether additional time is necessary, and shall not include consideration of changes in allocation of responsibility. Unless it is renewed pursuant to a further order after notice and an opportunity for hearing, this condition shall expire no later than one year after the DWR or the USBR requests in writing that the SWRCB convene a water right proceeding to determine whether to replace this condition with another condition that meets the objectives in Table 3. The SWRCB shall expedite any proceeding it conducts to assign long term responsibility to meet the objectives in Table 3, in an effort to keep the proceeding under two years. This condition does not mandate that the Licensee/Permittee use water under this license/permit if it uses other sources of water or other means to meet this condition.

CERTIFICATION

The undersigned, Clerk to the Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on April 26, 2001.

AYES: Art G. Baggett
Pete S. Silva
Richard Katz

NOS: None

ABSTAIN: None

ORIGINAL SIGNED BY Maureen Marché
Clerk to the Board

Footnotes:

[1] From July 1, 1998 through December 21, 1999, the SWRCB conducted Phases 1 through 7 of the BayDelta Water Rights Hearing. On December 29, 1999, the SWRCB adopted Decision 1641, determining some of the responsibilities for meeting the objectives in the 1995 Bay-Delta Plan and resolving other related issues. On April 11 and 12, 2000, the SWRCB conducted a session of Phase 8 of the Bay-Delta Water Rights Hearing to consider a petition for change filed by South Sutter Water District in connection with a settlement agreement to resolve the responsibilities of water right holders on the Bear River. The SWRCB approved the petition on July 20, 2000, in Order WR 2000-10.

[2] Uncontrolled flows include both natural flow and abandoned flow.

[3] Conditions 1 and 2 require full implementation of the objectives for municipal, industrial, and agricultural beneficial uses, and require full implementation of the flow-dependent objectives for fish and wildlife beneficial uses for an interim period. The objectives protect the public interest.

[4] The hearing record for D-1641 supports continuing the implementation by the DWR and the USBR of the objectives in the 1995 BayDelta Plan as provided by this order. See, for example, the Bay-Delta EIR, which analyzes the effects of imposing Conditions 1 and 2 on the DWR and the USBR.

[5] This conclusion addresses the need to extend the responsibilities of the DWR and the USBR for an adequate interim period. This conclusion does not predetermine the allocation of responsibility after completion of any further proceedings before the SWRCB, should further proceedings become necessary. The DWR and the USBR historically have been responsible for meeting Bay-Delta objectives. SWRCB Decision 1641 continues the responsibility of the DWR and the USBR to meet the municipal, industrial, and agricultural objectives, and the flowdependent fish and wildlife objectives on an interim basis. To stay or dismiss of Phase 8, it is necessary to continue the interim requirements imposed on the DWR and the USBR. If it did not extend the responsibility of the DWR and the USBR for at least two years beyond the date when the DWR or the USBR requests resumption or initiation of a hearing, the SWRCB would have to conduct a hearing to determine whether to require a party or parties to meet the objectives pending completion of the hearing. Considering their historical involvement, the public interest in continuously implementing the objectives, their role as public entities managing vast quantities of the state's water supply, and the lack of any other means for setting interim requirements, it is reasonable to continue the responsibility of the DWR and the USBR until the SWRCB establishes other responsibilities to meet the objectives.

[6] The stay and dismissal do not apply to the following proceedings related to the Bay-Delta Proceedings:

(a) Any proceedings necessary to respond to a writ of mandate or other court order, decision or opinion issued in connection with litigation to which the SWRCB is a party.

(b) An order necessary to implement new water quality objectives or amendments to the 1995 Bay-Delta Plan.

(c) A proceeding on an issue that is sufficiently unrelated [e.g. carriage water] to the subject of long term responsibility to meet the flow-dependent objectives in the 1995 Bay-Delta Plan that the proceeding will not adversely affect any negotiations among the parties seeking to settle their responsibilities to meet the BayDelta objectives. The SWRCB shall hold a workshop to obtain input from the parties before initiating any such proceedings.

(d) A proceeding relating to the implementation of the narrative salmon doubling objective set forth in Table 3 of the objectives in the 1995 Bay-Delta Plan. The existing D-1641 terms and conditions for fish and wildlife protection provide reasonable protection for a range of aquatic species in the Bay-Delta Estuary and help implement all of the objectives, including the narrative salmon doubling objective. Compliance with the existing flow objectives and other objectives in the 1995 Bay-Delta Plan may be sufficient to implement the salmon objective. Moreover, statutorily mandated non-flow fish restoration programs currently being implemented in other forums (e.g., CVPIA implementation and CALFED) will help implement the salmon objective. As other programs are implemented and monitored, the SWRCB will review the progress toward meeting the objective and may take additional action if needed.

Maureen Marché
Administrative Assistant to the Board.

Sacramento Valley Water Management Agreement Signatories

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Sacramento, CA 95814

W072001001RDD

Attachment 18

San Joaquin River Group

SFCWA
State & Federal Contractors Water Agency

March 3, 2011

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

Dear Chairman Isenberg:

The State and Federal Contractors Water Agency and the San Joaquin River Group appreciate the opportunity to provide comments on the first draft of the Delta Plan. We look forward to working with the Council and its staff to develop a successful final plan. Collectively, our organizations represent public entities that manage most of the water upstream of the Delta within the San Joaquin river watershed, and all of the water exported from it by the State Water Project and the federal Central Valley Project.

The task before the Council is both important and difficult, and we commend your efforts thus far. California desperately needs to resolve key Delta issues to foster achievement of the co-equal goals. We believe the Delta should be the Council's primary area of interest, and while it is useful to identify actions and actors outside the Delta that will aid in the success of resolving Delta issues, the Council should not seek to become involved in water management issues outside the Delta. Our organizations have developed the following principles to frame our review of the Delta Plan, which we hope will help us provide positive feedback to the Council. We ask that you review these principles and consider developing your own to give your staff and consultants guidance on developing the Plan. An effort to create such principles could be a valuable exercise within the Council to help define the overall approach and guide the Delta Plan.

1. Create lasting statewide value, such as recommendations for infrastructure and environmental investments in accordance with Section 35302 of the Water Code that will support ecosystem improvement and water supply sufficiency and reliability consistent with the co-equal goals.
2. Recognize fiscal constraints and promote investment that prioritizes stability and economic growth. A more sufficient and reliable water supply is foundational. If public costs increases, so should tangible improvements in the environment and water supply. Total and regional economic burdens on the public must be carefully assessed.
3. Stay within the delineated legal authorities specified in the Delta Reform Act of 2009. Expanding the Council's scope will undermine its ability to achieve important accomplishments that are within its reach.
4. Do not expect the first Plan to resolve all issues affecting the Delta or address all management concerns that intersect with Delta issues. The 5-year updates to the Plan should build on the success of a solid first effort to further the co-equal goals and assess local actions aiding the co-equal goals. Let's not let "perfect" be the enemy of "good".

5. In identifying issues outside the Delta that must be addressed for a successful Delta Plan, promote local responsibility and accountability. The Council has limited outside the Delta, and should avoid sounding paternalistic or dictatorial to locally elected government. Avoid broad prescriptions that don't account for local differences.
6. Create a system for measuring progress on the recommended actions that is consistent with the regular review and revision process of the Plan.

Attachment 1 to this letter contains our organizations' recommendations to the Council for key content we recommend be included in future drafts of the Delta Plan. Attachment 2 contains our specific comments on the first draft of Delta Plan (dated February 14, 2011).

Again, we commend the Council for its energy and willingness to step up to this invaluable task of creating a sound and implementable Delta Plan. We would be happy to discuss further our thoughts on this process and plan content at your convenience.

Sincerely,

Byron Buck
Executive Director
SFCWA

Allen Short

Allen Short
Chair, SJRG

Attachment 1

The San Joaquin River Group and State and Federal Contractors Water Agency Recommendations for Elements of the Delta Plan

SFCWA and the SJRG recommend the following elements be included in the Delta Plan. These recommendations are independent of the first draft Delta Plan, and therefore may or may not be included in the first draft. The recommendations are arranged by the Delta Policy Goals of Chapter 2 Section 85020 (a)-(h) of the Sacramento-San Joaquin Delta Reform Act of 2009, and include recommended actions within the Delta and actions upstream or out of the Delta.

85020. The policy of the State of California is to achieve the following objectives that the Legislature declares are inherent in the coequal goals for management of the Delta:

a) Manage the Delta's water and environmental resources and the water resources of the state over the long term.

In – Delta Actions

1. Facilitate construction and operation of an isolated conveyance facility of 15,000 cfs capacity from the Sacramento River to South Delta pumping facilities. While water rights are the jurisdiction of the SWRCB, the Council should recommend plans that assure that sufficient water is transported by the facility to restore long term average export supply and be financially feasible.

2. The SWRCB must assure that all Delta diversions occur consistent with verified water rights.

Upstream and Out of Delta Actions

3. Recognize SWRCB jurisdiction over flow measures and recommend that in balancing economic and environmental uses of water in support of flow decisions, the SWRCB must recognize the water rights priority system, area of origin rights, minimization of impacts to hydropower production, and economic reliance on water license decisions to date. Recommend that water users be compensated from general public sources, when such use is adversely impacted by flow regulation.

4. Promote the development of additional surface water and groundwater storage to provide for improved flows and water supply reliability.

5. Recommend the SWRCB and USGS develop a real-time diversion data telemetry system linked to water diversion permits to assure only legal diversion of water.

6. Make recommendations to streamline and reduce regulatory burdens for water transfers.

7. Recommend the SWRCB combine the place of use for Central Valley and State Water Projects with appropriate third party protections.

8. Recommend programs to provide incentives for increased water conservation, wastewater recycling, groundwater recharge, and desalination.

9. Support regional plans to develop additional local water resources and advance self-sufficiency.

Discussion

Over fifty years ago, when developing the California Water Plan, biologists and engineers recognized that an isolated conveyance was necessary to balance fishery and water supply needs. This conclusion has been confirmed by the Public Policy Institute of California, Delta Vision, and federal and state fishery agencies. An isolated facility will predominantly eliminate reverse flows in Old and Middle river, effectively ending entrainment of San Joaquin Valley salmonids, and insulate the California economy from virtually certain catastrophic failure of Delta levees. Improving the water quality of exports will allow greater use of recycled water, supporting efforts to reduce reliance on future water supplies coming from water transported through the Delta.

Better collection and management of water diversion data compared against water rights permits will reduce illegal diversion of water. Increasing water transfers will allow for improved water supply reliability without increased net water diversions. Combining the place of use for the CVP and SWP will allow for increased water transfer opportunities. Incentives for alternative resources can improve the economics of alternative resource development through local water resource plans.

b) Protect and enhance the unique cultural, recreational and agricultural values of the California Delta as an evolving place.

In – Delta Actions

1. Recommend the preparation of a strategic levee investment plan recognizing sea-level rise, relative levee vulnerability, critical infrastructure, high value agriculture and dense settlement. Make recommendations for the prioritization of levee investments. Promote the conversion of deeply subsided islands to peat restoration/carbon sequestration wetlands and/or allow for strategic abandonment of selected islands.

2. Coordinate jurisdictional agencies to improve levee failure emergency response capability, integrated with long-term strategic levee investment plan.

3. Coordinate jurisdictional agencies to integrate habitat restoration actions with expanded recreational uses. Levee rehabilitation should be focused on long-term sustainable uses and improve public access recreational opportunities.

Out of Delta Actions

4. Provide for coordination of in-Delta flood control and levee investments with the Central Valley Flood Control Plan

Discussion

The Delta Plan should recognize that sea level rise is occurring and will continue to occur, and will fundamentally change the geography of the Delta, eventually reclaiming deeply subsided islands. Credible experts have pointed out that the majority of western and central Delta levees could not withstand a significant earthquake and retrofitting these levees is not financially realistic, nor physically practicable. Further, the value of the private lands behind the levees does not justify public investment to protect against earthquake threats or sea level rise. Improvement of levees should only occur where local land use values and investment can support the investment without public subsidy. Levee failure response planning should be based on the long term view of the strategic investment plan.

c) Restore the Delta ecosystem, including its fisheries and wildlife, as the heart of a healthy estuary and wetland ecosystem.

In – Delta Actions

1. Promote removal of excess nutrients and correction of nutrient imbalances though nutrient removal from the Sacramento County Regional Sanitation District wastewater treatment plant effluent and other municipal wastewater plants in the Delta watershed adversely affecting ammonia levels in the Delta.

2. Coordinate jurisdictional agencies to provide for restoration of 20,000-80,000 acres of restored tidal and seasonal floodplain habitat.

3. Coordinate Delta Plan ecosystem measures with upstream restoration programs in the Sacramento and San Joaquin Valleys.

Upstream and Out of Delta Actions

4. Based on life-cycle modeling studies, work with the fish agencies and stakeholders to address key factors limiting native fishery production and health.

5. Provide for a mark-select salmon fishery to allow for healthy commercial salmon fishery and healthy native salmon survival.

6. Coordinate jurisdictional agencies to develop plans and implement actions to restore and enhance native fish species and reduce or extirpate non-native fish species, to the extent possible.

Discussion

Recovery of important fish species will require action on all significant ecosystem stressors, as well as restoration of nursery and rearing habitat for fish. Life cycle models of individual species should be compared to discern patterns of important common ecosystem stressors for prioritized action.

d) Promote statewide water conservation, water use efficiency and sustainable water use.

In – Delta and Out of Delta Actions

1. Provide incentives for increased water conservation, wastewater recycling, groundwater recharge and desalination.

2. Recommend the SWRCB and water purveyors focus water conservation incentives on water savings otherwise lost to reuse, e.g., discharges to salt-sinks.

3. Integrate current DWR 20-2020 water conservation program into the Delta Plan.

Out of Delta Actions

4. Integrate recommendations of the forthcoming Technical Report on Efficient Water Management for Regional Sustainability in the Sacramento Valley into the Delta Plan.

Discussion

The Delta Plan should build upon and support existing state policy to achieve the goals of the recent 2009 water legislative package by supporting efforts that develop local water resources and allow for reduced reliance on water transported through the Delta. Such incentives must be targeted where real basin-wide water savings are achieved.

e) Improve water quality to protect human health and the environment consistent with achieving water quality objectives in the Delta.

In-Delta Actions

1. Facilitate construction and operation of an isolated conveyance facility of 15,000 cfs capacity from the Sacramento River to South Delta pumping facilities. While water rights are the jurisdiction of the SWRCB, the Council should recommend plans that assure that sufficient water is transported by the facility to restore long term average export supply and be financially feasible.

2. Promote removal of excess nutrients and correction of nutrient imbalances though nutrient removal from the Sacramento County Regional Sanitation District wastewater treatment plant effluent and at other municipal wastewater plants in the Delta watershed adversely affecting ammonia levels in the Delta.

3. Coordinate jurisdictional agencies to continue monitoring fish for acute and chronic toxicity and effect controlling of significant toxicant sources.

Discussion

The single greatest measure that would improve drinking water statewide is the construction of an isolated facility to insulate public drinking water supplies from constituents that create difficult and expensive water treatment problems. Reduction of ammonium from wastewater discharge is fundamental to restoring an ecological system that supports pelagic fish. Further work is necessary to assure other sources of toxicity do not impair ecosystem restoration in the Delta.

f) Improve the water conveyance system and expand statewide water storage.

In-Delta Actions

1. Facilitate construction and operation of an isolated conveyance facility of 15,000 cfs capacity from the Sacramento River to South Delta pumping facilities. While water rights are the jurisdiction of the SWRCB, the Council should recommend plans that assure that sufficient water is transported by the facility to restore long term average export supply and be financially feasible.

Out of Delta Actions

2. Support development of local partnerships among the State, USBR and local entities to evaluate and develop appropriate surface and groundwater storage investments.

Discussion
An isolated facility and increased statewide storage are necessary to reduce impacts of water diversion on environmental uses of water and provide for additional management capability for and increased amounts of environmental water flow.

g) Reduce risks to people, property and state interests in the Delta by effective emergency preparedness, appropriate land uses and investments in flood protection.

In Delta Actions

1. Facilitate construction and operation of an isolated conveyance facility of 15,000 cfs capacity from the Sacramento River to South Delta pumping facilities. While water rights are the jurisdiction of the SWRCB, the Council should recommend plans that assure that sufficient water is transported by the facility to restore long term average export supply and be financially feasible.

2. Coordinate jurisdictional agencies to prepare a strategic levee investment plan recognizing sea-level rise, relative levee vulnerability, critical infrastructure, high value agriculture, and dense settlement. Recommend prioritized levee investment and conversion of deeply subsided islands to peat restoration/carbon sequestration wetlands and/or allow for strategic abandonment of selected islands.

3. Coordinate jurisdictional agencies to improve levee failure emergency response capability, integrated with long-term strategic levee investment plan.

Discussion
Over two-thirds of the California economy relies on water transported through the Delta. Insulating this economy from the effects of inevitable catastrophic levee failure is paramount. An integrated strategic levee investment, flood control, habitat restoration, and economic development plan needs to recognize the inexorably evolving nature of the Delta landscape that will not allow for current land uses to be sustained.

h) Establish a new governance structure with the authority, responsibility, accountability, scientific support and adequate and secure funding to achieve these objectives.

Out of Delta Actions

1. Through the Sacramento-San Joaquin Delta Reform Act, the Legislature took the first steps in modifying the Governance Structure for the Delta. The Council should explain its expectations of the Delta Plan, specifically, how the plan will enhance decision making, coordination and accountability. Limitations on these expectations can be noted and identified. Where the Council believes new or enhanced authority or responsibility for existing organizations or reformed organizations is appropriate beyond that now afforded in law, it should make recommendations accordingly.

Attachment 2

San Joaquin River Group and the State and Federal Contractors Water Agency
Joint Comments on the 2-14-11 First Draft of the Delta Stewardship Council's Delta Plan

GENERAL COMMENTS:

The DP must improve in clearly articulating, along with the legislative citation, which activities the Council considers within its regulatory purview, those that it will be "promoting", and those about which it will be making recommendations to other jurisdictional entities with pertinent authorities.

As stated at one point in the draft [page 1-1, line 27], no single effort or plan will achieve or "implement" the coequal goals. Consequently, the document should refrain from making and repeating the statement that the purpose of the Delta Plan (DP) is to "implement" or "achieve" the coequal goals. It is more accurate to say, as the draft does on page 2-1 at line 4, that the DP will "further the coequal goals", which is also how the Delta Reform Act (Act) puts it in section 85300(a): "the council shall develop…[a] Delta Plan…that furthers the coequal goals".

Throughout the DP there are references to the goal for water supply as "manage water resources," rather than using the statutory description of "providing a more reliable water supply." This is inappropriate and the language of the statute should be used rather than the phrase "manage water resources." The use of that term to describe a subset of water management actions contributing to greater reliability would be appropriate, but not as an overarching approach to fostering achievement of the coequal goals.

Further, with regard to water supply/management components of the DP, we remind the Council that the Act includes specific identified outcomes that must be used to determine the DP's ultimate success in satisfying the "providing a more reliable water supply for California" prong of the coequal goals:

> Section 85302(d) The Delta Plan <u>shall include</u> measures to promote a more reliable water supply that address <u>all</u> of the following:
> (1) Meeting the needs for reasonable and beneficial uses of water.
> (2) Sustaining the economic vitality of the state.
> (3) Improving water quality to protect human health and the environment.
> [Emphasis added.]

The current draft of the DP does not adequately reflect the Legislature's clear direction in section 85302(d). The DP should include discrete references to the outcomes set forth in section 85302(d)(1)-(3), and use them as organizing principles for the actions, policies, strategies and recommendations proposed within the DP that are intended to further their achievement.

We also point out that the draft does not discuss the reasonable use doctrine in a balanced manner. All beneficial uses of water within California are subject to the doctrine and the dictates of the Constitution's Article X, Section 2. The DP must incorporate that principle not only in its recommendations regarding "water management actions", but also to potential measures intended to benefit fish and wildlife.

In addition, although the draft defines "best available science", it cites documents to support some of its findings, conclusions and recommendations that do not meet that definition. For example, the draft relies upon the State Water Resources Control Board flow criteria report which by its own terms does not meet the "best available science" standard and which the Board itself acknowledged was rife with questions and uncertainties, as well as fundamentally not representing a valid approach to the setting of actual flow standards consistent with the Board's authorities and responsibilities pursuant to the balancing of beneficial uses. Moreover, the DP's similar reliance on the OCAP biological opinions, one of which was invalidated in many technical and scientific respects by the District Court, and the validity of the other is currently being challenged in that same court, is not consistent with the requirement in section 85302(g).

It is important that the DP describe "covered actions" consistently throughout and with a level of detail reflective of the definition in the Act, rather than only stating that covered actions are those that occur in whole or in part in the Delta or Suisun Marsh. Per section 85057.5 of the Act, there are additional criteria that must all be satisfied before an activity qualifies as a "covered action" and is subject the Council's consistency review authority: it must also be carried out, approved or funded by a state or local public agency; be covered by the Delta Plan; and, impact the co-equal goals or flood control capability in the Delta. Hence, not all projects in the Delta are necessarily "covered actions".

We urge the Council to focus, as well, on the particularly important need for the overall clarity of the DP given that state and local public agencies proposing to undertake "covered actions" must prepare a written certification that includes detailed findings that the proposed action is consistent with the DP. Without such clarity, certifications will be more difficult to prepare and unnecessary appeals to the Council could result.

With respect to the "working categories of potential policies and recommendations" found at the end of each chapter, the Council and the DP must take into account and not seek to reinvent the wheel where the state, with stakeholder input, has already developed policies and recommendations, and sometimes performance measures, for many of these same categories in the last few years. The Council and the DP should identify those efforts and allow sufficient time for agencies to implement such existing recommendations before rushing to develop redundant policies and regulations.

As one example, with regard to improving the management of water resources, the State has already developed the following policies and recommendations:

- Recycled Water - the SWRCB has adopted a Recycled Water Policy after input from a task force.
- Groundwater Management - The recycled water policy affects groundwater recharge and salt and nutrient plans are being developed for groundwater basins throughout the state. AB 2222, passed in 2008, established a task force through the SWRCB to extend the USGS GAMA (Ground-Water Ambient Monitoring and Assessment) Program. The SWRCB has received a "constituents of emerging concern" blue ribbon panel report. As part of the Act, SBX7-6 provided for DWR to start the CASGEM (California Statewide Groundwater Elevation Monitoring) Program.
- With regard to water use efficiency and 20x2020 criteria, methodologies and criteria are being established.
- Stormwater and new development standards: the Regional Boards have new requirements for MS4 Permits. MS4 applies to any storm drain or water body modified for flood control. Also there are already many discussions of Low-Impact Development criteria going on at state, county and local government levels.

The Council and the DP should inventory all that has already been developed, is in the process of being developed, and has already been directed to be developed in the areas pertinent to all of the lists of "working categories of potential policies and recommendations".

TABLE OF CONTENTS:

Chapter 1: should identify the Delta as critical not only to California, but also to the Nation.

Chapter 2: "Implementation" of the coequal goals is not a "purpose". "Contributing to the achievement of the coequal goals" is a "purpose" and such language should replace "implementation".

Chapter 5: "reliability imported from the Delta" doesn't make sense. Instead of "Measurable Assessment of Water Supply Reliability Imported from the Delta Watershed", we suggest "Measurable Assessment of Long-Term Reliability of Water Supplies Imported from the Delta Watershed."

Chapter 5: headings list a finding to "Promote" a more reliable water supply but then Chapter 6 is entitled "Restore Delta Ecosystem". These are not "equal" objectives consistent with "the coequal goals." To be consistent with the definition of the coequal goals in the Delta Reform Act, "Promote" in the Chapter 5 heading should be replaced with "Provide".

CHAPTER 1:

1-1, L 3: "ensure" is not the right word, as the legislation itself will do no such thing. We suggest "establish improved" as a substitute for "ensure", along with adding "as the coequal focal points of water management in the state." at the end of the sentence after "Marsh".

1-1, L 11: the "fundamental purpose" cannot be to "achieve" the coequal goals, as no single action or plan will *achieve* them. There will be multitudes of actions all over the state, as well as in the Delta, necessary to actually "achieve" the coequal goals over the course of decades. The purpose is to develop a DP that will <u>contribute</u> to the achievement of and "further" the coequal goals as part of a broader approach that will ultimately include actions beyond the scope of the DP and the jurisdiction and authorities of the Council.

1-1, L 22: "reduce future risks" to "most" of California. The risks to the Delta, Suisun Marsh and "most of California" are distinct and should be more specifically identified to better understand what the DP is being designed to address.

1-1, L 24: substitute "help California attain" for "attain" the coequal goals.

1-1, L 28: insert "all of the related" prior to "the water and ecosystem".

1-2, L 3-4: Heading (and following discussion) should also identify the Delta's role as the hub of the state's major water projects and as being critical to California and the nation, considering the economic activity and agricultural production dependent on State Water Project (SWP) and federal Central Valley Project (CVP) deliveries.

1-2, L 6-7: Water doesn't "flow" through the Delta to "more than two-thirds of all Californians." Water diverted to storage upstream and released there from eventually flows to and through the Delta to the SWP/CVP pumping and conveyance facilities, which then deliver it to agencies serving 25 million Californians, and 4 million acres of highly productive agricultural lands.

1-2, L 7-9: The 600,000 residents number should be replaced with or supplemented by the split of residents between the secondary and primary zones, or at the very least, the sentence should end by acknowledging that most live on the edges of the Delta in the "Secondary Zone."

1-2, L 11: Use of the term "islands" is misleading. The document should either include or footnote a description about subsided lands and the resulting "subsided depressions surrounded by channels" where levees are actually dams holding back water and protecting people and property behind them, 24/7/365.

1-2, L 33-35: This section inappropriately omits the impact of other stressors (invasive species, pollution, predation, etc.), which have increasingly come into focus as primary drivers negatively impacting species of concern in the Delta, and which have had the greatest impact on the "Delta and its sustainability." In addition, there is no mention of the dramatic alteration of the Delta's geometry over the last 150 years. The Delta has been all but completely channelized and most every natural watercourse has been modified, resulting in a loss of 95% of all wetland habitat, which certainly has had and continues to have a major impact on the Delta's sustainability. Moreover, the impact of past and current actions <u>in</u> the Delta on its sustainability must be acknowledged too, including land conversion, agricultural water use and runoff, unscreened diversions, etc. While the DP's statement about agricultural and urban "use patterns" (a term which is undefined, but needs to be) and actions "outside the Delta" being a significant factor impacting "the Delta and its sustainability" is valid, it is too simplistic to assert they "have perhaps the greatest impact". The current language perpetuates a mythology that diverts attention from and is not reflective of a more comprehensive approach that should be at the core of the DP.

1-2, L 36-37: The statement that "Water management practices across the state affect demand on water supplies conveyed through the Delta" is overly broad as a stand-alone assertion. Substitute "within the Delta watershed and in the export service areas" for "across the state".

1-3, 1-4: This bullet should also note that 95-98% of the biomass in the Delta is non-native.

1-3, 11-12: Again, it is important to segregate the numbers to reflect the dramatic difference between the primary and secondary zones. The former supports something like 6,000-8,000 jobs and much less acreage that is utilized for non-pasture agriculture. Not including these specifics gives a false impression to the reader of the potential impacts of various actions within "the Delta" since most impacts will occur in the primary zone where there are many fewer people, jobs, acres of non-pasture agricultural lands, etc. This is not to say that such impacts in the primary zone should be discounted, but rather that the DP should present a more precise rendering so they can be better acknowledged, understood and addressed.

1-4, L 3: "failure" of what? This is too opaque.

1-4, L 7-11: This sentence needs to be reworked as it is awkward and suffers from an apples and oranges problem. "Water supplies and ecosystem health" are not of the same category as levee investment and the capacity of the Delta economy in their ability to "counter" various risks in the Delta.

1-4, L 14: Because the seismic risk also imperils water conveyance in the Delta, "water supplies" should be added to the list of what is threatened (i.e. "residents, visitors, agriculture, water supplies and the ecosystem"). Although this is called out in the bullets subsequent to this sentence, it is important to include it in both places as are the other interests.

1-6, L 3-5: No government can make it rain or snow and including this statement implies there is an unmet expectation of that by some. The statement should either be deleted or revised along the lines of the following: "The limitations of current infrastructure capabilities, in combination with the nature and timing of water demands, both current and future, make it all but impossible to reliably and affordably meet all demands at all times." And while not necessary to address in this particular section, the DP needs to emphasize, as it notes in some instances already, that investment in infrastructure can improve water supply reliability and long term sustainability of water supplies, while enhancing operational flexibility that will also contribute to ecosystem recovery and restoration.

1-6, L 11-17: Because the first part of this sentence, "to plan for regionally sustainable water supplies to meet reasonable water demands for all beneficial uses", is not within the purview of the DP, we suggest putting a period (".") after "beneficial uses". Begin the next sentence with, "The Delta Plan is intended to help implement….", and delete the last sentence since the point is made by having moved the phrase to the beginning of the second sentence. It would also better reflect the breadth of the Act's charge to the Council and its direction regarding the content of the DP in section 85020 to include a reference to improvements to "the water conveyance system and expand statewide water storage" in the second sentence.

1-6, L 15-16: substitute "for" for "an" and add "consistent with the coequal goals" at the end of the sentence.

CHAPTER 2:

2-1, L 4-5: The DP should only be addressing policies "inherent" to management of the Delta (i.e. those identified in section 85020 of the Act) and those defined by the Act's specific direction regarding DP content (section 85300 et. seq.), not "all" policies or "objectives" identified in the Act, which this sentence implies is the intent. The DP must stay within the limits the Legislature defined in the Act.

2-1, L 7: Substitute "covered actions" for "projects".

2-1, L 9-11: Substitute "Contributing to" or "Furthering" for "Meeting" at the beginning of the sentence. Also, insert "("covered actions")" between "projects" and "that" to clearly reflect the fact that it is only "covered actions" that are subject to ultimate consistency determinations by the Council. In addition, it may be useful to also refer to the statutory definition of "covered actions" per section 85057.5: (1) occurs in whole or part in the Delta or Suisun Marsh, (2) will be carried out, approved, or funded by the state or a local public agency; (3) is covered by one or more provisions of the Delta Plan and (4) will have a significant impact on the achievement of one or both of the coequal goals or the implementation of a government-sponsored flood control programs to reduce risks to people, property, and state interests in the Delta.

2-1, L 17: The reference to section 85021 as partly defining objectives of DP is inappropriate and it should be deleted. Section 85021 is a discrete and separate policy statement by the Legislature that is not "inherent" to, or directed to be included in, the DP; nor does it confer any authority upon the Council. [It is telling that at page 3-1, L 17 the "inherent objectives" listed are only those appropriately gleaned from section 85020, without any mention of section 85021.]

2-2, L 11-16: Delete the quotation of section 85021.

2-2, L 35: The Council will not be "implementing" all of the DP, various other entities, including local governments proposing "covered actions" will be "implementing" the DP. The Council is to develop the DP and "implement" only those components within its purview and which are not within the purview of other existing agencies or processes. As noted in the subsequent sentence, the DP will provide "guidance" and it is more appropriate to state that the Council will implement portions of the DP and "will assist in guiding state and local agency actions related to the Delta" (section 85300(a)) consistent with the DP. While the DP will provide recommended guidance with regard to enforcement efforts across state agencies, actual enforcement is left to existing agencies under their existing authorities and discretion.

2-2, L 35-37: This discussion of the Council's authority regarding "covered actions" is pertinent to the "use" of the DP, but it isn't really relevant to a discussion of the "geographic scope" of the DP. While "covered actions" essentially delineate the limits of the Council's authority with regard to "legally enforcing" consistency with the DP, the discussion of the primary and secondary planning areas is relevant to the actual geographic scope of the DP itself. These are distinct issues that should be more clearly differentiated.

2-4, L 10-13: The DP includes the SWRCB's Delta flow criteria report and DFG's flow criteria and biological objective report as "other plans" the Council will consider during preparation of the DP. This, of course, was the intent of the legislation, although we again request a clear statement from the Council, in the next iteration of the DP perhaps, as to how it expects to "use" these reports and its perspective on issues related to river flows in the DP. We also feel compelled to remind the Council of the limited utility of these reports in that, as particularly caveated in the SWRCB report, both were prepared with a very narrow focus; namely, (1) looking at flow only, (2) ignoring the impact of other stressors, (3) assuming current conditions in the Delta and ignoring planned infrastructure and habitat improvements in the BDCP and other plans and, (4) there was no regard given to impacts on other beneficial uses. Consequently, it is clearly evident that the flow criteria developed in these reports ignore one of the two coequal goals, i.e. "a more reliable water supply for California." Moreover, these reports were developed in truncated processes that did not allow for rigorous debate over the merits of the criteria or the science underlying them. While at least the SWRCB held three days of "hearings", DFG developed its report behind closed doors with little public input whatsoever. Finally, in any proceedings considering the use of such flow criteria, a much broader array of interests must be considered before any determination of the appropriate criteria can be finalized.

2-4, L 24: Unlike the requirements set forth in section 85320, section 85321 represents a separate and distinct requirement the Legislature established for the BDCP but it is not an express requirement for consideration or incorporation of the BDCP into the DP and reference to it in this sentence should be deleted.

2-4, L 26-27: Contrary to how this sentence is written, it is not for the Council to determine whether the BDCP has satisfied the requirements set forth in section 85320. That job was expressly delegated to the DFG by the Legislature. The Council is only to determine if DFG's certification of BDCP's satisfaction of the statutory requirements was reasonable, if, and only if, that certification is appealed to the Council.

CHAPTER 3:

3-1, L 3: Add "and recommend" after "provide" as many of the components of the DP will involve choices by other entities. Only with respect to "covered actions" will discretion be limited.

3-3, L 10: The notion of using "anecdotal evidence" as potentially determinative of or contributing to the "best available science" is unacceptable and the term should be deleted. While anecdotal "evidence" may be relevant to an investigation and reflect the "best available information", it should in no way be equated with "science".

3-3, L 17: By the express language of the Act, section 85021 does not help "define" the coequal goals, and the citation to it should be deleted.

CHAPTER 5:

5-1, L 3: It's the "Bay Delta Conservation Plan" not "Program".

5-1, L 8: While it is true the water supply is "finite" (a statement that applies to water globally), the amount available to California can vary greatly from year-to-year -- from flood to drought and everything in between. This statement is essentially meaningless in the context of modern water management and should be deleted.

5-1, L 8-9: It is not the water right system that has led to unsustainability; it is competition for water supplies that now includes an overlay of environmental demands that weren't contemplated when the state's backbone water system was developed. California confronts primarily a management problem, combined with an infrastructure deficit, rather than a lack of water.

5-1, L 10: The notion that there is a "growing need to restore adequate water supplies to protect the state's environmental resources" neglects the incredible redistribution of water that has already occurred to meet environmental regulatory demands. The need is far from simply throwing more water at the problem, as this statement implies, but rather to reassess the efficacy of that long applied strategy in the context of increasingly competing demands to serve all beneficial uses and improved ecological understanding of other stressors on the system. Consequently, we suggest deleting “growing” and substituting “provide” for “restore”.

5-1, L 11: the “trajectory of water conflicts” is actually more than sustainable, were trying to get out of them, so this should be rewritten. Perhaps replace the last clause with “we find ourselves in a circumstance of unsustainable gridlock.”

5-1, L 21-22: Improving the Delta ecosystem is not a “necessary condition” for improving the water supply system for California, which is not limited to Delta related infrastructure. It would be more accurate to say that, pursuant to environmental laws, Delta ecosystem improvements are a requisite component of moving ahead with restoring the reliability and volume of export and other water supplies dependent on the Delta watershed.

5-1, L 27-30: Businesses have and do make decisions every day based upon data of dubious quality from many sources, or even based upon no data. The sentence should be revised simply to make the point that water information quality can be improved.

5-1, L 34: Is water supply “resiliency” the same as “reliability”? Why introduce this term and what does it mean, especially in the context of the DP?

5-2: under “Other objectives”: Why are the reasonable use and public trust doctrines “particularly applicable” to the Delta watershed and areas that use “Delta” water? These doctrines are equally applicable to all water use in the state. We suggest substituting “, as they are to all waters of the state,” for “are particularly”. In addition, here and elsewhere in the document, the notion that “Delta water” is used outside of the Delta proper is incorrect. Water that is exported by the SWP/CVP is diverted in the Sierra and conveyed to and through the Delta.

5-3, L 13-17: The statement “California regularly uses more water annually than is provided by nature” should be revised to read “The natural availability of water does not provide sufficient quantities in all places at all times that allow for all consumptive or environmental needs to be met. Deterioration in the ability to transfer water in times and places of surplus to other places and at other times of deficit, have contributed to unsustainable groundwater use in some areas of the state.” As a reminder, this is a problem of infrastructure and management, not of water supply per se as nature provides California with more than adequate precipitation: Total supply (precipitation + imports); wet year = 335.8 MAF, average year = 194.2 MAF, dry year = 145.5 MAF; while dedicated supplies in a wet year = 97.5 MAF, average year = 82.5 MAF, dry year = 65.1 MAF.

5-3, L 21: typo, delete “to the”

5-3, L 24: typo, “assumptions” not “assumption” and “demand” not “demands”.

5-3, L 25: The word “wrong” should be replaced with “have become outdated”.

5-3, L 26: insert “current” or “existing” before “water supply and storage system”. It would be beneficial to also add the fact that our management capacity (including particularly the lack of flexibility in the applicable regulatory regime today and which will grow in the future since it is unable to adapt to reflect the reality of climate change) isn’t currently adequate either.

5-3, L 35: As stated in the Constitution, insert “to the fullest extent of which they are capable” after “purposes”.

5-3, L 37: The Public Trust Doctrine is not based in the Constitution and it is incorrect to describe it as such. It is a common law doctrine adopted through the courts, with lineage back to the canals of England which were all owned by the realm but which the people were allowed to use as they were held in “trust” for them by the King/Queen. The word “constitutional” should be deleted.

5-3, L 36-39: There is no absolute connection between preventing waste and allowing “the natural environment to be protected.” This sentence should be rewritten. Perhaps, instead of “will increase water reliability and allow the natural environment to be protected”, we suggest “may increase water supply reliability in some areas and could provide additional flexibility to better protect the natural environment.”

5-3, L 40: typo, delete “the use”

5-4, L 3-12: While we do not disagree with the finding/discussion of investments in regional self-reliance included here, we do not understand why it is included and suggest it should be deleted as this subject matter is beyond the scope of the DP. In addition, linking the benefits of any such investments back to furthering the achievement of the coequal goals in the Delta is dubious.

5-4, L 13-14: Delete “SURFACE AND” and insert “UNMANAGED” between “IF” and “GROUNDWATER”. Not all surface supplies are connected to groundwater and as written this finding is much too broad.

5-4, L 20: insert “unmanaged” before “overdraft”.

5-4, L 21.5: We suggest the “Promote a More Reliable Water Supply” section is deficient because it does not include a finding that the identification and elimination of illegal Delta diversions is necessary to further achievement of the coequal goals. This omission is glaring for several reasons. First, The DP asserts California suffers from groundwater overdraft and the Council Chairman and Executive Officer have repeatedly stated that the water system generally is “oversubscribed”. Illegal diversions should not be tolerated considering this overburdened state of affairs. Second, the DP identifies the need for more information regarding the supply and demand of water. Eliminating illegal diversions would help resolve uncertainty regarding water use in the Delta. Third, the State Water Resources Control Board has concluded the “number and magnitude of illegal diversions” in the Delta “could be quite significant.” Fourth, eliminating illegal use must be prioritized over regulation and curtailment of legal water uses.

5-4, L 29: Ag water “use” is incorrect in that what’s being described is probably “applied water”. This needs to be checked, and if it is “applied water” that should noted and defined.

5-4, L 37-38: The assertion that "The per capita use of water in urban areas of California has remained essentially the same for the past 40 years" does not appear to be accurate. The reference cited Bulletin 166-94, which contains data up to 1990, does show per capita relatively unchanged in the 1970's and 1980's. However, none of the cited references have data from 1990 to 2010. The cited reference to the 20x2020 Water Conservation Plan makes no such assertion and the data in the report for 1995-2005 does not seem to support the stated assertion. More recent versions of Bulletin 166 do not support this statement either. Indeed, there is no question that some areas of the state have achieved significant urban residential conservation on a per capita basis and this should be acknowledged.

5-5, L 5-6: The statement that “DWR has identified the potential need to develop over 3.8 to 9.6 million acre-feet of new water supplies over the next twenty years…" "(based upon information included in the DWR Water Plan, 2005)" seems inconsistent with the citations and we suggest the statement be double-checked. Our read of the range in Water Plan 2005 is 0 to 4 MAF from the least to the highest demand scenario. Even if one adds 2 MAF for groundwater overdraft, the range would be 2 to 6 MAF. DWR has subsequently refined its analysis and taken climate change into account for its Water Plan 2009. We urge the use of the data from the 2009 Water Plan rather than that from the 2005 version.

5-5, L 28: typo, "has" for "have".

5-5, L 26-37: This "finding" needs to better reflect that most of this reduction in reliability has been a consequence of Endangered Species Act (ESA) regulation, as well as contracting and O & M problems within the State Water Project. Moreover, it is expected that implementation of the BDCP will increase these reliability figures significantly and that should be acknowledged as well. Climate change will still be a problem, but investment in new facilities and improved conjunctive use programs would help ameliorate the impacts.

5-5, L 41-44: This sentence is garbled and confusing and needs to be rewritten.

5-5, L 44-45: This statement is unfortunately largely incorrect since it fails to recognize the impact of the imposition of restrictions under the ESA. Prior to recent regulatory constraints there was an ability to move water to available storage south of the Delta – e.g. Diamond Valley Reservoir and the Kern Water Bank. Today, these storage investments have been largely stranded by the inability to move large volumes of water in wet years and during wet periods of normal years. Conveyance limitations are now more critical to address in order of priority than storage to re-establish the benefits of these stranded assets. Long term, if conveyance is addressed, additional storage will be necessary to meet co-equal goals.

5-6, L 7: Substitute "environments" for "ecology".

5-6, L 28: The findings under this section identify an apparent inability to sum up local water use data to give an accurate picture of statewide water use and trends. However, the findings should be revised to better address the assessment required by section 85211(b) which is to assess the reliability of supply imported from the Delta, which would consist of a subset of statewide water supplies and use trends.

5-6, L 42: typo, "available" not "avaiable".

5-7, L 12: Substitute "protocols" for "requirements".

5-7, L 21: Including "Future Water Supply Contracts" on this list of categories subject to the development of policies and recommendations should be deleted as the Council has no authority to reach into that arena.

CHAPTER 6:

6-1, L 4: BDCP is a "Plan" not a "Program".

6-1, L 10-11: The Delta ecosystem is not "in peril". In many ways it is a vibrant ecosystem with many species expanding and it now supports a multi-million tournament bass industry which did not exist twenty years ago. It's just not supporting the species we want it to support, particularly native species and those of concern because of environmental regulations such as the ESA. This vibrant ecosystem is still evolving and unless action is taken, it will evolve further away from that favored by law.

6-1, L 14: should add "for native species" after "healthy ecosystem".

6-1, L 17: states that "the Delta ecosystem is now on a trajectory of change that cannot be completely reversed…" This is not a recent phenomena, the irreversible trajectory began with the "reclamation of swampland" over 150 years ago, and mining, etc. We suggest substituting "has been" for "is now" and inserting "for over a century" between "change" and "that".

6-1, L 19: add at the end of the sentence, "with regard to preferred native species and desired ecosystem functions."

6-1, L 30: we suggest inserting "the need for continuing and" prior to "substantial".

6-3, L 18.5: A finding should be added based on the PPIC Envisioning Delta Futures report Appendix A regarding the need for a "new paradigm" of ecosystem assessment and response, while developing an improved understanding of what was "wrong" about previous restoration efforts. Another pertinent finding to add would be one acknowledging the inherent uncertainty in pursuing ecosystem restoration and the uncertainty of the science upon which it is based.

6-4 L 41-43: This assertion is subject to significant scientific debate. A metric needs to be created to measure variability and it needs to be demonstrated that it has, in fact, demonstrably changed. Moyle et. al., 2010, assert that reductions in variability of flow are a major cause of the pelagic fish decline. However, Moyle et. al. do not define variability; nor have they presented any analysis demonstrating that variability of flow has changed between the period when pelagic fish abundance was relatively high and now. Furthermore, Enright and Culberson, 2010, report no change in flow variability during the era of water project development. We suggest either deleting this sentence, or at least adding language identifying the scientific debate.

6-6, L 7: This section on the reduction of threats and stressors is much too narrow, with the introduction of non-native species and entrainment as the only two system stressors identified as affecting the Delta ecosystem. The Delta ecosystem is far more complex and consists of stressors including, but not limited to, water temperature, tidal influences, sedimentation, channelization, predation, hatchery impacts, illegal harvest, nutrient ratios, subsidence, habitat loss, food web, and sea level rise. We urge that this section be supplemented. Although the stressors that affect the Delta ecosystem are varied and complex, the DP must include a comprehensive assessment and analysis of all stressors and their impact on the ecosystem.

6-6, L 8-12: Should add "95-98% of biomass in the Delta is non-native" in this description.

6-6, L 13-14: With regard to entrainment at the SWP/CVP facilities, this finding is in scientific dispute, particularly with regard to alleged population level effects. There are no studies that show statistically significant relationships between various measures of entrainment and subsequent spawning abundance. Furthermore, two recent life cycle models failed to find statistically significant effects of proportional entrainment over the one-year life cycle of delta smelt. The distribution of longfin smelt is centered in downstream areas so that the fraction of the population susceptible to entrainment is very small, approaching 0.0%. Two factors make the effects of entrainment of delta smelt on subsequent spawning abundance statistically insignificant: (1) Density dependence acts at higher levels of abundance to mute entrainment effects, and (2) the variation in other important factors, most notably food, are so large relative to entrainment effects that entrainment effects cannot be detected. This finding needs to at least add some narrative explaining the nuances of the entrainment issue.

6-6, L 29-31: New flow standards must be designed to achieve both prongs of the coequal goals not just ecosystem restoration. Indeed, it is expected that the BDCP will result in new flow standards serving both prongs of the coequal goals. It is inappropriate and sadly ironic that the DP cited to the SWRCB 2010 flow criteria report as the basis of asserting a need for more flow to meet the ecosystem restoration objectives (as yet to be determined) of the coequal goal when by its own admission the SWRCB completely ignored any aspect of the water supply reliability component of the coequal goals in developing its report and subsequent analysis of the developed criteria have been shown to completely crash the water management system, emptying reservoirs to the devastation of the state's economy, the significant loss of clean hydropower generation, and to the detriment of salmonid resources due to lack of cold water resources in dryer years driven by the flow object.

CHAPTER 8

8-1, L 15: there should be a footnote to use of the term "islands" since so many are really subsided depressions surrounded by channels rather than islands in the conventional sense.

8-1, L 16-17: Threats should also include increased peak flows as a result of climate change and altered hydrology, including more rain than precipitation being locked up in snowpack for release over longer period.

8-1, L 21: should add threat to water system from salt water intrusion etc., and it should be "4" million acres rather than "3".

8-1, L 23: should add threat to ecosystem values as well from levee failure, including previous, current and probably future investments in habitat that already do or will rely on levees too.

8-3, L 29: "PROCESS" for "PORCESS"

8-4, L 12: To meet an explicit charge from the Legislature, there should be a finding which identifies the lack of an existing strategic levee investment plan that identifies and prioritizes necessary improvements, including the consideration of habitat restoration opportunities. There should be an additional finding that these strategic investments in levee improvements must be commensurate with benefits achieved. Further, there should be another finding, as the Legislature has concluded, that not all islands are economically sustainable with respect to the high cost of levee maintenance or reclamation after a breach; e.g. "THE VALUE OF LANDS BEHIND LEVEES OFTEN DO NOT SUPPORT (OR JUSTIFY) THE COST OF LEVEE MAINTENANCE AT EVEN MINIMAL SAFETY STANDARDS AND WHERE THEY DO, OFTEN THE ABILITY OF LOCAL RESIDENTS TO FUND SUCH MAINTENANCE IS WANTING"

8-4, L 40: This finding should be specifically tied to California by mentioning the Delta or California as well as the "nation".

8-5, L 30 & 38: These two findings are redundant in many respects and should be rewritten to eliminate that redundancy.

8-6, L 8: substitute "upstream of" for "connected to"

8-6, L 35-36: Here the numbers are 23 million people and 7 million acres of agriculture. Earlier it was 25 million people and 3 million acres of agriculture. Whatever the numbers are, the document should be consistent.

8-7, L 27: We suggest adding the following to the list of "Working Categories of Potential Policies and Recommendations" for risk reduction; "Study of potential freshwater pathway as response to major levee failure prior to new conveyance coming on-line".

CHAPTER 9

9-1, L 13: insert "the" before "San Francisco Bay Area".

9-1, L 18: add at end of sentence, "consistent with furthering achievement of the coequal goals."

9-3, L 11: Would add "recreational activities" (hunting, birding, fishing, boating, etc.) as helping to "define" the Delta's unique "culture".

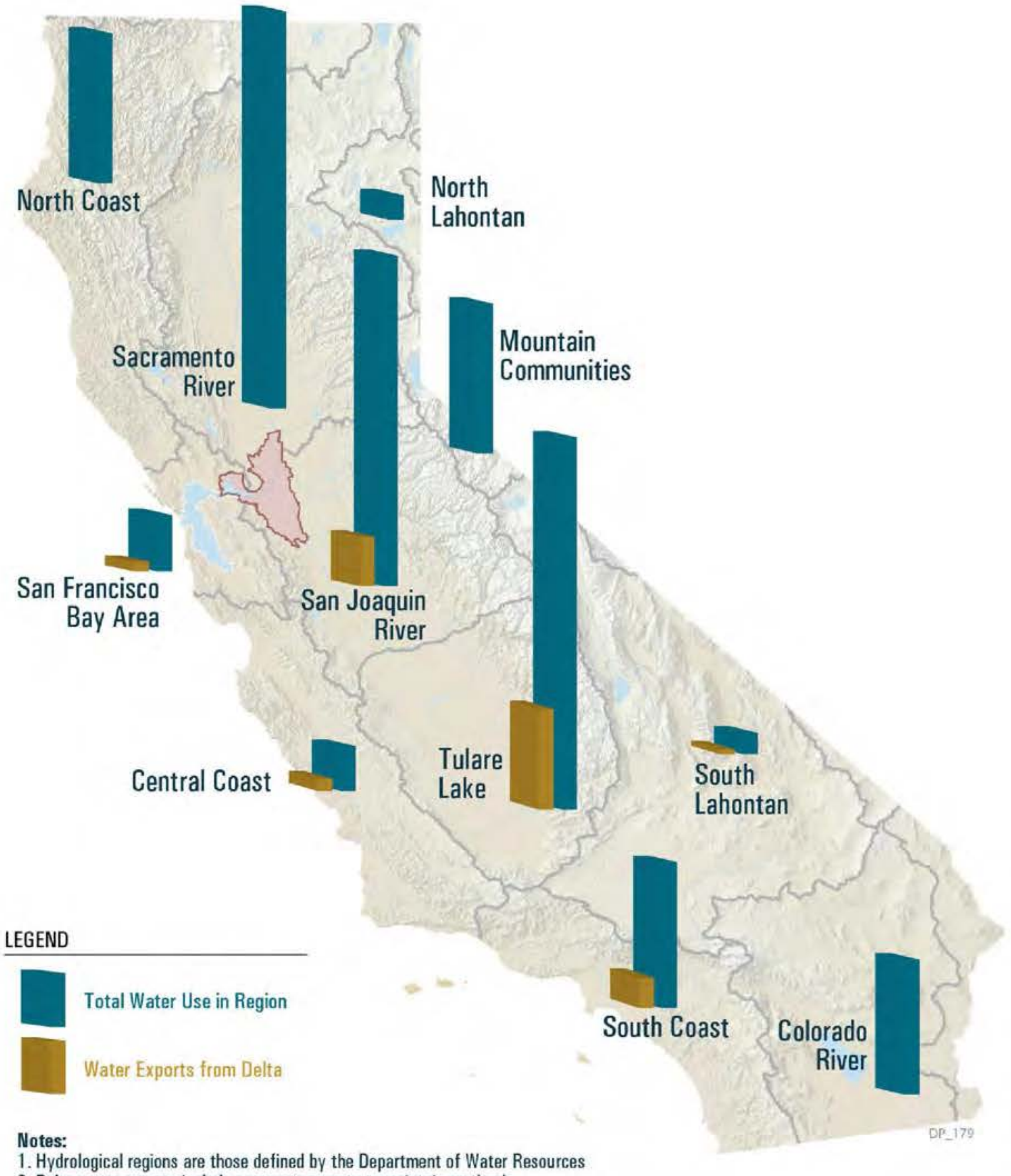
9-3, L 16: The Delta is not the "source" of export water supplies; it is the "source" of water used in the Delta itself. This is an important distinction that cannot be ignored.

9-5, L 25-26: This statement implies that in-Delta agriculture is more economically productive than areas that use or rely on water from the Delta watershed. The DP should provide a table that demonstrates consistently calculated economic values of agriculture of upstream, in-Delta and export areas to inform the Council and the public regarding relative agricultural values. This table should also include the average applied and consumptive water amounts used in each region.

9-5, L 38: actually subsidence has reached as deep as 30 feet in some areas of the Delta, so we suggest substituting "30" for "25".

9-7, L 19: possible typo, missing space between "subsidence" "and"?

Local Water Sources Meet Most of California's Water Needs



Notes:
1. Hydrological regions are those defined by the Department of Water Resources
2. Delta water exports include contract amounts to maintain wetlands

Sources: DWR 2009, Reclamation 2011b, DWR 2011c

Figure 3-3 The vast majority of California's water comes from local sources. Exports from the Delta comprise 8 percent of California's water use. Yet, the Delta supply is important to many regions south of the Delta.

18 Principles for Water Conveyance in the Delta, Storage Systems, and for the Operation of Both to Achieve the Coequal Goals[1,2]

New or Improved Water Conveyance, Storage Systems, and the Operation of Conveyance and Storage is Needed Now. The Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis and existing Delta policies are not sustainable. The current drought underscores this crisis. The Delta Plan includes a series of policies and recommendations intended to build regional self-sufficiency and reduce reliance on the Delta. However, regional actions alone will not be sufficient. After decades of study, decisions on conveyance, storage, and the operations of conveyance and storage need to be made promptly to further the coequal goals.

Delta Conveyance Principles

1. New or improved Delta conveyance infrastructure should enhance the Delta ecosystem, including restoring more natural flows, and increase the reliability that water available for export supplies can be exported.

2. Flexibility is key to new or improved Delta conveyance infrastructure. Conveyance improvements should be able to adapt to changing conditions (hydrology, climate change, and ecosystem needs) both near-term and in the future while continuing to provide benefits to the ecosystem and reliably convey available water supplies.

3. New or improved Delta conveyance infrastructure should increase resiliency of the state's water supply systems in the face of future threats related to climate change and levee failures due to sea level rise, more frequent flood events and earthquakes.

4. The benefits of new Delta conveyance infrastructure should be maximized by integrating with new and expanded storage projects, implementing projects that increase water-use efficiency and conservation, improving groundwater management, and restoring the structure and function of some key Delta ecosystems. New Delta conveyance infrastructure by itself does not create any new supplies of water.

Water Storage System Principles

5. New or expanded water storage projects above and below the Delta are necessary. They should enhance the ability to divert and store water during wet periods, contribute additional flows during dry periods, improve system flexibility to meet the coequal goals, and provide multiple additional benefits

such as flood control, recreation, or hydropower generation. Projects enhance the Delta ecosystem when they help better manage water quality and water temperature - especially during dry years, and when they increase the reliability of water supplies for wildlife refuges. Storing water in wet periods to use in dry periods also increases California's water supply reliability.

6. New or expanded storage projects should be cost effective. The amount of new storage that can be added to the system is limited by California's hydrology and topography. Smaller regional surface water storage projects and groundwater storage projects can sometimes provide significant benefits at a more affordable cost.

7. Groundwater storage opportunities should be protected. Groundwater basins in the Central Valley provide the largest amount of existing capacity to store excess flows from wet years. This capacity is threatened by land use decisions and by land subsidence caused by groundwater overdraft.

8. New or expanded storage projects should provide both immediate and enduring ecosystem and water supply benefits. Climate change and California's changing hydrology will challenge the ability for existing storage systems to maintain the level of benefits they currently provide.

9. New or expanded water storage projects are part of a system and should support a comprehensive approach to managing the water cycle. This also includes conjunctive management of rivers, groundwater, surface storage, floodplains, and wetlands that enhance groundwater recharge and improvements in regional water self-sufficiency.

Delta Water System Operational Principles

10. Water exported from the Delta should more closely match water supplies available to be exported. This should be based on water year type and consistent with the coequal goal of protecting, restoring, and enhancing the Delta ecosystem.

11. Storage and conveyance should be operated to provide more natural, functional flows to enhance Delta inflows and outflows by storing water in wet periods and reducing diversions in dry periods, consistent with the needs of the Delta ecosystem and water users.

12. Operational decisions should be based upon more accurate, timely, and transparent water accounting and budgeting.

13. Additional water supplies can be derived from more efficient reoperation of existing infrastructure.

14. Water storage operational guidelines should adopt a multi-year planning horizon to ensure adequate carryover of stored water in surface and groundwater reservoirs at the end of each water year to buffer against multiple dry years.

15. Surface and groundwater storage, whenever feasible, should be operated conjunctively to reduce long term groundwater basin overdraft and improve groundwater basin recharge.

16. Conveyance and storage infrastructure and their operation should provide real benefits to the ecosystem, in contrast to just protecting the ecosystem from further degradation.

17. Operation of storage and Delta conveyance infrastructure should be informed by best available science, adequately monitored and evaluated, and adaptively managed to ensure progress towards well-defined performance measures.

18. Ecosystem benefits should be assured through contracts, operations and governance protocols, or other enforceable agreements.

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[1] Water Code section 85304 - The Delta Plan shall promote options for new and improved infrastructure relating to the water conveyance in the Delta, storage systems, and for the operation of both to achieve the coequal goals.

[2] Title 23 CCR 5001(h)(1)-(3) "Coequal goals" means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place. In addition, "achievement" for the purpose of determining whether a plan, program, or project meets the definition of a "covered action" under section 5001(j) is further defined as follows:

(1) "Achieving the coequal goal of providing a more reliable water supply for California" means all of the following:

(A) Better matching the state's demands for reasonable and beneficial uses of water to the available water supply. This will be done by promoting, improving, investing in, and implementing projects and programs that improve the resiliency of the state's water systems, increase water efficiency and conservation, increase water recycling and use of advanced water technologies, improve groundwater management, expand storage, and improve Delta conveyance and operations. The evaluation of progress toward improving reliability will take into account the inherent variability in water demands and supplies across California;

(B) Regions that use water from the Delta watershed will reduce their reliance on this water for reasonable and beneficial uses, and improve regional self-reliance, consistent with existing water rights and the State's area-of-origin statutes and Reasonable Use and Public Trust Doctrines. This will be done by improving, investing in, and implementing local and regional projects and programs that increase water conservation and efficiency, increase water recycling and use of advanced water technologies, expand storage, improve groundwater management, and enhance regional coordination of local and regional water supply development efforts; and

(C) Water exported from the Delta will more closely match water supplies available to be exported, based on water year type and consistent with the coequal goal of protecting, restoring, and enhancing the Delta ecosystem. This will be done by improving conveyance in the Delta and expanding groundwater and surface storage both north and south of the Delta to optimize diversions in wet years when more water is available and conflicts with the ecosystem are less likely, and limit diversions in dry years when conflicts with the ecosystem are more likely. Delta water that is stored in wet years will be available for water users during dry years, when the limited amount of available water must remain in the Delta, making water deliveries more predictable and reliable. In addition, these improvements will decrease the vulnerability of Delta water supplies to disruption by natural disasters, such as, earthquakes, floods, and levee failures.

(2) "Achieving the coequal goal of protecting, restoring, and enhancing the Delta ecosystem" means successfully establishing a resilient, functioning estuary and surrounding terrestrial landscape capable of supporting viable populations of native resident and migratory species with diverse and biologically appropriate habitats, functional corridors, and ecosystem processes.

(3) "Achieving the coequal goals in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place" means accepting that change, including change associated with achieving the coequal goals, will not cease, but that the fundamental characteristics and values that contribute to the Delta's special qualities and that distinguish it from other places can be preserved and enhanced while accommodating these changes. In this regard, the following are core strategies for protecting and enhancing the unique values that distinguish the Delta and make it a special region:

(A) Designate the Delta as a special place worthy of national and state attention;

(B) Plan to protect the Delta's lands and communities;

(C) Maintain Delta agriculture as a primary land use, a food source, a key economic sector, and a way of life;

(D) Encourage recreation and tourism that allow visitors to enjoy and appreciate the Delta and that contribute to its economy;

(E) Sustain a vital Delta economy that includes a mix of agriculture, tourism, recreation, related industries and business, and vital components of state and regional infrastructure; and

(F) Reduce flood and other risks to people, property, and other interests in the Delta.

Attachment

Delta Independent Science Board

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September 30, 2015

To: Randy Fiorini, Chair, Delta Stewardship Council
Charlton Bonham, Director, California Department of Fish and Wildlife

From: Delta Independent Science Board

Subject: Review of environmental documents for California WaterFix

We have reviewed the partially Recirculated Draft Environmental Impact Report/ Supplemental Draft Environmental Impact Statement for the Bay Delta Conservation Plan/California WaterFix (herein, "the Current Draft"). We focused on how fully and effectively it considers and communicates the scientific foundations for assessing the environmental impacts of water conveyance alternatives. The review is attached and is summarized below.

The Current Draft contains a wealth of information but lacks completeness and clarity in applying science to far-reaching policy decisions. It defers essential material to the Final EIR/EIS and retains a number of deficiencies from the Bay Delta Conservation Plan Draft EIR/EIS. The missing content includes:

1. Details about the adaptive-management process, collaborative science, monitoring, and the resources that these efforts will require;
2. Due regard for several aspects of habitat restoration: landscape scale, timing, long-term monitoring, and the strategy of avoiding damage to existing wetlands;
3. Analyses of how levee failures would affect water operations and how the implemented project would affect the economics of levee maintenance;
4. Sufficient attention to linkages among species, landscapes, and management actions; effects of climate change on water resources; effects of the proposed project on San Joaquin Valley agriculture; and uncertainties and their consequences;
5. Informative summaries, in words, tables, and graphs, that compare the proposed alternatives and their principal environmental and economic impacts.

The effects of California WaterFix extend beyond water conveyance to habitat restoration and levee maintenance. These interdependent issues of statewide importance warrant an environmental impact assessment that is more complete, comprehensive, and comprehensible than the Current Draft.

Review by the Delta Independent Science Board of the

Bay Delta Conservation Plan/California WaterFix Partially Recirculated Draft Environmental Impact Report/ Supplemental Draft Environmental Impact Statement

September 30, 2015

Contents

EXPECTATIONS FOR IMPACT ASSESSMENT OF CALIFORNIA WATERFIX

The Sacramento – San Joaquin Delta presents interconnected issues of water, biological resources, habitat, and levees. Dealing with any one of these problem areas is most usefully considered in light of how it may affect and be affected by the others. The effects of any actions further interact with climate change, sea-level rise, and a host of social, political, and economic factors. The consequences are of statewide importance.

These circumstances demand that the California WaterFix EIR/EIS go beyond legal compliance. This EIR/EIS is more than just one of many required reports. Its paramount importance is illustrated by the legal mandate that singles it out as the BDCP document we must review.

It follows that the WaterFix EIR/EIS requires extraordinary completeness and clarity. This EIR/EIS must be uncommonly complete in assessing important environmental impacts, even if that means going beyond what is legally required or considering what some may deem speculative (below, p. 4). Further, the WaterFix EIR/EIS must be exceptionally clear about the scientific and comparative aspects of both environmental impacts and project performance (p. 9).

These reasonable expectations go largely unmet in the Bay Delta Conservation Plan/California WaterFix Partially Recirculated Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement Draft (herein, "the Current Draft"). We do not attempt to determine whether this report fulfills the letter of the law. But we find the Current Draft sufficiently incomplete and opaque to deter its evaluation and use by decision-makers, resource managers, scientists, and the broader public.

BACKGROUND OF THIS REVIEW

The Delta Reform Act of 2009, in §85320(c), directs the Delta Independent Science Board (Delta ISB) to review the environmental impact report of the Bay Delta Conservation Plan (BDCP) and to provide the review to the Delta Stewardship Council and the California Department of Fish and Wildlife. On May 14, 2014, we submitted our review of the BDCP's Draft Environmental Impact Report/Draft Environmental Impact Statement (herein, the "Previous Draft"), which had been posted for review on December 9, 2013. This review[1] contained three main parts: an extended summary, detailed responses to charge questions from the Delta Stewardship Council, and reviews of individual chapters. Although the Previous Draft considered vast amounts of scientific information and analyses to assess the myriad potential environmental impacts of the many proposed BDCP actions, we concluded that the science in the Previous Draft had significant gaps, given the scope and importance of the BDCP.

The proposed BDCP actions have now been partitioned into two separate efforts: water conveyance under California WaterFix[2] and habitat restoration under California EcoRestore[3]. Environmental documents in support of California WaterFix (the Current Draft) were made available for a 120-day comment period that began July 10, 2015. The Current Draft focuses on three new alternatives for conveying Sacramento River water through the Sacramento – San

[1] http://deltacouncil.ca.gov/sites/default/files/documents/files/Attachment-1-Final-BDCP-comments.pdf
[2] http://www.californiawaterfix.com/
[3] http://resources.ca.gov/ecorestore/

Joaquin Delta. One of them, Alternative 4A, is the preferred alternative, identified as California WaterFix.

The Delta Stewardship Council asked us to review the Current Draft and to provide our comments by the end of September 2015. We are doing so through this report and its summary, which can be found in the cover letter.

The review began in July 2015 with a preliminary briefing from Laura King-Moon of California Department of Water Resources (three Delta ISB members present). The Delta ISB next considered the Current Draft in a public meeting on August 13–14 (nine of the ten members present)[4]. The meeting included a briefing on California EcoRestore by David Okita of California Natural Resources Agency and a discussion of the Current Draft and California WaterFix with Cassandra Enos-Nobriga of California Department of Water Resources (DWR) and Steve Centerwall of ICF International.

The initial public draft of this review was based on our study of Sections 1-4 of the Current Draft and on checks of most resource chapters in its Appendix A. This public draft was the subject of a September 16 meeting that included further discussions with Cassandra Enos-Nobriga[5] and comments from Dan Ray of the Delta Stewardship Council staff. Additional comments on that initial draft were provided by DWR in a September 21 letter to the Delta ISB chair[6]. These discussions and comments helped clarify several issues, particularly on expectations of a WaterFix EIR/EIS.

This final version of the review begins with a summary in the cover letter. The body of the report continues first with a section on our understanding of major differences between the BDCP and California WaterFix. Next, after noting examples of improvement in the Current Draft, we describe our main concerns about the current impact assessments. These overlap with main concerns about the Previous Draft, which we revisit to consider how they are addressed in the Current Draft. Finally, we offer specific comments on several major Sections and Chapters.

DIFFERENCES BETWEEN THE BDCP AND CALIFORNIA WATERFIX

The project proposed in the Current Draft differs in significant respects from what was proposed as the BDCP in December 2013. Here we briefly state our understanding of some main differences and comment on their roles on this review:

- The time period for permitting incidental take under Section 7 of the federal Endangered Species Act (ESA) and Section 2081(b) of the California Endangered Species Act (CESA) is substantially less than the 50 years envisioned as part of a Habitat Conservation Plan (HCP) and Natural Community Conservation Plan (NCCP) in BDCP. As a result, the science associated with many impacts of climate change and sea-level rise may seem less relevant. The permitting period for the project proposed in the Current Draft remains in place unless environmental baseline conditions change substantially or other permit requirements are not met. Consequently, long-term effects of the proposed project remain important in terms of operations and expected benefits (p. 8).

[4] http://deltacouncil.ca.gov/docs/delta-isb-meeting-notice-meeting-notice-delta-isb/delta-independent-science-board-isb-august-13
[5] Written version at https://s3.amazonaws.com/californiawater/pdfs/63qnf_Delta_ISB_draft_statement_-_Enos_-_FINAL.pdf
[6] http://deltacouncil.ca.gov/docs/response-letter-dwr

- In this shortened time frame, responsibility for assessing WaterFix's effects on fish and wildlife would fall to resource agencies (National Marine Fisheries Service, U.S. Fish and Wildlife Service, California Department of Fish and Wildlife). Other impacts would be regulated by a variety of federal and state agencies (Current Draft Section 1).
- The proposed habitat restorations have been scaled back. The Current Draft incorporates elements of 11 Conservation Measures from BDCP to mitigate impacts of construction and operations. Most habitat restoration included in the Previous Draft has been shifted to California EcoRestore. Our review of the Previous Draft contained many comments on the timing of restoration, species interactions, ecological linkages of conservation areas, locations of restoration areas and the science supporting the efficiency and uncertainty of effective restoration. Some of these comments apply less to the Current Draft because of its narrower focus on water conveyance.
- There remains an expected reliance on cooperative science and adaptive management during and after construction.
- It is our understanding that the Current Draft was prepared under rules that disallow scientific methods beyond those used in the Previous Draft. The rules do allow new analyses, however. For example, we noticed evidence of further analyses of contaminants, application of existing methods (e.g. particle tracking) to additional species (e.g., some of the non-covered species), and occasional selection of one model in place of the combined results of two models (e.g., fish life cycle models SALMOD and SacEFT).

IMPROVEMENTS ON THE PREVIOUS DRAFT

A proposed revamping of water conveyance through the Sacramento-San Joaquin Delta involves a multitude of diverse impacts within and outside of the Delta. Unavoidably, the EIR/EIS for such a project will be complex and voluminous, and preparing it becomes a daunting task in its own right. The inherent challenges include highlighting, in a revised EIR/EIS, the most important of the changes.

The new Sections 1 through 4 go a long way toward meeting some of these challenges. Section 1 spells out the regulatory context by discussing laws and agencies that establish the context for the Current Draft. Section 2 summarizes how the Previous Draft was revised in response to project changes and public input. Section 3 describes how the preferred alternative in the Previous Draft (Alternative 4) has been changed. Section 4 presents an impressive amount of detailed information in assessing the sources of habitat loss for various species and discussing how restoration and protection can mitigate those losses. Generally comprehensive lists of "Resource Restoration and Performance Principles" are given for the biological resources that might be affected by construction or operations. For example, page 4.3.8-140 clearly describes a series of measures to be undertaken to minimize the take of sandhill cranes by transmission lines (although the effectiveness of these measures is yet to be determined).

Section 4 also contains improvements on collaborative science (4.1.2.4, mostly reiterated in ES.4.2). This part of the Current Draft draws on recent progress toward collaborative efforts in monitoring and synthesis in support of adaptive management in the Delta. The text identifies the main entities to be involved in an expected memorandum of agreement on a monitoring and adaptive-management program in support of the proposed project.

Appendix A describes revisions to the resource chapters of the Previous Draft. Track-changed versions of the chapters simplify the review process, although this was not done for the key chapter on aquatic resources (p. 17). We noticed enhanced analyses of contaminants and application of methods such as particle tracking to additional species, including some of the non-covered taxa; a detailed treatment of *Microcystis* blooms and toxicity; more information about disinfection byproducts; improved discussion of vector control arising from construction and operational activities; and revised depiction of surficial geology. Potential exposure of biota to selenium and methylmercury is now considered in greater detail. Evaluations will be conducted for restoration sites on a site-specific basis; if high levels of contaminants cannot otherwise be addressed, alternative restoration sites will be considered (page 4.3.8-118). Incidentally, this is a good example of adaptive management, although it is not highlighted as such. Explanations were provided for why the nitrogen-to-phosphorus ratio was not specifically evaluated, why dissolved vs. total phosphorus was used in the assessment, and how upgrades to the Sacramento Regional Wastewater Treatment Plant would eventually affect phosphorus concentrations.

CURRENT CONCERNS

These and other strengths of the Current Draft are outweighed by several overarching weaknesses: overall incompleteness through deferral of content to the Final EIR/EIS (herein, "the Final Report"); specific incompleteness in treatment of adaptive management, habitat restoration, levees, and long-term effects; and inadequacies in presentation. Some of these concerns overlap with ones we raised in reviewing the Previous Draft (revisited below, beginning on p. 10).

Missing content

The Current Draft lacks key information, analyses, summaries, and comparisons. The missing content is needed for evaluation of the science that underpins the proposed project. Accordingly, the Current Draft fails to adequately inform weighty decisions about public policy. The missing content includes:

1. Details on adaptive management and collaborative science (below, p. 5).
2. Modeling how levee failures would affect operation of dual-conveyance systems (below, p. 7). Steve Centerwall told us on August 14 that modeling of the effects of levee failure would be presented in the Final Report.
3. Analysis of whether operation of the proposed conveyance would alter the economics of levee maintenance (below, p. 7).
4. Analyses of the effects of climate change on expected water exports from the Delta. "[A]n explanation and analysis describing potential scenarios for future SWP/CVP system operations and uncertainties [related to climate change] will be provided in the Final Report" (p. 1-35 of the Current Draft).
5. Potential impacts of climate change on system operations, even during the shortened time period emphasized in the Current Draft (below, p. 8 and 11).
6. Potential effects of changes in operations of the State Water Project (SWP) and Central Valley Project (CVP), or other changes in water availability, on agricultural practices in the San Joaquin Valley (p. 12).
7. Concise summaries integrated with informative graphics (below, p. 9 and 13). The Current Draft states that comparisons of alternatives will be summarized in the Final Report (p. 1-35).

While some of the missing content has been deferred to the Final Report (examples 2, 4, and 7), other gaps have been rationalized by deeming impacts "too speculative" for assessment.

CEQA guidance directs agencies to avoid speculation in preparing an EIR/EIS[7] . To speculate, however, is to have so little knowledge that a finding must be based on conjecture or guesswork. Ignorance to this degree does not apply to potential impacts of WaterFix on levee maintenance (example 3; see p. 7) or on San Joaquin Valley agriculture (example 6; p. 12).

Even if content now lacking would go beyond what is legally required for an EIR/EIS, providing such content could assist scientists, decision-makers, and the public in evaluating California WaterFix and Delta problems of statewide importance (above, p. 1).

Adaptive management

The guidelines for an EIR/EIS do not specifically call for an adaptive-management plan (or even for adaptive management). However, if the project is to be consistent with the Delta Plan (as legally mandated), adaptive management should be part of the design.

The Current Draft relies on adaptive management to address uncertainties in the proposed project, especially in relation to water operations. The development of the Current Draft from the Previous Draft is itself an exercise in adaptive management, using new information to revise a project during the planning stage. Yet adaptive management continues to be considered largely in terms of how it is to be organized (i.e., coordinated with other existing or proposed adaptive-management collaborations) rather than how it is to be done (i.e., the process of adaptive management). Adaptive management should be integral with planned actions and management—the Plan A rather than a Plan B to be added later if conditions warrant. The lack of a substantive treatment of adaptive management in the Current Draft indicates that it is not considered a high priority or the proposers have been unable to develop a substantive idea of how adaptive management would work for the project.

There is a very general and brief mention of the steps in the adaptive management process in Section 4 (p. 4.1-6 to 4.1-7), but nothing more about the process. We were not looking here for a primer on adaptive management. Rather, we expected to find serious consideration of barriers and constraints that have impeded implementation of adaptive management in the Delta and elsewhere (which are detailed in the Delta Plan), along with lessons learned on how adaptive management can be conducted overcome these problems.

The Current Draft contains general statements on how collaborative science and adaptive management under California WaterFix would be linked with the Delta Collaborative Science and Adaptive Management Program (CSAMP) and the Collaborative Adaptive Management Team (CAMT). These efforts, however, have taken place in the context of regulations and permits, such as biological opinions and biological assessments required under the Endangered Species Act. We did not find examples of how adaptive management would be applied to assessing—and finding ways to reduce—the environmental impacts of project construction and operations.

Project construction, mitigation, and operations provide many opportunities for adaptive management, both for the benefit of the project as well as for other Delta habitat and ecosystem initiatives, such as EcoRestore. To be effective in addressing unexpected outcomes and the need for mid-course corrections, an adaptive-management management team should evaluate a broad range of actions and their consequences from the beginning, as plans are being developed, to facilitate the early implementation and effectiveness of mitigation activities.

[7] https://s3.amazonaws.com/californiawater/pdfs/bo0lx_Delta_ISB_Draft_Statement_&_Response_Letter_-_Enos_-_FINAL.pdf

The Current Draft defers details on how adaptive management will be made to work: "An adaptive management and monitoring program will be implemented to develop additional scientific information during the course of project construction and operations to inform and improve conveyance facility operational limits and criteria" (p. ES-17). This is too late. If adaptive management and monitoring are central to California WaterFix, then details of how they will be done and resourced should be developed at the outset (now) so they can be better reviewed, improved, and integrated into related Delta activities. The details could include setting species-specific thresholds and timelines for action, creating a Delta Adaptive Management Team, and capitalizing on unplanned experiments such as the current drought[8]. Illustrative examples could use specific scenarios with target thresholds, decision points, and alternatives. The missing details also include commitments and funding needed for science-based adaptive management and restoration to be developed and, more importantly, to be effective.

The protracted development of the BDCP and its successors has provided ample time for an adaptive-management plan to be fleshed out. The Current Draft does little more than promise that collaborations will occur and that adaptive management will be implemented. This level of assurance contrasts with the central role of adaptive management in the Delta Plan and with the need to manage adaptively as climate continues to change and new contingencies arise.

Restoration as mitigation

Restoration projects should not be planned and implemented as single, stand-alone projects but must be considered in a broader, landscape context. We highlighted the landscape scale in our review of the Previous Draft and also in an earlier review of habitat restoration in the Delta[9]. A landscape approach applies not just to projects that are part of EcoRestore, but also to projects envisioned as mitigation in the Current Draft, even though the amount of habitat restoration included (as mitigation) in the Current Draft has been greatly reduced. On August 13 and 14, representatives of WaterFix and EcoRestore acknowledged the importance of the landscape scale, but the Current Draft gives it little attention. Simply because the CEQA and NEPA guidelines do not specifically call for landscape-level analyses is not a sufficient reason to ignore them.

Wetland restoration is presented as a key element of mitigation of significant impacts (example below in comments on Chapter 12, which begin on p. 18). We noticed little attention to the sequence required for assessing potential impacts to wetlands: first, avoid wetland loss; second, if wetland loss cannot be avoided, minimize losses; and third, if avoidance or minimization of wetland loss is not feasible, compensate. Much of the emphasis in the Current Draft is on the third element. Sequencing apparently will be addressed as part of the permitting process with the US Army Corps of Engineers (USACE) for mitigation related to the discharge of dredged or fill material.[10] However, it is difficult to evaluate the impacts on wetlands in advance of a clarification of sequencing and criteria for feasibility.

Mitigation ratios

Restoring a former wetland or a highly degraded wetland is preferable to creating wetlands from uplands[11]. When an existing wetland is restored, however, there is no net gain of

[8] http://deltacouncil.ca.gov/docs/adaptive-management-report-v-8
[9] http://deltacouncil.ca.gov/sites/default/files/documents/files/HABITAT%20RESTORATION%20REVIEW%20FINAL.pdf
[10] Letter from Cassandra Enos-Nobriga, DWR, September 21, 2015.
[11] http://www.nap.edu/openbook.php?isbn=0309074320

area, so it is unclear whether credits for improving existing wetlands would be considered equivalent to creating wetlands where they did not recently exist.

In view of inevitable shortcomings and time delays in wetland restorations, mitigation ratios should exceed 1:1 for enhancement of existing wetlands. The ratios should be presented, rather than making vague commitments such as "restore or create 37 acres of tidal wetland…." The Final Draft also needs to clarify how much of the wetland restoration is out-of-kind and how much is in-kind replacement of losses. It should examine whether enough tidal area exists of similar tidal amplitude for in-kind replacement of tidal wetlands, and whether such areas will exist with future sea-level rise. We agree that out-of-kind mitigation can be preferable to in-kind when the trade-offs are known and quantified and mitigation is conducted within a watershed context, as described in USACE's 2010 guidance for compensatory wetland mitigation.[12] Since then, many science-based approaches have been developed to aid decision-making at watershed scales, including the 2014 Watershed Approach Handbook produced by the Environmental Law Institute and The Nature Conservancy[13].

Restoration timing and funding

To reduce uncertainty about outcomes, allow for beneficial and economical adaptive management, and allow investigators to clarify benefits before the full impacts occur, mitigation actions should be initiated as early as possible. Mitigation banks are mentioned, but are any operational or planned for operation soon? The potential for landowners to develop mitigation banks could be encouraged so restoration could begin immediately, engendering better use of local knowledge, financial profit, and local support for the project. We are told that the timing of mitigation will be coordinated with other review processes that are currently ongoing.[6]

Levees

A comprehensive assessment of environmental impacts should relate California WaterFix to levee failure by examining the consequences each may have for the other. The interplay between conveyance and levees is receiving additional attention through the Delta Levee Investment Strategy.

On the one hand, the Current Draft fails to consider how levee failures would affect the short-term and long-term water operations spelled out in Table 4.1-2. A rough estimate was proposed under the Delta Risk Management Study[14] and another is part of a cost-benefit analysis for the BDCP[15]. The Final Report should provide analyses that incorporate these estimates.

On the other hand, the Current Draft also fails to consider how implementing the project would affect the basis for setting the State's priorities in supporting Delta levee maintenance. This potential impact is illustrated by a recent scoring system of levee-project proposals that awards points for expected benefits to "export water supply reliability"[16]. Further efforts to quantify these benefits have been recommended as part of a comprehensive risk assessment that

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[12] http://www.sac.usace.army.mil/Portals/43/docs/regulatory/Guidelines_for_Preparing_a_Compensatory_Mitigation_Planf.pdf
[13] https://www.eli.org/sites/default/files/eli-pubs/watershed-approach-handbook-improving-outcomes-and-increasing-benefits-associated-wetland-and-stream_0.pdf
[14] http://www.water.ca.gov/floodmgmt/dsmo/sab/drmsp/docs/Delta_Seismic_Risk_Report.pdf
[15] http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Draft_BDCP_Statewide_Economic_Impact_Report_8513.sflb.ashx
[16] http://www.water.ca.gov/floodsafe/fessro/docs/special_PSP14_final.pdf

would guide the Delta Levees Investment Strategy[17]. Public safety, a focus of the Delta Flood Emergency Management Plan,[18] is just one asset that levees protect. The Current Draft does not evaluate how the proposed project may affect estimates of the assets that the levees protect.

The Current Draft cites levee fragility mainly as a reason to build isolated conveyance for Sacramento River water (examples, p. 1-1, 1-7, 1-9). In a similar vein, the California WaterFix website states, “Aging dirt levees are all that protect most of California’s water supplies from the affects [*sic*] of climate change. Rising sea levels, intense storms, and floods could all cause these levees to fail, which would contaminate our fresh water with salt, and disrupt water service to 25 million Californians”[19]. Neither the Previous Draft nor the Current Draft, however, provides a resource chapter about Delta levees. Such a chapter would be an excellent place to examine interacting impacts of conveyance and levees.

Long-term effects

With the shortened time period, several potential long-term impacts of or on the proposed project no longer receive attention. While these effects may not become problematic during the initial permit period, many are likely to affect project operations and their capacity to deliver benefits over the long operational life of the proposed conveyance facilities. In our view, consideration of these long-term effects should be part of the evaluation of the science foundation of the proposed project.

The No-Action alternative establishes the baseline for evaluating impacts and benefits of the proposed alternative(s). It is therefore important to consider carefully how the baseline is established, as this can determine whether particular consequences of the alternatives have costs or benefits. Climate change, for example, is considered under the No-Action alternative in the Current Draft, as is sea-level rise. Climate change is expected to reduce water availability for the proposed northern intakes, and both climate change and sea-level rise are expected to influence tidal energy and salinity intrusion within the Delta[20]. Changes in water temperature may influence the condition of fishes that are highly temperature-dependent in the current analyses. These environmental effects, in turn, are likely to influence environmental management and regulation; from the standpoint of water quality they may even yield environmental benefits if agricultural acreage decreases and agricultural impacts are reduced.

Rather than consider such effects, however, the Current Draft focuses on how the proposed project would affect “the Delta’s resiliency and adaptability to expected climate change” (Current Draft section 4.3.25). Quite apart from the fact that “resiliency” and “adaptability” are scarcely operational terms, the failure to consider how climate change and sea-level rise could affect the outcomes of the proposed project is a concern that carries over from our 2014 review and is accentuated by the current drought (below, p. 11).

The Current Draft states that “Groundwater resources are not anticipated to be substantially affected in the Delta Region under the No Action Alternative (ELT) because surface water inflows to this area are sufficient to satisfy most of the agricultural, industrial, and municipal water supply needs” (p. 4.2-16). This conclusion is built on questionable assumptions; the current drought illustrates how agriculture turns to groundwater when surface-water availability diminishes. Groundwater regulation under the recently enacted Sustainable

[17] http://deltacouncil.ca.gov/docs/delta-levee-investment-strategy/dlis-peer-review-technical-memorandum-31
[18] http://www.water.ca.gov/floodmgmt/hafoo/fob/dreprrp/InterdepartmentalDraftDFEMP-2014.pdf.
[19] http://www.californiawaterfix.com/problem
[20] http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0024465

Groundwater Management Act (SGMA) can also be expected to have long-term effects on the proposed project—effects that the Current Draft does not assess. Ending of more than a million acre-feet of overdraft in the southern Central Valley under the SGMA is likely to increase demand for water exports from the Delta in the coming decades. The Current Draft discusses the potential effects of the project on groundwater (for example, in Sections 4.3.3 and 5.2.2.3), but we found only two brief, descriptive mentions of SGMA in the 235 pages of Section 5. The implications of prolonged droughts (e.g., on levee integrity) and of the consequences of SGMA receive too little attention in the Current Draft.

The Current Draft suggests that unnamed “other programs” that are “separate from the proposed project” will use elements of the Previous Draft to implement long-term conservation efforts that are not part of California WaterFix (Current Draft, p. 1-3). The Final Report should provide assurances that such other programs will step in, and could go further in considering their long-term prospects.

Informative summaries and comparisons

According to guidance for project proponents, “Environmental impact statements shall be written in plain language and may use appropriate graphics so that decision-makers and the public can readily understand them" (Code of Federal Regulations, 40 CFR 1502.8). Far-reaching decisions should not hinge on environmental documents that few can grasp.

This guidance applies all the more to an EIR/EIS of the scope, complexity, and importance of the Current Draft. It demands excellent comparative descriptions of alternatives that are supported by readable tables and high-quality graphics, enumeration of major points, well-organized appendices, and integration of main figures with the text. For policy deliberations, the presentation of alternatives should include explicit comparisons of water supply deliveries and reliabilities as well as economic performance. For decision-makers, scientists, and the public, summaries of impacts should state underlying assumptions clearly and highlight major uncertainties. The Current Draft is inadequate in these regards.

The Previous Draft provided text-only summaries for just the two longest of its resource chapters (Chapters 11 and 12). A fragmentary comparison of alternatives was buried in a chapter on "Other CEQA/NEPA required sections" (part 3 of Chapter 31) but fell far short of what was needed. Both the Previous and Current Drafts have been accompanied by a variety of outreach products for broad audiences (e.g., the descriptive overview of the BDCP Draft EIR/EIS[21]). These products do little to compensate for the overall paucity of readable summaries and comparisons in the Previous and Current Drafts.

For over three years, the Delta ISB has been specifically requesting summaries and comparisons: first in June 2012[22], then in June 2013[23], and again in a review of the Previous Draft in May 2014 (footnote 1, p. 1). Appallingly, such summaries and comparisons remain absent in the Current Draft. The generally clear writing in Sections 1 through 4 shows that the preparers are capable of providing the requested summaries and comparisons. Prescriptions in CEQA and NEPA in no way exclude cogent summaries, clear comparisons, or informative graphics. And three years is more than enough time to have developed them.

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[21] Highlights+of+the+Draft+EIS-EIR+12-9-13.pdf

[22] http://deltacouncil.ca.gov/sites/default/files/documents/files/DISB_Letter_to_JMeral_and_DHoffman-Floerke_061212.pdf

[23] http://deltacouncil.ca.gov/sites/default/files/documents/files /DISB%20Comments%20on%20Draft%20BDCP%20Document.doc_.pdf

On August 14, 2015, representatives of California WaterFix assured us that this kind of content would eventually appear, but only in the Final Report. That will be far too late in the EIR/EIS process for content so critical to comprehending what is being proposed and its potential impacts.

PRIOR CONCERNS AND THEIR RELEVANCE TO THE CURRENT DRAFT

The Delta ISB review of May 14, 2014 emphasized eight broad areas of concern about the scientific basis for the Previous Draft. Each is summarized below, followed by a brief appraisal of how (or whether) the concern has been dealt with in the Current Draft. While the reduced scope of the proposed project has reduced the relevance of some issues, particularly habitat restoration and other conservation measures, other concerns persist.

Our persistent concerns include the treatment of uncertainty, the implementation of adaptive management, and the use of risk analysis. These topics receive little or no further attention in the Current Draft. We also found few revisions in response to points we raised previously about linkages among species, ecosystem components, or landscapes; the potential effects of climate change and sea-level rise; and the potential effects of changes in water availability on agricultural practices and the consequent effects on the Delta. Our previous comments about presentation also pertain.

Effectiveness of conservation actions

Our 2014 review found that many of the impact assessments hinged on optimistic expectations about the feasibility, effectiveness, or timing of the proposed conservation actions, especially habitat restoration.

This is arguably less of a concern now, given the substantially shorter time frame of the revised project and narrower range of conservation actions designed for compensatory restoration. Nonetheless, the Current Draft retains unwarranted optimism, as on page 4.3.25-10: "By reducing stressors on the Delta ecosystem through predator control at the north Delta intakes and Clifton Court Forebay and installation of a nonphysical fish barrier at Georgiana Slough, Alternative 4A will contribute to the health of the ecosystem and of individual species populations making them stronger and more resilient to the potential variability and extremes caused by climate change." A scientific basis for this statement is lacking, and an adaptive or risk-based management framework is not offered for the likely event that such optimism is unfulfilled.

Is it feasible for even the reduced amounts of mitigation and restoration to be completed within the time period proposed? Perhaps yes. Is it feasible that these actions will mitigate impacts over the long term? This is more problematic. To be effective, mitigation actions should deal with both the immediate and long-term consequences of the project. The proposed permitting should allow for monitoring long enough to assess the effectiveness of habitat restoration measures, which will need to extend beyond the initial permitting period.

Uncertainty

The 2014 review found the BDCP encumbered by uncertainties that were considered inconsistently and incompletely. We commented previously that modeling was not used effectively enough in bracketing uncertainties or exploring how they may propagate or be addressed.

In the Current Draft, uncertainties and their consequences remain inadequately addressed, improvements notwithstanding. Uncertainties will now be dealt with by establishing "a robust program of collaborative science, monitoring, and adaptive management" (ES 4.2). No details about this program are provided, so there is no way to assess how (or whether) uncertainties will be dealt with effectively. Although sensitivity modeling was used to address the effects of changes in the footprint and other minor changes of the revised project, full model runs were not carried out to assess the overall effects of the specific changes. Consequently, modeling that would help to bracket ranges of uncertainties or (more importantly) assess propagation of uncertainties is still inadequate.

Many of our prior concerns about uncertainties pertained to impacts on fish. If those uncertainties have now been addressed in Chapter 11, they are difficult to evaluate because changes to that chapter have not been tracked in the public draft (below, p. 17).

There are also uncertainties with the data generated from model outputs, although values are often presented with no accompanying error estimates. This situation could be improved by presenting results from an ensemble of models and comparing the outputs.

Effects of climate change and sea-level rise on the proposed actions

Our 2014 review stated concerns that the Previous Draft underestimated effects of climate change and sea-level rise across the 50-year timeline of the BDCP. With the nominal duration shortened substantially, most of the projected impacts of climate change and sea-level rise may occur later. But climate-related issues remain.

First, the Current Draft is probably outdated in its information on climate change and sea-level rise. It relies on information used in modeling climate change and sea-level rise in the Previous Draft, in which the modeling was conducted several years before December 2013. The absence of the climate-change chapter (Chapter 29) in the Previous Draft from Appendix A in the Current Draft indicates that no changes were made. In fact, the approaches and assumptions in the Current Draft remained unchanged from the Previous Draft in order to ensure consistency and comparability across all the Alternatives, even though newer scientific information had become available.[6] Yet climatic extremes, in particular, are a topic of intense scientific study, illustrated by computer simulations of ecological futures[24] and findings about unprecedented drought[25]. The Current Draft does not demonstrate consideration of recently available climate science, and it defers to the Final Report analysis of future system operations under potential climate and sea-level conditions. In fact, the Current Draft generally neglects recent literature, suggesting a loose interpretation of "best available science."

Second, climate change and sea-level rise are now included in the No-Action Alternative, as they will transpire whether or not WaterFix moves forward. A changed future thus becomes the baseline against which Alternative 4A (and the others) are compared. Changes in outflow from the Delta due to seasonal effects of climate change and the need to meet fall X2 requirements are considered in Section 4.3.1. The difference in outcomes then depends on assumptions about the facility and operations of Alternative 4A and the other Alternatives. Sensitivity analyses indicate that the impacts of the different Alternatives are generally similar in comparison to the No Action Alternative under the range of climate projections considered.[6] Thus, "Delta exports would either remain similar or increase in wetter years and remain similar

[24] http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0024465

[25] Cook, B.I., Ault, T.R., and Smerdon, J.E., 2015, Unprecedented 21st century drought risk in the American Southwest and Central Plains: *Science Advances*, v. 1, doi:10.1126/sciadv.1400082.

or decrease in the drier years under Alternative 4A as compared to the conditions without the project." (p. 4.3.1-4). Such an inconclusive conclusion reinforces the need to be able to adapt to different outcomes. Simply because the Alternatives are expected to relate similarly to a No Action Alternative that includes climate change does not mean that the Alternatives will be unaffected by climate change.

Interactions among species, landscapes, and the proposed actions

The Previous Draft acknowledged the complexities produced by webs of interactions, but it focused on individual species, particular places, or specific actions that were considered in isolation from other species, places, or actions. Potential predator-prey interactions and competition among covered and non-covered fish species were not fully recognized. Confounding interactions that may enhance or undermine the effectiveness of proposed actions were overlooked. In our 2014 review we recommended describing and evaluating the potential consequences of such interactions, particularly in Chapters 11 (Fish and aquatic resources) and 12 (Terrestrial resources).

The Current Draft recognizes that mitigation measures for one species or community type may have negative impacts on other species or communities, and mitigation plans may be adjusted accordingly. But the trade-offs do not seem to be analyzed or synthesized. This emphasizes the need for a broader landscape or ecosystem approach that comprehensively integrates these conflicting effects.

Effects on San Francisco Bay, levees, and south-of-Delta environments

In 2014 we pointed to three kinds of impacts that the Previous Draft overlooked: (1) effects on San Pablo Bay and San Francisco Bay in relation to Delta tides, salinity, and migratory fish; (2) effects of levee failures on the proposed BDCP actions and effects of isolated conveyance on incentives for levee investments; and (3) effects of increased water reliability on crops planted, fertilizers and pesticides used, and the quality of agricultural runoff. The Current Draft responds in part to point 1 (in 11.3.2.7) while neglecting point 2 (above, p. 7) and point 3.

On point 3: Although the Current Draft considers how the project might affect groundwater levels south of the Delta (7.14 to 7.18), it continues to neglect the environmental effects of water use south of (or within) the Delta. Section 4.3.26.4 describes how increased water-supply reliability could lead to increased agricultural production, especially during dry years. Elsewhere, a benefit-cost analysis performed by ICF and the Battle Group[26] calculated the economic benefits of increased water deliveries to agriculture in the Delta. The Current Draft does not fully consider the consequences of these assumptions, or of the projections that the project may enhance water-supply reliability but may or may not increase water deliveries to agriculture (depending on a host of factors). We have been told that to consider such possibilities would be "too speculative" and that such speculations are explicitly discouraged in an EIR/EIS. Yet such consequences bear directly on the feasibility and effectiveness of the project, and sufficient information is available to bracket a range of potential effects. Our previous concerns are undiminished.

The impacts of water deliveries south of the Delta extend to the question of how each intake capacity (3,000, 9,000, or 15,000 cfs) may affect population growth in Southern

[26] Hecht, J., and Sunding, D., Draft Bay Delta Conservation Plan statewide economic impact report, August 2013.

California. Section 4.4.1-9 treats the growth-enabling effects of alternative 2D lightly, saying that additional EIS review would be needed for future developments.

Implementing adaptive management

In the Previous Draft, details about adaptive management were to be left to a future management team. In our 2014 review we asked about situations where adaptive management may be inappropriate or impossible to use, contingency plans in case things do not work as planned, and specific thresholds for action.

Although most ecological restoration actions have been shifted to California EcoRestore (p. 5), we retain these and other concerns about adaptive management under California WaterFix. If the mitigation measures for terrestrial resources are implemented as described, for example, they should compensate for habitat losses and disturbance effects of the project. The test will be whether the measures will be undertaken as planned, be as effective as hoped, and continue long enough to fully mitigate effects. This is where adaptive management and having contingency plans in place becomes critically important. It is not apparent that the mitigation plans include these components.

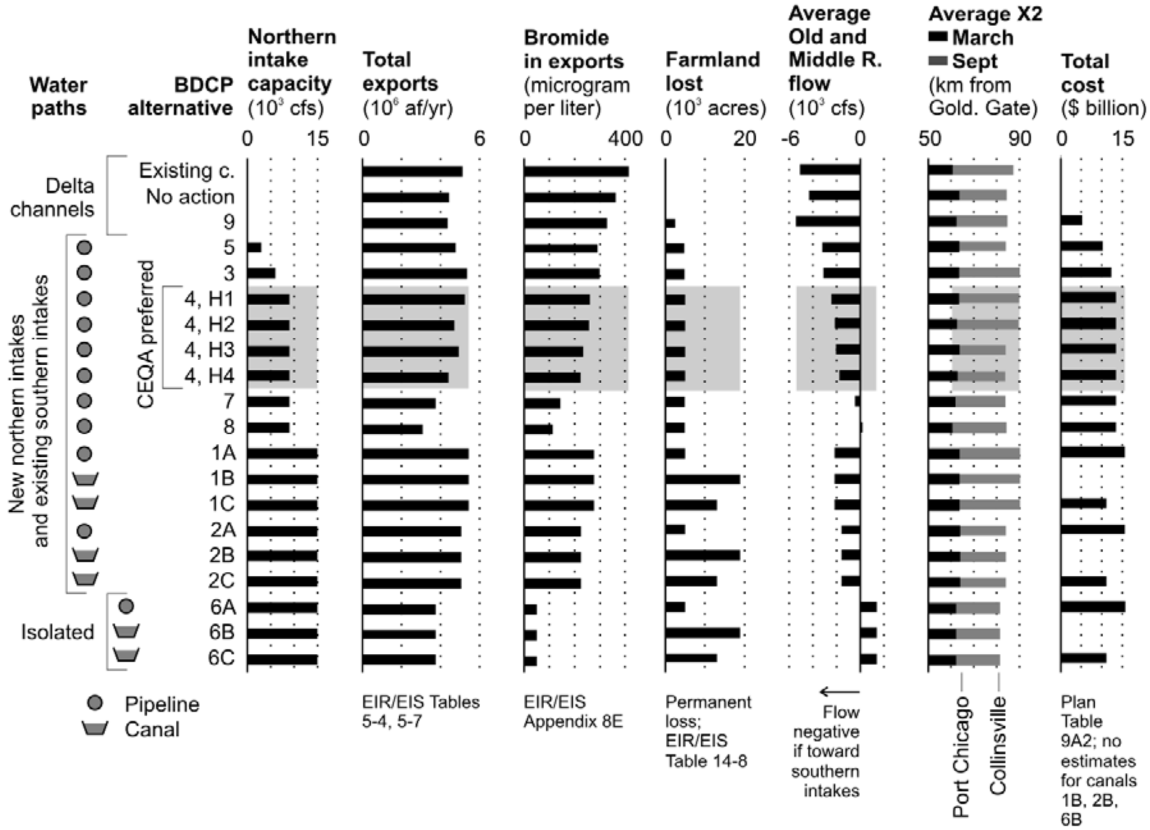
Reducing and managing risk

Our 2014 review advised using risk assessment and decision theory in evaluating the proposed BDCP actions and in preparing contingency plans. We noticed little improvement on this issue, just a mention that it might be considered later. This is not how the process should be used.

Comparing BDCP alternatives

The Previous Draft contained few examples of concise text and supporting graphics that compare alternatives and evaluate critical underlying assumptions. Rudimentary comparisons of alternatives were almost entirely absent. The Current Draft retains this fundamental inadequacy (p. 9).

Our 2014 review urged development and integration of graphics that offer informative summaries at a glance. We offered the example reproduced below. If the Current Draft contains such graphics, they would need to be ferreted out from long lists of individual pdf files. Because they are not integrated into the text where they are referenced in the Current Draft, the figures cannot readily illustrate key points.



COMMENTS ON INDIVIDUAL SECTIONS AND CHAPTERS

This final section of the review contains minimally edited comments on specific points or concerns. These comments are organized by Section or Chapter in the Current Draft. Many are indexed to pages in the section or chapter named in the heading.

Alternatives 4A, 2D, and 5A (Section 4)

It is good that the proposed alternatives are seen as flexible proposals, as it is difficult to imagine that any proposal for such a complex and evolving system could be implemented precisely as proposed. Some initial and ongoing modifications seem desirable, and unavoidable.

The operating guidance for the new alternatives seems isolated from the many other water management and environmental activities in and upstream of the Delta likely to be important for managing environmental and water supply resources related to Delta diversions. While it is difficult to specify detailed operations for such a complex system, more details on the governance of operations (such as the Real Time Operations process) would be useful. The operational details offered seem to have unrealistic and inflexible specificity. Presentations of delivery-reliability for different alternatives remain absent. Environmental regulations on Delta diversions have tended to change significantly and abruptly in recent decades, and seem likely to change in the future. How sensitive are project water supply and environmental performance to changes in operating criteria?

The collaborative science ideas seem philosophically attractive, but are not given much substance. Monitoring is mentioned, but details of organization, intent, and resources seem lacking. Adequate funding to support monitoring, collaborative science, and adaptive management is a chronic problem. Section ES.4.2 states that "Proponents of the collaborative science and monitoring program will agree to provide or seek additional funding when existing resources are insufficient." This suggests that these activities are lower in priority than they should be.

The three new alternatives, 4A, 2D, and 5A, seem to have modest changes over some previous alternatives, with the exception of not being accompanied by a more comprehensive environmental program. In terms of diversion capacities, they cover a wide range, 3,000 cfs (5A), 9,000 cfs (4A), and 15,000 cfs (2D). The tables comparing descriptions of the new alternatives to previous Alternative 4 are useful, but should be supplemented by a direct comparison of the three new alternatives.

The new Sustainable Groundwater Management Act (SGMA) seems likely to increase demands for water diversions from the Delta to the south to partially compensate for the roughly 1.5-2 maf/year that is currently supplied by groundwater overdraft.

The State seems embarked on a long-term reduction in urban water use, particularly outdoor irrigation. Such a reduction in urban water use is likely to have some modest effects on many of the water-demand and scarcity impacts discussed.

The climate change analysis of changes in Delta inflows and outflows is useful, but isolating the graphs in a separate document disembodies the discussion. The fragmentation of the document by removing each Section 4 figure into a separate file is inconvenient for all, and makes integrated reading practically impossible for many.

The details of the alternative analyses seem mostly relevant and potentially useful. Much can be learned about the system and the general magnitude of likely future outcomes from patient and prolonged reading of this text. An important idea that emerges from a reading of the No Action Alternative is that the Delta, and California water management, is likely to change in many ways with or without the proposed project. The No Action and other alternatives also illustrate the significant inter-connectedness of California's water system. The range of impacts considered is impressive, but poorly organized and summarized.

The discussion of disinfection by-product precursor effects in Delta waters is improved significantly, but could be made more quantitative in terms of economic and public-health impacts.

The discussion on electromagnetic fields is suitably brief, while the tsunami discussion could be condensed.

The effects of the likely listing of additional native fish species as threatened or endangered seems likely to have major effects on project and alternative performance. These seem prudent to discuss, and perhaps analyze.

Is Alternative 2D, with 15,000 cfs capacity, a serious alternative? Does it deserve any space at all?

Table 4.1-8 implies that tidal brackish/*Schoenoplectus* marsh. Should some of this be considered tidal freshwater marsh?

The dynamics of the Delta are largely determined by water flows. The Current Draft acknowledges that water flows and salinity will change in complex ways. There are statements about how inflows, outflows, and exports will change in Alternative 4A in relation to baseline (No-Action) conditions (p. 4.3.8-13). What is the scientific basis on which these changes will be managed? Will models be used? What confidence should we have in current projections? Have the effects of droughts or deluges been considered?

4.3.7-10, line 13: Text on disturbing sediments and releasing contaminants needs to add nitrogen and phosphorus to the concerns.

Water quality (Chapter 8)

8-3, line 13: *Microcystis* is singled out as a cyanobacterium that can (but doesn't always) produce the toxin, myrocystin; however, there are other cyanobacteria that sometimes produce other toxins. Different genera can differ in the nutrient that limits their blooms (see 2014 letter by Hans Paerl in Science 346(6406): 175-176). For example, *Microcystis* blooms can be triggered by N additions because this species lacks heterocysts, while toxin-producing *Anabaena* blooms can be triggered by P additions, because *Anabaena* has heterocysts and can fix N. The frequently repeated discussion of cyanobacteria blooms needs to be updated. Also cite Paerl on page 8-45 line 8. Ditto on page 8-103 and 8-106 line 34.

8-8. In our earlier comments, we recommended that carbon be separated into its dissolved and particulate forms for consideration of water quality impacts because dissolved organic carbon (DOC) is the form most likely to react with chloride and bromide and result in formation of disinfection by-products. The section on bromide focuses on interactions with total organic carbon (TOC), rather than DOC. Carbon is primarily considered with respect to formation of disinfection by-products but carbon plays a central role in the dynamics of the Delta, affecting processes such as metabolism, acidity, nutrient uptake, and bioavailability of toxic compounds. Carbon cycling determines ecosystem structure and function in aquatic systems. It also modifies the influence and consequences of other chemicals and processes in aquatic systems. Dissolved organic carbon (DOC), for example, influences light and temperature regimes by absorbing solar radiation, affects transport and bioavailability of metals, and controls pH in some freshwater systems. Respiration of organic carbon influences dissolved oxygen concentrations and pH.

8-18, line 12 says that salt disposal sites were to be added in 2014; were they?

8-19 and 8-20: "CECs" is not defined and seems to be used incorrectly. Change "CECs" to "EDCs" on page 8-19 and to "PPCPs" on page 8-20.

8-21, line 18-19: Such a statement should be qualified. The conclusion that marine waters are N-limited and inland waters are P-limited is outdated. Recent papers, including the above, find more complex patterns.

8-22, lines 18 and 30: Choose either "cyanobacteria" or "blue-green algae;" using both will confuse readers who may perceive them as different.

8-23, lines 15-16: Say how the N:P ratio changed composition, not just that it did change composition.

8-23 through 8-25: Uncertainties (e.g., standard deviation or standard error of the mean) associated with the mean concentrations of DOC should be presented. It is impossible to interpret differences between the values that are presented without knowledge of the variation around the mean values (e.g., without knowledge of variation around the mean, it is difficult to evaluate whether DOC concentrations at south vs. north-of-Delta stations and Banks headworks differ from one another; 3.9 to 4.2 mg/L vs. 4.3 mg/L).

8-65, line 12: Specify if DO is for daytime or night, and for surface, bottom or mid-water column.

8-75, line 6: The failure to consider dissolved P (DP) should be addressed; there is much greater uncertainty. The adherence of some P to sediment does not prevent considerable discharge of P as DP. Also on page 8-95 line 40, qualify predictions due to lack of consideration of DP.

8-82, line 4-5: It seems unlikely that current levels of *Microcystis* growth in the Delta are dependent on the exclusive uptake of ammonia. Temperature is one of the primary factors driving *Microcystis* blooms and global warming could promote bloom occurrence. Consider revising this section to, “Because it seems unlikely that current levels of *Microcystis* growth in the Delta are dependent on the exclusive uptake of ammonia, the frequency, magnitude and geographic extent of *Microcystis* under future scenarios is difficult to predict.”

8-105, line 8: Would total nitrogen be dominated by nitrate just by increasing ammonia removal? Depending on redox and microbiota, why wouldn’t nitrate be converted to ammonium?

A lot of attention is given to factors controlling *Microcystis* blooms in this chapter but little attention is given to its toxicity. Just as factors controlling blooms are not fully understood, the regulating factors of cellular toxin contents remain poorly understood. As a result, the impact of blooms on the environment can vary (e.g., large blooms of non-toxic or low toxin organisms may have impacts on environmental variables such as nutrient uptake and dissolved oxygen consumption while small blooms of highly toxic organisms could impact food webs) [see: Ma et al. (2015) Toxic and non-toxic strains of *Microcystis aeruginosa* induce temperature dependent allelopathy toward growth and photosynthesis of *Chlorella vulgaris*. Harmful Algae 48: 21–29].

Fish and aquatic resources (Chapter 11)

We found individual conclusions or new analyses difficult to identify in this key chapter because changes to it were not tracked in the public version of the Current Draft and there was no table of contents that could have assisted in side-by-side comparison with the Previous Draft.

Effects of temperature

We noticed more emphasis on temperature concerning the fish ‘downstream’ impacts (but without tracked changes this becomes difficult to document).

The main temperature variable used expresses the percentage of time when monthly mean temperatures exceed a certain rate or fall within a certain boundary. The biological impact, however, is difficult to assess with these numbers. If all of the change occurred just during operations or just during one day, the biological impact could be much different than a small change every day (provided by using means). Graphs of changes and listing of extreme highs and lows during a model run would have more biological meaning. Also, comparisons were made using current baseline conditions and did not consider climate change effects on temperatures.

Fish screens

It is unclear how (and how well) the fish screens would work. The description of fish screens indicates that fish >20 mm are excluded, but what about fish and larvae that are <20 mm, as well as eggs? Table 11-21 seems out of date, because some fish screens appear to have been installed, but data on their effects are not given. Despite the lack of specific data on how well screens function, the conclusion that there will be no significant impact is stated as certain (e.g., page 1-100 line 38).

Here, as in many other places, measures are assumed to function as planned, with no evidence to support the assumptions. The level of certainty seems optimistic, and it is unclear whether there are any contingency plans in case things don’t work out as planned. This problem persists from the Previous Draft.

Invasive plants

Cleaning equipment is mentioned, but it is not specifically stated that large machinery must be cleaned before entering the Delta. Section 4.3.8-358 says equipment would be cleaned if being moved within the Delta. Cleaning is essential to reduce transfer of invasive species; a mitigating measure is to wash equipment, but it must also be enforced.

Weed control (fire, grazing) is suggested, but over what time frame? It may be needed in perpetuity. That has been our experience at what is considered the world's oldest restored prairie (the 80-yr-old Curtis Prairie, in Madison, WI).

Weed invasions can occur after construction is completed; how long will the project be responsible for weed control? 3-5 years won't suffice.

4.3.8-347. Herbicides are prescribed to keep shorebird nesting habitat free of vegetation, but toxic effects of herbicides on amphibians etc. are not considered.

4.3.8-354. Impacts of invasive plants seem underestimated. Impact analysis implies that the project disturbance area is the only concern, when dispersal into all areas will also be exacerbated. At the Arboretum, a 1200-ac area dedicated to restoration of pre-settlement vegetation, invasive plants are the main constraint. A judgment of no significant impact over just the disturbance area is overly optimistic.

4.3.8-356. Does not mention need to clean equipment to minimize import of seeds on construction equipment.

Cryptic acronym and missing unit

Figure 2: SLR x year: y axis lacks units; reader has to continue on to table 11-20 to find that it is cm.

Terrestrial biological resources (Chapter 12)

Effects on wetlands and waters of the United States (WOTUS)

Page 12-1, line 18-19 says: "Under Alternatives 2D, 4 , 4A , and 5A, larger areas of non-wetland waters of the United States would be filled due to work in Clifton Court Forebay; however, the Forebay would ultimately expand by 450 acres and thus largely offset any losses there." Is the assumption that, acre for acre, all jurisdictional waters are interchangeable, whether of different type or existing vs. created? The literature does not support this assumption.

The text argues that the wetlands would be at risk with levee deterioration, sea-level rise, seismic activity, etc. But the solution is for "other programs" to increase wetlands and riparian communities. What if this project causes the problem, e.g. via vibration?

CM1 alternative 4A would fill 775 acres of WOTUS (491 wetland acres); Alt 2D would fill 827 (527 wetland) + 1,931 ac temporary fill at Clifton Court Forebay; Alt 5A would fill 750 (470 wetland). That's a lot of area. The timing and details of mitigation measures are not provided. References to the larger Delta Plan suggest that compensations would come at unknown times. Piecemeal losses such as indicated here: "Only 1% of the habitat in the study area would be filled or converted" (Chapter 12, line 29, page 12-22) is how the US has lost its historical wetlands. What are the overall cumulative impacts of wetland losses in the Delta? What is the tipping point beyond which further wetland losses must be avoided? The proposed project is one part of the broader array of management actions in the Delta and should be considered in that broader context.

Habitat descriptions

How will mudflats be sustained for shorebirds? Exposed mud above half-tide can become vegetated rapidly. In the Delta, the bulrush *Schoenoplectus californicus* tolerates nearly continuous tidal submergence.

Are soils clayey enough for the proposed restoration of up to 34 acres of vernal pool and alkali seasonal wetland near Byron? These areas will need to pond water, not just provide depressions.

12-243, line 18: How would adding lighting to electrical wires eliminate any potential impact to black rails? This mitigation is overstated.

Several of the species accounts (e.g., bank swallow) indicate that there is uncertainty about how construction or operations will impact the species. In most cases, monitoring is proposed to assess what is happening. But to be effective, the monitoring results need to be evaluated and fed into decision-making, as visualized in the adaptive-management process. There is little explicit indication of how this will be done or funded.

Land use (Chapter 13)

Alternative 4A would allow water diversion from the northern Delta, with fish screens, multiple intakes, and diversions limited to flows that exceed certain minima, e.g., 7000 cfs. This would reduce flood-pulse amplitudes and, presumably, downstream flooding. How does this alter opportunities for riparian restoration? Which downstream river reaches are leveed and not planned to support riparian restoration? Where would riparian floodplains still be restorable?

Over what surface area does the pipeline transition to the tunnel? At some point along the pipeline-tunnel transition, wouldn't groundwater flow be affected?

Up to 14 years of construction activities were predicted for some areas (e.g., San Joaquin Co.); this would have cumulative impacts (e.g., dewatering would affect soil compaction, soil carbon, microbial functions, wildlife populations, and invasive species). What about impacts of noise on birds; e.g., how large an area would still be usable by greater sandhill cranes?

State how jurisdictional wetlands have been mapped and how the overall project net gain or net loss of wetland area has been estimated. If mitigation consists only of restoration actions in areas that are currently jurisdictional wetlands, then there would be an overall net loss of wetland area due to the project. A mitigation ratio >1:1 would be warranted to compensate for reduced wetland area. This was also a concern for Chapter 12.

Up to 277 ac of tidal wetlands are indicated as restorable; text should indicate if these are tidal freshwater or tidal brackish wetlands (or saline, as is the typical use of "tidal wetlands").

13-19. On the need to store removed aquatic vegetation until it can be disposed: there are digesters for this purpose, and they might be efficient means of mitigation if management of harvested aquatic plants will be long-term. A waste product could be turned into a resource (methane fuel).

13-19, line 12: Text says that "predator hiding spots" will be removed. What are these?

13-19, line 20: What are the E16 nonphysical fish barriers? An electrical barrier?

13-20, line 19: Boat-washing stations are mentioned; would these discharge pollutants (soap, organic debris?)

Attachment 22

NMFS Progress Assessment and Remaining Issues Regarding the Administrative Draft BDCP Document[1]

4/4/13

In April 2012, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) submitted our "red flag" comments regarding the previous draft of the Bay Delta Conservation Plan (BDCP). These comments were developed by agency staff to flag those issues that may require significant changes to the BDCP and would need to be resolved prior to final submittal of the plan. Since then, NMFS has worked closely with the State and its consultants on the details of the revised BDCP. The following is an assessment of the materials provided to NMFS in the December 2012 Administrative Draft BDCP document as well as Section 5.5, which was submitted to NMFS in February 2013. Additional draft materials were subsequently submitted to NMFS on March 1st. We have conducted a cursory review of the March 1st materials to confirm that all of the following comments are still applicable, but we have not had the opportunity to conduct a complete and thorough review of those newer materials.

We would like to acknowledge the very significant improvements and progress that have been made in the development of the effects analysis and the plan itself over the past year. DWR has substantially amended the proposed plan by reducing the number of planned intakes and overall capacity and including significant improvements to operational criteria, including the High Outflow Scenario and improvements to South Delta Old and Middle River (OMR) limits. These changes are in direct response to our previous red flags and are critically important to providing for species needs.

We have experienced excellent cooperation and coordination with the project consultants (ICF International) along with the other planning agencies. There has been significant improvement in the expanded analytical methodologies used in the effects analysis and many technical and policy issues have been resolved. Many other technical and plan component issues are currently in active discussion, and we are optimistic they can be resolved with additional time, technical resources, and independent peer review. We look forward to continuing our close collaboration with all of the involved parties to resolve remaining issues and complete this planning process.

The first section of this document is intended to provide an assessment of the progress that has been made in addressing NMFS' initial comments provided in April 2012, following our review of the previous draft BDCP document. The format below shows our previous comments from last April, followed by our updated assessment of these issues in **bold print.** We have categorized the comment headers to allow for quick viewing:

- Critical = Significant disagreement between NMFS and consultant team and/or no significant progress made to resolve issue.
- Important = Significant progress has been made or is in process of being made on methods. We have not yet seen the results, or there is disagreement on results, or interpretation of results that NMFS believes could be resolved with more time and effort.
- Resolved = Red flag is resolved.

[1] December 2012/February 2013 version

The second section of this document describes several new comments and issues resulting from our review of the current draft of the BDCP (the December 2012/February 2013 version of the document or AdminDraft). These new concerns highlight key areas of the BDCP that will need to be addressed between now and the time that the plan and accompanying materials are submitted to us as a complete application under section 10 of the ESA. We have provided, where possible, suggestions for addressing these comments and are committed to working closely with our State and Federal partners to find resolutions to these issues. We view these comments as critical to the completion of a successful planning effort and generally they should be viewed as very important for resolution, preferably prior to issuance of the public draft. In addition to these comments, NMFS has also submitted more detailed technical comments and edits in "track changes" format for each chapter of the BDCP directly to the State and its consultants.

In summary, we note very substantial progress has been made, and we look forward to continue to work collaboratively with all parties towards timely completion of this ambitious plan.

Section 1: Progress Assessment on Resolution of Previous Comments/Issues: NMFS List of Issues Unresolved in BDCP Administrative Draft (from 4/2/2012; 2013 updates in bold print)

1.1 Hood Diversion Bypass Flows (Critical)

Previous comment: The Effects Analysis of the Preliminary Proposal (PP) raises concerns over reduced flows downstream of the North Delta diversions, especially in winter and spring months. These flows relate to:

A. Increased frequency of reversed Sacramento River flows at the Georgiana Slough junction. The January 2010 PP rules included a provision that north Delta pumping would not increase these reverse flows. CALSIM II results provided by CH2M-Hill indicate that the PP will increase the percent of time Sacramento River flows are reversed, causing increased entrainment of juvenile salmonids into the Central Delta. If the frequency of reverse flows increases due to the PP, then the diversion amounts allotted under the PP could not be implemented. The DSM2 analysis of reverse flows in the DPM suggests that tidal marsh restoration in the Delta will nearly offset both the effects of sea-level rise and large water diversions from the Sacramento River, a conclusion which needs much more explanation in the EA (see comment on tidal marsh effects).

B. Long-term viability of sturgeon populations. There are concerns that Sacramento River flow reductions will impact the reproductive success of white and green sturgeon, which have been documented to produce strong year classes mostly in years with high flows in April and May (AFRP study). We do not know if this has been addressed in revised Appendix C.

1. *Further explanation and analysis of the reverse flow issue.*
2. *Work with the Services to find a diversion operating scheme that is still likely to be permitable after adequate modeling and analysis has been conducted.*

Update: The modeling analysis in the Admin Draft indicates that the Evaluated Starting Operations (ESO) will generally result in a reduction in flows below the north Delta diversions, but that those reductions will not result in increased duration or magnitude of reverse flows at the Georgiana Slough junction. This conclusion is relatively counter-intuitive and the concepts and mechanisms that support this conclusion, and the level of uncertainty around it, need to be very clearly explained in thorough detail. We also recommend independent peer

review of these methods and results. Regardless of the modeling results, the planning parties agreed that the north Delta diversions would be operated in a manner that would not result in increased frequency, duration or magnitude of reverse flows at the Georgiana Slough junction. Therefore, the description of Conservation Measure 1 (CM1) needs to very clearly explain that real-time operations will be managed to insure that diversions in the north Delta will not result in increased frequency, duration or magnitude of reverse flows at the Georgiana Slough junction. Such a description is currently missing from CM1.

With regard to the Delta flows needed for sturgeon reproductive success, the spring outflows provided under the High Outflow Scenario (HOS) appear to meet the 25,000 cfs outflow in 50% of years as recommended in NMFS' Combined Scenario 5 (CS5) criteria. The other decision tree scenarios do not provide these flow parameters and therefore would not be likely to provide the necessary benefits to contribute to the recovery of green sturgeon.

There are additional concerns with the modeled ESO bypass flows with regard to juvenile salmonid survival downstream of the new intakes. The effects analysis acknowledges that there are potential impacts from reduced flows downstream of the intakes, as seen in the results of the Newman (2003) analysis, which shows slightly reduced (though not statistically significant) survival rates through the Delta, and the Delta Passage Model, which shows a slight decrease in smolt survival prior to the addition of survival benefits from Yolo Bypass.

NMFS has conducted a simple analysis of survival using Newman's (2003) and Perry's (2010) flow-survival relationships showing average survival rates under different bypass criteria levels (provided under separate cover). This assessment indicates a significant reduction in salmonid survival under level 3 pumping criteria for the ESO as compared to Existing Biological Conditions (EBC2). This is a key finding and should be carried through into the net effects analysis.

In summary, our recommendations on this topic are to:

- Submit the reverse flow analysis and conclusions to independent peer review.
- Amend the HOS decision tree to include the green sturgeon criterion.
- Augment the effects analysis to include NMFS analysis and to highlight magnitude and certainty of effects associated with Level 3, as compared to Level 2 and Level 1 pumping/bypass criteria.
- Submit the NMFS and ICF analyses of survivals associated with varying pumping/bypass criteria to independent peer review.
- In light of steps above, seriously consider amending Level 3 pumping/bypass criteria prior to submitting the section 10 application.

1.2 Salmonid Net Effects (Critical)

Previous comment: All salmonid species are grouped together, with no separate evaluations for the separate ESUs of Chinook salmon or for steelhead. It is important for the net effects analysis to describe individual ESUs/species, and provide full consideration of the life-history diversity and timing exhibited by each ESU/species. We also need the Sacramento River populations and San Joaquin populations for Spring-run Chinook, Fall-run Chinook, and Central Valley steelhead summarized by river basin, prior to the roll-up by ESU/DPS. Steelhead life-history and ecology especially warrant a separate evaluation. "Net effects" is useful for comparing alternative operations, but will not provide the robust effects analysis needed for ESA purposes (see comment on ESA baseline).

Separate all Chinook by ESU, by San Joaquin and Sacramento populations, and separate steelhead in all analyses and discussion.

Update: The initial issue has been addressed. Each species and Evolutionarily Significant Unit (ESU) has a separate analysis.

Now that the analysis has been separated out by species and ESU, we have been able to determine the following concerns with the net effects analysis:

The net effects section does not provide a well-integrated assessment of the overall population-level effects of the plan. It is primarily a reporting of disparate segments and a summary of the different analyses, without an analytical method or over-arching conceptual model to tie them all together (i.e., feed one into another). It is still a discussion of the application of different methods to different life stages. Results are based on "environmental attributes" that are scored for magnitude of effect and uncertainty; the agencies did not have an opportunity to assess these scores and there are no tables of these attribute magnitude/certainty scores provided for salmon and sturgeon.

During the effects analysis review workshops conducted in November/December 2012, ICF and the interagency technical team agreed that the environmental attributes analysis in the net effects section should be fundamentally re-worked to make flow a much more robust element of the stressor tables by including the "five attributes" of flow (magnitude, timing, frequency, duration, and rate of change), how the project would affect each of these attributes, and how these changes would affect fish. These agreements are not reflected in the framework of the current environmental attributes analysis and should be incorporated into the next draft.

There needs to be a systematic method for selecting the number of attributes that are summed in the net effects. For example, for steelhead, there are four categories of food in the summary figure, which doesn't seem appropriate for salmonids, especially the migrants. At the same time, no benefit is assigned to channel margin habitat restoration in the figure. A table showing the summed scores for all attributes would be more helpful than the figure.

The attributes themselves need to be better defined. E.g., how does "Sacramento River Flows" differ from "Sacramento River Habitat" differ from "channel margin" or "riparian"? A conceptual model would help with this. The assessment should be of the *change* in these factors attributable to the project.

There needs to be a second level of analysis to weight the results by the proportion of each life history type exposed to the effect (e.g., the 95% migrants to 5% foragers split for juvenile steelhead seems appropriate, but each segment is given equal emphasis in the summary figure).

Some QA/QC needs to be done to make sure the conclusions from the text match the summary figure (e.g., in steelhead, the figure shows a moderate benefit from Feather River flows, but there is no discussion of this in the text).

The changes in flows mentioned for some locations need to be translated to their effects on water temperature in order to fully understand their impact. For example, a 28% reduction in flow for the American River shown under ESO and HOS in the summer and fall months could potentially cause significant temperature issues for juvenile steelhead, as these are the months that the river can get very warm in lower-flow years.

There also needs to be a more systematic method for assigning level of benefit from a CM to a species. For example, in the steelhead net effects section, the sensitivity analysis for non-physical barriers showed a 0.00 (zero) survival increase in one year, and a 0.03 increase in a second year, yet the conclusion was a moderate positive change with moderate certainty. We recommend that a facilitated workgroup including biologists from all five agencies and ICF be charged with assigning specific magnitude and certainty scores and documenting the rationale and data sources for those determinations.

As part of the South Delta Research Collaborative, NOAA's Southwest Fisheries Science Center has developed a simple "top-down" conceptual model of south Delta operational effects on salmonids, which among other things links hydrodynamics to predation. We recommend that ICF coordinate with the agency staff involved in this collaborative process and exchange information on common issues being analyzed in both efforts.

In summary, our recommendations on this topic are to:

- **Conduct a facilitated workshop with the agencies to identify conceptual models of operational effects on salmonids and sturgeon and to agree on a model to guide the quantitative net effects analysis.**
- **Conduct a facilitated workshop with agencies to discuss and define environmental attributes and scores, the methodology of combining and weighting scores, and incorporation of the five attributes of flow.**
- **Complete a thorough cross-check of conclusions in text against those in figures.**
- **Explore flow-temperature relationships in upstream areas to provide a better inference of effects of reduced flow on temperature stress.**

1.3 ESA Baseline, Future Conditions, and Climate Change (Important)

Previous comment: In order to conduct the ESA jeopardy analysis on the PP, the baseline condition and projections of future baseline conditions, including effects of climate change, need to be re-written to be consistent with the 2009 Biological Opinion and current case law. 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." Implicit in this definition is a need to anticipate the future baseline, which includes future changes due to natural processes and climate change. For the ESA jeopardy analysis we add the effects of the proposed action[2] to the

[2] Effects of the action refers to 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.

environmental baseline to determine if there will be an appreciable reduction in the likelihood of survival and recovery of the species (by reducing its reproduction, numbers or distribution).

Upstream effects associated with climate change need to be in the baseline and future conditions, with any effects of the project (in the Delta or associated with upstream operations) added to that future condition to determine jeopardy. A project proposed in this type of baseline conditions needs to more than offset its effects in order to alleviate a jeopardy finding.

Update: As a result of this comment, ICF is developing a scope to conduct a new "aggregate" analysis that meets the needs of FWS and NMFS. NMFS intends to continue to work with them and the other agencies to complete this analysis and incorporate it into the effects analysis of the proposed project prior to submitting the section 10 application.

1.4 Analysis of Water Temperature Impacts (Important)

Previous comment: Lethal and sub-lethal water temperature thresholds need to be examined at a finer scale. Currently the effects analysis relies heavily on a Reclamation water temperature model which can only estimate monthly values, which have limited value for predicting project effects on fish. In addition, the effects analysis has only presented frequencies of temperature threshold exceedances, while the magnitude and duration of exceedance is also very important. We do not know if this has been addressed in revised Appendix C.

1. Provide tables and probability plots of magnitude and duration of temperature exceedances at certain upstream locations, by water year type and month.

2. Technical discussion with Reclamation and CH2MHill about how to post-process data.

3. Investigate the use of SWFSC's Sacramento River temperature model to predict project effects and make hindcasts of empirical temperatures.

4. Investigate the use of the new American River temperature (and storage and flow?) model

Update: NMFS and ICF are working to develop temperature data presentation methods that provide a more useful representation of results. Daily data will be used when available to indicate the magnitude and duration of temperature exceedances at compliance locations. These new analytical methodologies have not yet been incorporated into the effects analysis.

1.5 Assumption of Habitat Restoration CM Success (Critical)

Previous comment: In several places, the EA assumes that adverse impacts of the PP will be offset by unsubstantiated benefits of habitat restoration. The EA assumes that all restoration will be successful and work as predicted, with little or no evidence to support this prediction and no attempt to analyze the potential outcomes of less than perfect success.

1. It is imperative to avoid language such as "This conservation measure will...", because the anticipated CM outcomes are based on conceptual thinking, not execution. To be able to comprehensively think through the adaptive management and monitoring plan, implementers need to try to anticipate a range of responses that must be managed in order to be prepared for the uncertainty of the response.

2. Alternative outcome scenarios should be evaluated to bracket the range of possible outcomes from proposed habitat restoration.

Update: Language has been altered to reflect uncertainty to an extent, but alternative outcome scenarios have not been evaluated; all analyses and results assume that restoration activities will be successful. Alternative outcome scenarios showing varied effectiveness of habitat restoration efforts have not been provided, and therefore it is not possible to assess the effects of CM1 without the assumed benefits of completely successful habitat restoration. The total success of habitat restoration efforts remains highly uncertain, and an appropriate analysis should include an evaluation of the biological effects of at least a partial failure of efforts that are expected to "improve" conditions.

ICF has indicated that a comprehensive list of previously restored areas and "lessons learned" is included in the description of CM3, but we were not able to find the summary of "lessons learned". The list in Table 3.4.3-5 shows several estuarine aquatic habitat restoration projects but the "Results" column does not provide any direct links to improved biological metrics such as growth, survival, or abundance of native fishes.

1.6 Overreliance on Real-time Operations and Adaptive Management (Important)

Previous comment: In several places, the EA assumes that adverse impacts of the PP will be fully resolved through the implementation of real-time operations and adaptive management. This may not always be possible. For example, long-term trends towards reduced carryover storage may not be able to be mitigated using real-time operations. How adaptive management might work in this situation has not been fully assessed. There are going to be limitations on what adaptive management and real time operations can accomplish.

Examine recent (five to ten years) real-time management of the cold water pool in Shasta Reservoir to determine both the effectiveness of real-time operations and a range of adaptive management options.

Update: The majority of upstream issues have been addressed through major changes in the proposed project (not withstanding some remaining issues with egg mortality and juvenile survival discussed below). However, there remains a need to more clearly describe how real-time operational adjustments will be implemented to achieve some of the stated objectives of the water operations. Specific examples include the need to thoroughly describe how the new intakes will be operated to: 1) avoid reverse flows at Georgiana Slough; 2) implement pulse protection when monitoring indicates that winter-run Chinook are "riding" a flow pulse; and 3) determine when a sufficient percentage of winter-run Chinook have passed the intakes to end the pulse protection and initiate standard level 1 pumping procedures. While it is understandable that these real-time criteria have not been developed to date (because they have not been necessary to complete CALSIM modeling and run monthly average models of effects), we will need greater specificity on real-time operations in order to meet section 10 permit issuance criteria and complete the underlying Section 7 analysis. We recommend that an interagency technical team be formed immediately to work with ICF to start scoping these real-time criteria.

1.7 North Delta Diversion Effects (Resolved)

Previous comment: Mortality rates from predation and other screening effects are difficult to predict, as there is a high level of uncertainty associated with predation and other effects on juvenile salmonids. The estimate of <1% loss at all 5 screens is not sufficient without giving additional consideration to higher estimates of mortality (GCID empirical studies showed a 5% per screen loss rate, much higher than the <1% used in the DPM).

1. Bracket the analysis of screen related mortality around a 5% per screen loss assumption.

2. Investigate the use of DWR's hydrodynamic model to assess local flow alterations at the proposed diversion structures, including the creation of predator holding areas. Specific questions are whether the model can simulate on-bank structures and the additional hydrodynamic effects of active pumping.

Update: This comment has been addressed through the inclusion of a more comprehensive analysis of potential screen related mortality including an assessment of a 5% per screen loss rate. The recommendation to conduct a detailed hydrodynamic analysis of the screen face area is being advanced by the Fish Facilities Studies Group. This analysis should be incorporated into the effects analysis when it is available.

1.8 Predator Control Conservation Measure (Important)

Previous comment: We agree that predation is a significant risk factor to the listed species, but the assumed positive results of this CM are questionable and unsupported (see F.5.4.1.4 in Appendix F). As an example, localized control of striped bass may not be feasible as this species exists throughout the Plan area and are highly mobile. Few specific details have been presented on how the CM will be implemented, and an aggressive predator removal program could result in significant incidental take of listed species. Due to the high level of uncertainty, we find it very unlikely that we could rely on this measure for any benefits during the permit process.

Remove this CM measure from the plan, and move it to an experimental research program and link to adaptive management. Reflect this appropriately in the EA.

Update: The authors have generally toned down the level and certainty of beneficial effects anticipated from CM15 (Predator Control). However, the measure still lacks an appropriate metric to measure the success (or lack thereof) of the predator control program and seems to assume phase 1 (the scoping stage) will show success and phase 2 will be implemented. There is no discussion of what happens if phase 1 shows no benefits from the program. The conservation measure needs to clearly explain how the success of this action will be measured (metrics and success criteria). The analysis of CM15 also needs to take the next step and describe the expected outcomes if the measure is less than fully successful. This is a very important element of any analysis of actions whose outcome is highly uncertain and should be considered a universal recommendation for all measures where the results of implementation have high uncertainty.

1.9 Delta Passage Model (Important)

Previous comment: The Delta Passage Model (DPM) is used as the sole predictor of smolt survival in baseline and PP scenarios. However, the assumptions, inputs, and results are still being validated and reviewed. The datasets used in this model are very limited and largely based on results from hatchery late-fall run Chinook, which are then being applied to other runs of Chinook.

Continue refinement and development of DPM. Weigh validity of results against those of other models and relationships. The use of Newman, 2003 may be another tool to use for assessing the survival of fall and spring run smolts through the Delta.

Update: DPM continues to be refined through discussions with Cramer Fish Sciences and NMFS. Survival analyses based on methods in Newman (2003) have been incorporated into the effects analysis, and results of both models showing similar trends for the modeled years are discussed in the net effects section. NMFS recommends that this model continue to be used as an informative tool but that the results be closely scrutinized to determine what is driving them and if they make sense based on the system as we know it. NMFS also recommends that additional peer review should be conducted – perhaps a reconvening of those who participated in the previous workshop in June 2011.

1.10 Deficient Analysis of Fry Passage/Survival (Important)

Previous comment: Because the DPM model is only for smolt sized fish, the salmonid analysis is insufficient as it provides no information on fry-sized salmonid passage/survival.

Add qualitative analysis of fry survival based on best available data. Perhaps add time/added mortality to a modified version of an updated DPM model.

Update: In this new draft, fry growth is analyzed relative to the Yolo Bypass and a fry Particle Tracking Model (PTM) analysis was included (See 5C.5.3.7; 5C.5.4.1.4). ICF has acknowledged these analyses need additional agency input for the public draft. The PTM analysis was discussed at recent species-specific meetings where it was determined that it may not be appropriate for this application. NMFS has requested (and ICF is working on) more detailed (3- and 7-day) PTM output to allow a closer look at travel time through key reaches, which may potentially be linked to fry survival rates through those reaches. It is generally agreed that neutral particle movement does not necessarily mimic the movement of living fish and the SWFSC/NMFS life cycle model will include a "smart PTM" component that attempts to add more "life-like" movement to the particles, which may provide a better way to analyze fry survival.

1.11 PTM Runs Inadequately Capture Altered North Delta Hydrodynamics (Important)

Previous comment: PTM model runs did not include conditions in which ND diversions would be at the upper limits of allowable pumping (high proportion of total river flow). The technical memo from NMFS and USFWS highlighted the issue and the resolution to the problem. We will need additional modeling runs to adequately assess ND diversion impacts on salmonid travel time and route entrainment.

Do additional PTM analysis following guidelines outlined in NMFS/USFWS memo.

Update: While it appears from Chapter 5 Appendix B.6 and Appendix C.4.3.2.4 that some of the suggested time periods were included, Attachment 5C.A.9 indicates that PTM was run for 24 representative months. These are the same months that were used in the previous (February 2012) effects analysis draft. The methods attachment needs to be updated to reflect the additional runs.

The time periods recommended by NMFS and USFWS were selected based on evaluation of impacts of a 15,000 cfs capacity project. It is possible that different time periods would be more appropriate to assess the effects of a 9,000 cfs capacity diversion. NMFS will continue to look into this and determine whether the modeled periods capture an appropriate range of effects from the updated project.

1.12 D1641 Export/Inflow Ratio (Important)

Previous comment: Combined north and south Delta exports under the PP exceed the current D-1641 Delta Export/Inflow standard. (The PP calculation method measures Sac River inflow below the North Delta diversions and does not include ND diversions as part of total exports).

1) *Provide summary analysis of differences between PP and EBC by month and water year type using alternate E/I calculations.*
2) *Show resulting flow data for both calculation methods.*

Update: The Export/Inflow (E/I) ratio has been applied two different ways in the three project scenarios (ESO, HOS, and LOS). The "Partial E/I", which measures Sacramento River inflow below the north Delta diversions and excludes north Delta diversions as part of total exports, has been applied to ESO and LOS. However, HOS has been modeled using the "Full E/I", which includes the full Sacramento River inflow upstream of the diversions as inflow and the north Delta diversion exports as exports. This is an inconsistency in approach that raises questions about the subsequent analyses. ICF has indicated that new analyses have been done but have not yet been fully incorporated into the effects analysis. There is placeholder language in CM1 showing both options but the actual operational criteria to be implemented upon project completion has yet to be decided. NMFS recommends that the "Full E/I" criteria be adopted and that this methodology be applied across all scenarios for consistency.

1.13 Yolo Bypass (Important)

Previous comment: Yolo Bypass has great potential for fisheries benefits, but the current EA may be overstating the benefits without adequate studies or data to support these conclusions. Without project specific plans to help quantify the effects, concerns remain about issues such as sturgeon passage, juvenile salmonid survival under lower flow regimes, ability to get juveniles into the floodplain through notch and reduction of flows in the mainstem Sacramento River to accommodate additional flooding in Yolo Bypass. Also, some races/runs of salmon may not have access to Yolo Bypass.

Provide project specific plans and consider the risks of managing the floodplain under lower flows related to issues above.

Update: ICF has indicated that these project specific plans are not yet available, but risks related to stranding, passage, etc., are acknowledged. See 5.C.5.4.1. This is another conservation measure where a lack of specific designs and operating criteria create significant uncertainty as to the efficacy of the measure and level of biological benefits that it will provide. However, the net effects analysis attributes broad success and significant benefits from the measure with no analysis of the consequences of less-than-complete success. We suggest that this is another area where an analysis of less than fully successful implementation should be conducted to determine the sensitivity of the overall plan to the success of this CM.

1.14 Channel Margin Habitat (Important)

Previous comment: Altered flows resulting from the North Delta diversions may result in reduced water levels affecting the percentage of time that current wetland and riparian benches are inundated.

> *Compare anticipated water levels under future scenarios with those in the design documents of restored wetlands and riparian benches to analyze potential dewatering of those features.*

Update: NMFS and ICF are coordinating to develop and execute an effective analysis of the effects of proposed operations on inundation of existing wetland and riparian benches. We will need to assess the results of this analysis with respect to effects on covered fish once the analysis is completed. This analysis should also be submitted to independent peer review.

1.15 Construction and Maintenance Impacts (Important)

Previous comment: The EA does not adequately address the potential for adverse impacts on sturgeon, fall-run Chinook adults, and steelhead adults, which are generally present in the project area during the proposed in-river work windows described for construction and maintenance of North Delta facilities.

> *Discuss ways of minimizing impacts and implementing mitigation for species not protected by work windows.*

Update: NMFS has been working with ICF to incorporate more detail into the construction and maintenance impacts analysis. This has resulted in significant improvements in the analysis. However, several elements, particularly regarding the long-term maintenance of the facilities, lack the detail and specificity to allow NMFS to conduct a thorough assessment of the amount and extent of take that will need to be included in the permit and the section 7 consultation analysis for the project. NMFS generally requires in-water construction projects to be at the 80% design stage for section 7 consultations, and we will likely need that level of design completion to conduct a thorough assessment of the amount and extent of take for this large construction project. We request information from ICF on when this level of design will be ready in order to understand the implications for the schedule, if any.

1.16 Tidal Marsh Impacts on Riverine Flow (Important)

Previous comment: The effect analysis assumes that restored tidal marsh will act to decrease flow reversals, which has not been well explained. It seems that tidal marsh restoration was modeled as a single configuration; there has been no description of that configuration to indicate how they were implemented in the hydrodynamic models. Therefore, there is a lot of uncertainty regarding model results.

> *Document changes to hydrodynamic models that were implemented to characterize tidal marsh restoration.*

Update: ICF has communicated to NMFS that the data that can be provided is limited, and that ICF and the California Department of Water Resources (DWR) have provided as much specificity as they can. ICF met with NMFS and other agencies on March 5, 2013, to provide

additional information regarding the relationship between restoration and tidal dampening as they relate to riverine hydrodynamics, and more specifically to reverse flows near Georgiana Slough (See 5.C). We suggest that the document include a more comprehensive narrative of the tidal hydrodynamics and the effects of tidal habitat restoration, including a discussion of the RMA modeling conducted on this topic. Because of the importance of this analysis to determining potential project effects on covered fish, we recommend that these methods be independently peer reviewed and appropriately characterized for their uncertainty.

1.17 Cumulative Effects Show Long-Term Viability Concerns for Salmon (Critical)

Previous comment: The analysis indicates that the cumulative effects of climate change along with the impacts of the PP may result in the extirpation of mainstem Sacramento River populations of winter-run and spring-run Chinook salmon over the term of the permit.

1) Incorporate operational criteria into the PP that will protect and conserve suitable habitat conditions in the upper river for the species under the 50 year HCP (these operational criteria should be designed to meet the performance criteria in the NMFS BiOp RPA).

2) Convene a 5-agency team of experts specialized in Shasta operations and temperature management to develop the above described operational criteria.

Update: The current efforts to develop a fully "aggregated" effects analysis should address the analytical concerns related to this issue, but the fact that the cumulative effects of the project when combined with effects of climate change and other baseline conditions is showing the potential extirpation of mainstem Sacramento River populations of winter-run and spring-run Chinook salmon over the term of the permit remains as a serious concern.

The reported OBAN and IOS modeling results indicate a potential issue with either the modeling tools (OBAN and IOS), or the author's assertion that the upstream flows associated with EBC2 and ESO are "essentially identical". The conclusions in this section state that "The majority of the effects of both BDCP and climate change were driven by increases in upstream temperatures affecting egg survival, which, relative to the BDCP contribution, is a potential modeling artifact and not an actual predicted effect." However, ICF has determined that these are the best modeling tools available. The results cannot necessarily be discounted because they do not show what was "expected". Since these methods were deemed acceptable, the results need to be fully acknowledged.

The results of these models signal a need for further investigation to determine why they are not what are "expected". It seems that upstream releases between ESO and EBC2 do not match as well as thought, as seen in Table C.5.2 2 titled "Difference and Percent Difference in Flows in the Sacramento River at Keswick, Year-Round". Some summertime and fall months in drier years are very different, which may be what is causing the biological models to show a negative egg survival response. The table below shows the results of month-to-month comparisons of flows out of Keswick for LLT. It indicates that the ESO flows could be as much as 6500 cfs less than EBC2 flows (November) when months are evaluated individually, and not grouped by month and water year type.

Month	Maximum Difference (ESO_LLT - EBC2_LLT)
January	-7683
February	-1571
March	-4825
April	-1221
May	-830
June	-2979
July	-5916
August	-3712
September	-2691
October	-5510
November	-6504
December	-4594

We recommend that ICF work with the Shasta operations experts at Reclamation, and possibly a broader workgroup of biological and operations experts to resolve these issues and determine if/how the entire project can be operated to insure that BDCP does not cause impacts to upstream spawning and rearing habitat in the Sacramento River.

1.18 Holistic Estuarine Evaluation (Critical)

Previous comment: The effects analysis should examine synergistic and cumulative ecological impacts associated with reducing inflows to an estuary that is already severely degraded, and discuss the importance that water quantity, quality, and the natural hydrograph have to the ecosystem, as well as the direct impacts on native fish species. So far, the impacts to fish have mostly been examined in a piecemeal fashion (e.g., examining impacts of flow reduction on adult homing).

> *Incorporate a holistic evaluation of impacts on the estuarine ecosystem. Include discussion of the importance of water quantity, quality, and the natural hydrograph to the ecosystem, and the direct impact that changes to these conditions have on native fish species.*

Update: The holistic evaluation described above in our previous recommendation does not appear in the 2013 Admin Draft of BDCP. We suggest that ICF use Carlise et al. (2010) as a starting point for this discussion. Carlisle et al. found that in an analysis of over 200 stream systems, "biological assessments showed that, relative to eight chemical and physical covariates, diminished flow magnitudes were the primary predictors of biological integrity for fish and macroinvertebrate communities". In other words, the change in flow was a better predictor of whether the biotic communities were impaired than variables such as temperature, pH, total nitrogen, or urban land cover. It is also well recognized that streamflow reductions can impair the ecological function of downstream estuaries (Drinkwater and Frank 1994; Jassby et al. 1995; Loneragen 1999; Flannery et al. 2002; Winder et al. 2011).

1.19 Burden of Proof (Important)

Previous comment: Deference should be given to known population drivers and documented relationships (e.g., sturgeon recruitment relationship with flows is well documented, though the exact mechanism is not completely understood). Since flow is a key component of habitat for aquatic species, do not assume that it can be substituted for by other actions.

Do not assume that incremental benefits in a conservation measure will compensate for known population drivers related to flow.

Update: There has been significant improvement in the language used to describe the level of certainty of potential benefits attributed to those CMs that are less certain in their implementability or effectiveness for protecting covered fish. However there remain some instances of overstating/understating of beneficial/detrimental effects. For instance, the net effects analysis concludes that CM2 will "increase floodplain availability and usage and improve conditions for juvenile and adult winter-run Chinook salmon". However, the analytical methods for juveniles suggest only a low or moderate positive change. There are some stated conclusions that are based on analyses that are not yet complete (e.g., bench inundation). Some conclusions suggest that decreases in flows due to the project are "rare" because they only occur in some months of drier water years. But since dry and below normal water years can occur 40% of the time, this should not be considered a "rare" occurrence. There are numerous additional examples of these types of analytical discrepancies provided in the "track-changes" comments on the Admin Draft provided by NMFS.

1.20 Incomplete Analyses and Documentation (Important)

Previous comment: The full appendices were not released concurrently with Chapter 5 which makes review of the results problematic.

Provide all appendices/analysis simultaneously so Services can have all pertinent information used in Effects Analysis summaries without having to backtrack weeks later.

Update: While NMFS received the majority of the document on 12/21/12, this did not include Chapter 5.5 Effects on Covered Fish. Appendix 5.B Entrainment was provided on 1/2/13. Chapter 5.5 Effects on Covered Fish was provided on 2/7/13. This lag reduced the ability to simultaneously view results in appendices and assess how they were incorporated into Chapter 5.5.

The "complete" Admin Draft was delivered on March 4, 2013. This presumably includes all additional outstanding sections (Section 5.3 Ecosystem and Landscape Effects, Table 5.2-5 Biological Objectives for Covered Fish and Their Assessment in the Effects Analysis, Tables C.0-3 and C.0-4 Summary Tables, Appendix 5.I Critical Habitat and Essential Fish Habitat Analyses). NMFS has not had an opportunity to conduct a thorough review of this recent submittal.

Specific documentation for all analytical methods are not included or are outdated or incorrect (e.g., SacEFT documentation is outdated according to its developers; OBAN, MIKE21, SALMOD, Reclamation Mortality Model documentation is not included at all). This makes it impossible to fully understand how these models were configured or to determine the exact drivers of the reported results. It appears at times that the chapters/appendices were written by staff unfamiliar with the model operations and intricacies of results.

NMFS suggest that future drafts include updated and correct documentation (manuscripts, user's manuals, etc.) for all analytical methods. Documentation should include listings of all relevant input parameters and relationships. ICF should also draw on the expertise of the developers of specific models to interpret model results, identify uncertainties and limitations, and verify the stated conclusions.

1.21 Insufficient Biological Goals and Objectives (Important)

Previous comment: The conservation measures are sometimes defining the BDCP species objectives, which is insufficient. 30% juvenile through-Delta survival is not a suitable goal for a 50 year conservation plan.

The BDCP objectives should be biological, species-level outcomes.

Update: This issue has generally been resolved (for salmonid BGOs) through the incorporation of the recommendations provided in NMFS' technical memo on juvenile salmonid through-delta survival. However, the text that describes the BDCP's level of responsibility for achieving the through-delta survival objectives does not match what is described in the NMFS tech memo on salmonid BGOs. The tech memo calls for the BDCP to be responsible for 100% of the improvement in smolt survival through the Delta, not >50%. This is because it will be impossible to determine causation for any measured increase in through-delta survival rate. The specific objectives are interim and should be reevaluated over time. The actual tech memo should be included as an appendix to Chapter 3.

The biological objectives for sturgeon abundance and productivity (under GRST1) are vague and rely too much on "documenting the current distribution" and future studies. There needs to be greater emphasis on the objective to provide adequate adult attraction flows.

1.22 OMR Flows Unimproved in Drier Water Years (Important)

Previous comment: Improved OMR flows under the PP occur during wetter years when OMR is less of an issue for covered fish. PP OMR flows are often worse than, or similar to, EBC in drier years. Sacramento Basin fish are most vulnerable to entrainment into the central Delta in drier years when Sacramento River flows have the potential to reverse and OMR levels are below -2,500 cfs. San Joaquin basin fish are best protected by increased Vernalis flows and/or a HORB which the PP does not address.

1. Analyze the risk in different water year types and with different flow levels in the Sacramento River.

2. Implement Scenario-6 to help address the adverse impacts seen under the PP.

Update: This issue has generally been addressed by adopting "Scenario 6" into the proposed project and including the High Outflow Scenario into the decision tree. There were additional south Delta operational criteria included in the agency recommendations developed in the CS5 process. These included additional protections in the "shoulder" months of the juvenile salmonid migratory period (March and June), as well as summer OMR criteria intended to provide protections against sturgeon entrainment into the export facilities. The potential biological benefits of these CS5 criteria should be assessed in the effects analysis. ICF's participation in the South Delta Research Collaborative will provide an important linkage between BDCP and the conceptual models and hypotheses emerging from that effort. This

remains a key issue because of the importance of improving survival of emigrating salmonids from the San Joaquin River system, which is generally less than 10%. We recommend continued iterations on these operations prior to Plan completion, and between Plan completion and full implementation (during ELT).

1.23 Non-Physical Barriers (Important)

Previous comment: Assessment of non-physical barriers is inadequate, and the potential negative effects of predation associated with non-physical barriers haven't been assessed.

Include analysis of potential adverse effects of non-physical barriers.

Update: This is another instance where the certainty of beneficial effects from a CM is overstated in relation to the amount and quality of data on which those conclusions are based. The Georgiana Slough non-physical barrier (NPB) effectiveness is based on one year of data from high flow conditions. We have yet to see results from a lower-flow year when reverse flows at the Georgiana Slough junction may be more frequent. It should also be acknowledged that under the OCAP Reasonable and Prudent Alternatives (RPA) the development and implementation of NPBs would be required if they are found to be effective.

Also, the way in which the effects of NPBs are described is confusing and potentially misleading. According to Appendix 5C.5.4 Methods, there was a 67% reduction in the proportion of fish entering GS/DCC (from 22.1% to 7.4%). However, in the text it is often stated that the NPB provides a "67% deterrence", which implies that 67% of fish approaching the junction would be deterred, and therefore stay in the mainstem. That is not true. It would be better to describe this as a "67% decrease in proportional entry into GS."

1.23.1 Carry-over of OCAP RPA's on technological improvements to South Delta Facilities (Critical)

Previous comment: By not carrying forward technological fixes in the South Delta called for in the OCAP RPAs into the Conservation Measures, we would expect the effects analysis to specifically flag this and analyze it as a degradation to future conditions (as compared to the baseline which should include the RPA improvements).

Add south Delta technological improvement RPA's to Conservation Measures

Update: ICF states that "Many RPAs are assumed to be completed prior to the implementation of BDCP and/or CM1 and are therefore assumed in the baseline (This is clarified in Tables 3.2-1 and 5.2-2.)". However, all the comparisons in the effects analysis are to current levels of pre-screen loss and salvage, not to what they might be with these RPA elements implemented. Therefore, the results overstate the benefits of the project as compared to an appropriate baseline condition which should include these RPA required improvements.

This same issue is repeated by the fact that the analytical baseline (EBC) does not include potential beneficial effects of Yolo Bypass floodplain habitat restoration, and implementation of non-physical barriers, both of which are included in the OCAP RPA. This is a significant flaw in the net effects analysis. The analysis needs a clearly stated caveat of interpretation of results to reflect this limitation. The aggregate analysis should be helpful in addressing these beneficial effects in a different framework.

1.24 Feasibility of 65K acres of Habitat Restoration (Critical)

Previous comment: Recent evaluation of land available for habitat restoration indicates potential roadblocks to acquiring all the land proposed in the PP. DWR's own analysis suggests that 65K acres is very unlikely.

Analyze the potential effects of partial implementation of habitat restoration and incorporate alternative actions or measures to compensate for this possibility.

Update: The previous comment from 2012 was referring specifically to tidal wetland habitat. Since that time DWR has revised their habitat restoration feasibility analysis and expanded the definition of the "tidal natural communities" category to include all tidally influenced habitats to be restored under BDCP. DWR believes that it will be possible to fully achieve the plan's habitat restoration goals. However, there is no specific analysis of the feasibility of acquiring 65,000 acres of land appropriate for tidally influenced habitat restoration provided in the document. All related analyses proceed as if restoration will be wholly successful; there are no bounding analyses to show the effects of CM1 operations if restoration either cannot be completed to the full extent or is not fully successful. Therefore, our previous recommendation stands: Analyze the potential effects of partial implementation of habitat restoration and incorporate alternative actions or measures to compensate for this possibility.

Section 2: Additional Issues to be Resolved for Public Draft

Chapter 1

Introduction - Track changes comments submitted separately.

Chapter 2

Existing Ecological Conditions - Track changes comments submitted separately.

Chapter 3

2.1 <u>Decision Tree process needs to include consideration of flow needs for salmonids and sturgeon (Section 3.4)</u>

Modeling results of the HOS indicate that flow requirements intended to address the needs of smelt would also be likely to address some of the flow requirements for salmonids and sturgeon identified through the CS5 process. However, the description of the Decision Tree management process states that monitoring and research used to determine which "tree branch" would be implemented would only look at smelt issues and would not attempt to determine which flow scenario would be appropriate for salmonids and sturgeon. The monitoring and research should also investigate the flow needs of salmonids and sturgeon and the determination of which flow scenario will be implemented should be based on the needs of all covered species. There also needs to be a clear understanding that while the current Decision Tree would create four possible combinations of spring and fall outflow criteria that would be included in the range of potential options for initial study, prior to commencement of conveyance operations, there will be a new determination by the permitting agencies specifying what the spring and fall outflow criteria will be at the time the new facility begins to operate. This determination will be based on all best available science, including that developed during the decision tree process.

2.2 Sensitivity analysis of likely effects of future increase in south-of-delta storage capabilities (Section 3.4)

There is a high likelihood that south-of-delta storage capabilities will be increased over the 50-year term of this permit. There is also the potential for such an increase in storage capacity to result in water operation parameters (pumping rates/timing, OMR flows, I/E ratios, etc.) that differ from those modeled in the current analysis. There needs to be a "sensitivity analysis" of the likely effects of future increase in south-of-delta storage capabilities on these operational parameters and the resulting biological effects on covered species.

2.3 No description of "operational phasing" of north Delta facilities (Section 3.4 and 3.6)

The document lacks any language describing the agreement to use "operational phasing" in lieu of construction phasing, as agreed to by the BDCP principals. The plan will need to include significant detail on the monitoring and metrics necessary to implement the operational phasing agreement and a detailed description of how all aspects of that agreement will be implemented. We have provided the document describing the details of the Principals' agreement last spring, and these need to be accurately reflected in the conservation measures and as a separate section of the adaptive management chapter.

2.4 The Role of Adaptive Management (Section 3.6)

Almost three years ago, the Federal Agencies issued a white paper on application of the Five Point Policy to the BDCP (document attached to this memorandum). It articulated the role of adaptive management in the BDCP, saying, in part, that

> "The BDCP is a complex, landscape scale, long-term HCP with a high degree of uncertainty as to how close the initial conservation measures will come to achieving the plan's biological goals and objectives. It falls into the category of plans that will be a mixture of the two strategies, with initial prescriptions associated with adaptive management, and specific biological outcomes defining the ultimate success of the plan. This type of plan will allow management flexibility so the permittee may institute actions necessary to achieve the plan's goals while providing boundaries for future expectations and commitments. In addition, a results-based plan will address uncertainty in the ecosystem and provide the conservation assurances required by the Act. The Services will be challenged to make the findings required for permit issuance if the plan does not include clearly defined and scientifically supported biological goals and objectives, an adaptive management plan that tests alternative strategies for meeting those biological goals and objectives, and a framework for adjusting future conservation actions, if necessary, based on what is learned." (4/29/2010 memo, page 1)

The adaptive management program created by the BDCP serves the essential functions of (1) assuring that alternative conservation measure designs that might more efficiently achieve objectives are studied and, where appropriate, implemented; (2) providing a workable framework for deliberating difficult management issues and proposing solutions; and (3) providing transparency in the management of the BDCP to ensure public confidence that the conservation measures and strategies implemented under the plan are based on the best available science. We have concerns with the current draft on all three of these points.

2.5 Adaptive Limits (Section 3.6)

"Adaptive limits" in the BDCP refers to the most extreme sets of operational parameters that might be required or authorized to the permittee through the working of adaptive management over the life of the permit. Some discussion of what such parameter-by-parameter limits might be has already occurred, but neither the concept of adaptive limits nor a draft example of them is included in the current BDCP draft. This leaves open the question of what commitment of resources might be required of the permittee.

As is clear in both the HCP Handbook and the Five Point Policy, the permittee in an HCP is protected by the inclusion of adaptive limits that "clearly state the range of possible operating conservation program adjustments due to significant new information, risk or uncertainty. This range defines the limits of what recourse commitments may be required of the permittee. This process will enable the applicant to assess the potential economic impacts of adjustments before agreeing to the HCP." 65 Fed. Reg. 35253; see also HCP Planning Handbook at 3-24 – 3-25.

In the BDCP, adaptive limits would provide an important assurance that would protect the permittee from an open-ended obligation to commit resources irrespective of circumstances. They would also provide an important level of transparency to the permittee and the public regarding the commitments represented in the plan. The range of adaptations to reflect evolving scientific understanding and improved information on the effectiveness of the various conservation measures are usually described as changed circumstances within an HCP that has high scientific uncertainty, such as this one, and therefore do not trigger a formal plan amendment. Thus, the adaptive limits serve as an important guide regarding the boundaries of the anticipated changed circumstances.

2.6 Role of BGOs (Section 3.3)

Biological Goals and Objectives form the core of the BDCP. Biological goals represent the ultimate conservation outcomes toward which the plan is striving. In some cases, achievement of ultimate goals lies within the power of the BDCP; in others the achievement of goals depends in part on factors that are outside the control of the water projects. Objectives are lower-level outcomes within each goal that are essential to achieving the overarching goal. To be effective, objectives need to be SMART: specific, measurable, achievable, relevant to the goal, and time-bound. In addition to meeting the other SMART criteria, BDCP objectives are "achievable" because they are within the power of the water projects to achieve, and essential to BDCP success because they are "relevant to the goal[s]."
BDCP conservation measures are designed to achieve the biological objectives of the plan. Because of this, BDCP adaptive management will primarily focus on adjustment of the conservation measures to achieve the objectives as efficiently as possible.

The document generally makes it clear that the BGOs will be used to guide the implementation of conservation measures, but we have important concerns with the way objectives are used.

(1) The plan needs to clearly acknowledge and articulate that achieving the outcomes described in the Objectives is the actual basis of the entire conservation strategy and its constituent conservation measures. Continuing to achieve objectives is necessary for progress toward recovery of covered species and in many cases will be required for compliance with the terms of the BDCP permit.

(2) The plan needs to clearly articulate that the adaptive management program will focus on ensuring that plan objectives are being met. Indeed, looking at alternative management strategies to achieve program objectives is fundamentally what AM is designed to do. Failure of conservation measures to achieve objectives will, therefore, be a basis for the AMT to propose changes to conservation measures. There are several statements of the role of adaptive management in chapters 3, 6, and 7 that need to be edited to make this clear.

(3) The plan needs to make clear that objectives are themselves subject to adaptive management. Objectives are ultimately based on models describing the relationship of covered species to their environments, and changes to those models might occasion any of the following: changing an objective either up or down, adding an new objective to reflect improved understanding, removing an objective that is superseded or found not to be relevant to achieving its overarching goal. Deliberations on these issues is properly a subject for the AMT, with oversight by the AEG, POG, and ultimately the fish and wildlife agencies with final authority on adaptive management decisions. Though chapter 7 lays out a clear role for the AMT in these matters, section 3.6 is currently ambiguous and contradictory on the role of the AMT and how it makes decisions. Furthermore, section 3.6 does not adequately articulate how the AMT will exercise its responsibilities with respect to the nine enumerated steps of adaptive management, making it quite unclear whether the AMT is appropriately empowered to carry out its mission.

(4) Implementation of the conservation measures as initially described in the plan does not constitute the extent of the responsibilities of the Authorized Entities. Achieving the outcomes described in the objectives is the primary responsibility of those implementing the plan.

2.7 <u>Effects of proposed operations on Coordinated Operations Agreement</u>

There have been frequent discussions within various workgroups and meetings on the potential for some proposed operational scenarios to affect the Coordinated Operations Agreement (COA) agreement between Reclamation and DWR, but we were unable to find anything in the document describing this subject. If this is truly an issue, and certain operational scenarios intended to benefit covered species will require amendments to the COA agreement, this should be described somewhere in the document as part of the process necessary to implement the BDCP.

Chapter 4

Covered Activities and Federal Actions - Track changes comments submitted separately.

Chapter 5

2.8 <u>Potential project related impacts on upstream egg and juvenile survival continue to be predicted in model results (Section 5.5 and Appendix 5.C)</u>

OBAN, IOS and SacEFT model results continue to indicate that slight differences in Keswick release strategies between the ESO and EBC will result in increased egg mortality upstream. Lower flows in key summer and fall months increase egg mortality for winter-run and spring-run Chinook salmon and potentially other runs. SacEFT habitat results show significant impacts on spawning and rearing habitat for winter-run that are above and beyond effects of climate change.

Critical year egg mortality is very high by the LLT suggesting that a few dry/critical years in a row could potentially cause significant impacts to Sacramento River-dependent ESUs over the 50 year permit timeframe. The analysis shows that ESO criteria could result in riskier operations relating to stranding risk for juveniles (over two times more low risk years under EBC). The document should provide full SacEFT results – not just a summary of "good" year conditions. We are also interested in "poor" year conditions between the scenarios.

The analysis should provide a better examination of "worst case scenarios" for indicators like juvenile production, egg survival, escapement, etc. ESO appears to have riskier operations that result in half as many juveniles in minimum estimates of SALMOD. It may be useful to develop threshold juvenile production estimates (JPEs) of concern that can be compared between scenarios.

2.9 Additional Analysis of Feather River and Oroville Reoperations (Section 5.5 and Appendix 5.C)

Increased summertime temperatures in the Feather River may have effects on the reproductive success of sturgeon, especially for the high outflow scenario. While the high spring-time Feather River flows modeled in HOS could attract sturgeon into the Feather River from the Sacramento River, summertime releases are decreased compared to EBC2 to provide for end-of-September storage requirements. The decreased summertime river flows increase water temperatures in the high-flow channel; the resulting temperatures reported in the effects analysis would be lethal to sturgeon eggs and embryos. This is not discussed in the net effects section because lethal egg temperatures are not considered in the net effects conclusions. NMFS is also concerned with the low frequency with which the ESO and HOS meet the recommended minimum spring flows in above normal and below normal water years.

The forecasting method for Oroville releases is not clearly defined in any section. The effects of relying on Oroville to meet HOS spring-time Delta outflow requirements are reviewed in Chapter 5 (Appendix C Attachment A), and there are references to reduction of exports to also meet the outflow target. Chapter 5 Appendix C.2 presents NMFS' recommended Feather River flow schedule, but there are unexplained modifications and no description of the driving constraints or storage forecasting methodology. While these operations need to be described, the effects analysis should also address any influence of the potential temperature compliance point included in the Dec 2012 Settlement Agreement for Licensing of the Oroville Facilities. This would require compliance to 64° F from May-September in the high flow channel, and the Robinson Riffle criteria for protection of spring-run Chinook in the low flow channel, which could be affected as a result of changes in end of May storage and resulting diminishment of the cold water pool. Because of the potential biological importance of re-operation of Oroville, we recommend that the entire set of decisions and effects analysis be submitted for independent peer review to further assist in predicting these effects.

2.10 Turbidity Reduction Analysis (Chapter 5 and Appendix 5.F)

While Chapter 5 and Appendix 5.F contain discussion and evaluation of water clarity and the change in sediment delivery to the Delta due to the project, it does not specifically address the localized change in turbidity or sediment transport that may result due to reduced river velocity downstream of the north Delta diversion structures.

ICF could use DSM2 results to evaluate whether any reductions in flow velocity downstream of the intakes will reduce sediment transport capacity, causing deposition and reduced turbidity.

2.11 Poor linkage between net effects results and achievement of biological objectives (Section 5.5 and Section 3.3)

The net effects analysis needs to include a section(s) that specifically ties the results of the net effects to the achievement of the BGOs for each species. We need to be able to determine the likelihood of the various operational scenarios actually achieving the BGOs for each species. A rough examination of this issue in the current draft indicates that it may be difficult to meet the through-delta survival objectives for salmonids under the proposed operational criteria.

Chapter 6

2.12 Expansion of Changed Circumstances and adaptive responses to those Changed Circumstances (Section 6.4)

There are numerous problems with the latter sections of Chapter 6 (Sections 6.4 and 6.5). The list of foreseeable changed circumstances described in Section 6.4 needs to be significantly expanded and the range of adaptive responses available to address those changed circumstances is far too narrow and limiting. At a minimum, changed circumstances should consider all foreseeable changes in storage, conveyance and operations external to the BDCP conservation measures but that could substantially affect the CALSIM runs and therefore the effects analysis that supports the BDCP permit issuance criteria. These include: new North of Delta storage, new South of Delta storage, and new State Water Resources Control Board San Joaquin and Delta flow criteria. In general, we expect any one of these would trigger a new analysis of effects and the potential for changes to conservation measures. The Five Agencies will need to review this section and come to agreement on revising its contents prior to release of the public draft of the plan. More detailed comments on the issues with this section of Chapter 6 are provided in NMFS' "track-changes" submittal.

Chapter 7

2.13 Governance

While many of the important issues regarding the governance of plan implementation have been resolved over the last few years, one of the remaining significant issues is the lack of a clear tables and graphics describing how entities relate to each other (e.g. organization charts or flow charts) and which entities will retain final decision making power over each of the major categories of decisions to be made. We recommend that the "decision table" that was developed in the Principals workshop process be included in the document, with any necessary edits, to explain the decision-making process that was agreed to in the text.

There are also some issues regarding the role of the implementing office and its employees that remain to be resolved in Chapters 3, 6, and 7. The plan needs to be clear that adjustment of the conservation measures and other actions that are necessarily and appropriately part of adaptive management are to be managed and administered by the Adaptive Management Team, and not by the Implementation Office or any of its employees, including the Program Manager and the Science Manager.

Chapter 8

Implementation Cost and Funding Sources - Section is pending changes and was not reviewed at this time.

Chapter 9

Alternatives to Take - Track changes comments submitted separately. Intend additional review upon release of revised version.

Chapter 10

Integration of Independent Science - Track changes comments submitted separately. Intend additional review upon release of revised version.

Attachment 23

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

OFFICE OF THE
REGIONAL ADMINISTRATOR

Aug 26, 2014

Will Stelle, Regional Administrator
West Coast Region National Marine Fisheries Service
650 Capitol Mall, Suite 5-100
Sacramento, CA 95814

Subject: Draft Environmental Impact Statement for the Bay Delta Conservation Plan, San Francisco Bay Delta, California (CEQ# 20130365)

Dear Mr. Stelle:

The U.S. Environmental Protection Agency has reviewed the Bay Delta Conservation Plan (BDCP) Draft EIS pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act. The Draft EIS explores options for a comprehensive conservation strategy to restore and protect the Sacramento–San Joaquin Delta's ecosystem health, water supply, and water quality.

As you know, the San Francisco Bay/Sacramento-San Joaquin Delta Estuary is one of the largest and most important estuarine systems on the Pacific Coast of the United States, supporting over 750 species. It is the hub of California's water distribution system, supplying drinking water to 25 million people and irrigation water to 4 million acres of farmland. The decline of aquatic resources in the Estuary, along with the corresponding impacts on urban and agricultural water districts that rely on water exported from it, present significant challenges. Recent circumstances have only underscored the importance of working together on these issues, as California is experiencing severe drought and water shortages. We believe the NEPA process is well-suited to bring all of these considerations together, including the consideration of the environmental impacts of reasonable alternatives to the BDCP as it is currently proposed. We appreciate the effort to prepare the Draft EIS, and we support your recent decision to prepare a Supplemental Draft EIS to take a closer look at these issues.

EPA fully supports the stated purpose of the BDCP effort: to produce a broad, long-term planning strategy that would meet the dual goals of water reliability and species recovery in this valuable ecosystem, and we recognize the potential benefits of a new conveyance facility. However, we are concerned that the actions proposed in the Draft EIS may result in violations of Clean Water Act water quality standards and further degrade the ecosystem.

Our comments are consistent with those we have made in conversations that have taken place over the last few years among the agencies involved in managing the Delta. Many of our comments have also been made by others, both formally and informally, throughout the process, and we believe that they reflect a developing consensus within the scientific and regulatory communities. We are committed to continuing to work with you and other stakeholders toward a project proposal that meets the dual goals of water reliability and species recovery in the Bay Delta, and toward a well documented EIS that adequately informs decision-makers and the public, as required by NEPA.

Clean Water Act Water Quality Standards

The Draft EIS shows that operating any of the proposed conveyance facilities, which constitute Conservation Measure 1 (CM1), would contribute to increased and persistent violations of water quality standards in the Delta, set under the Clean Water Act, measured by electrical conductivity (EC) and chloride concentrations. We recommend that the Supplemental Draft EIS include one or more alternatives that would, instead, facilitate attainment of all water quality standards in the Delta. Specifically, we recommend that an alternative be developed that would, at minimum, not contribute to an increase in the magnitude or frequency of exceedance of water quality objectives, and that would address the need for water availability and greater freshwater flow through the Delta. Such an alternative should result in a decrease in the state and federal water projects' contributions to the exceedance of any water quality objectives in the Delta.

We also note that, while CM1 would improve the water quality for agricultural and municipal water agencies that receive water exported from the Delta, water quality could worsen for farmers and municipalities who divert water directly from the Delta. In that regard, we recommend that the Supplemental Draft EIS consider measures to ensure that the project would not increase concentrations of bromide around the intake for the North Bay Aqueduct at Barker Slough. In addition, we recommend consideration of whether additional measures, such as operational modifications both upstream and downstream, are needed to avoid increasing mercury and selenium concentrations and bioavailability in the Delta.

The Draft EIS indicates that CM1 would not protect beneficial uses for aquatic life, thereby violating the Clean Water Act. Total freshwater flows will likely diminish in the years ahead as a result of drought and climate change. Continued exports at today's prevailing levels would, therefore, result in even lower flows through the Delta in a likely future with less available water. We recommend that the Supplemental Draft EIS consider modified operational scenarios for CM1 alternatives that would have beneficial effects on covered fish populations during all life stages and attain water quality standards in the Bay Delta.

Habitat Restoration

The Draft EIS describes a general proposal to restore approximately 150,000 acres of wetlands, uplands, grasslands, and riparian areas in and around the Delta to offset the adverse impacts of the continued operations of the water projects. However, the Draft EIS does not indicate whether suitable acreage is available or whether restoration alone would be sufficient to recover fish populations. We are concerned over the sole reliance on habitat restoration for ecosystem recovery, recognizing that existing freshwater diversions and significantly diminished seaward flows have played a significant role in precluding the recovery of Bay Delta ecosystem processes and declining fish populations. We recommend that the Supplemental Draft EIS consider measures to ensure freshwater flow that can meet the needs of those populations and the ecosystem as a whole, and is supported by the best available science. We recommend that this analysis recognize the demonstrated significant correlations between freshwater flow and fish species abundance. We also recommend that the Supplemental Draft EIS include gradients of partial success for each habitat type to be restored, as supported by available science. The impacts could be re-evaluated relative to each alternative (CMs2-11) in light of these gradients and the likely success rates for each habitat restoration type.

Alternatives

The Draft EIS defines the alternatives in terms of the design and capacity of the proposed conveyance structure. Each alternative is paired with a particular operational scenario. EPA agreed with this organizational construct early in the BDCP process, expecting that the Draft EIS would present a range of fully evaluated alternatives that clarifies the environmental and water supply tradeoffs being considered. The Draft EIS, however, focuses primarily on Alternative 4. It appears that the environmental impacts of certain other alternatives would be reduced if those alternatives were matched with more optimal operational criteria (for example, Alternative 5 with Operational Scenario F). Other reasonable alternatives could be developed by incorporating a suite of measures, including Integrated Water Management, water conservation, levee maintenance, and decreased reliance on the Delta.[1] Such alternatives would be consistent with the purpose and need for the project, as well as with the California Bay Delta Memorandum of Understanding among federal agencies[2] and the Delta Reform Act of 2009.

Project-level Analysis

The Draft EIS states that it includes a *project-level* analysis of environmental effects associated with CM1 (the conveyance facilities, which define the alternatives), and a *programmatic-level* analysis of 21 other Conservation Measures, including a suite of habitat restoration and aquatic stressors management initiatives. Programmatic-level inputs were used in some of the "project-level" analyses. We recommend that the Supplemental Draft EIS include project-level information and analyses for the conveyance tunnels, including the information necessary for permit decisions, to support the federal decision.

Upstream/Downstream Impacts

The federal and State water management systems in the Delta are highly interconnected, both functionally and physically. The Draft EIS does not address how changes in the Delta can affect resources in downstream waters, such as San Francisco Bay, and require changes in upstream operations, which may result in indirect environmental impacts that must also be evaluated. We recommend that the Supplemental Draft EIS include an analysis of upstream and downstream impacts.

NEPA Effects Determination

The Draft EIS presents *NEPA Effects Determinations*, but does not describe the decision rules that were used to make those determinations from the analytical information presented for each impact category. We recommend that the *NEPA Effects Determinations* and thresholds -- quantitative when possible – be provided for each category so that it is clear why some estimated impacts result in one *NEPA Effects Determination* over another. We also recommend that the Supplemental Draft EIS explain whether all metrics are considered equal in the analysis or some are weighted. Please clarify whether negative impacts in one metric category translate into an adverse determination, regardless of the other metrics. Lastly, it would be helpful to include summary tables for each impact category so that the public and decision-makers can understand the metrics and their results and how they compare among alternatives.

[1] The "Portfolio Approach" developed by a diverse set of stakeholders is one attempt to place Delta water management into the larger context of facilities investments and integrated operations. http://www.sdcwa.org/sites/default/files/files/news-center/top-issues/portfolio-based-bay-delta-conceptual-alternative_1-16-13.pdf

[2] http://www2.epa.gov/sites/production/files/documents/baydeltamousigned.pdf

Adaptive Management

The Draft EIS explains that the adaptive management program is a work in progress. The specific approach for an adaptive management program and its effect on environmental consequences is fundamental to the success of the BDCP and should be addressed during the NEPA process. We recommend that a more detailed adaptive management program be provided in the Supplemental Draft EIS, since the goal of species recovery relies significantly on an effective adaptive management program. As you develop the plan, include detailed information on the plan's objectives, explicit thresholds, alternative hypotheses, responsive actions, and designated responsible parties.

Conclusion

EPA remains committed to working with the federal and state lead agencies to develop an environmentally sound, scientifically defensible, and effective plan for restoring the Bay Delta ecosystem and achieving greater water supply reliability. Please note that, because you are preparing a Supplemental Draft EIS, which we anticipate will address many of the issues raised about this Draft EIS, including the issues we have outlined here, EPA will defer our rating until the Supplemental Draft is circulated for public review and comment. We have also enclosed more detailed comments and recommendations for your consideration.

We are available to discuss our comments and recommendations. Please send one hard, and one electronic, copy of the Supplemental Draft EIS to this office at the same time it is officially filed with our Washington D.C. Office. If you have any questions, please contact me at 415-947-8702. Alternatively, your office may contact Kathleen Johnson, Enforcement Division Director. Ms. Johnson can be reached at 415-972-3873.

Sincerely,

/S/

Jared Blumenfeld

Enclosure

cc: Ren Lohoefener, Regional Director, Pacific Southwest Region, U.S. Fish and Wildlife Service
David Murillo, Regional Director, Mid Pacific Region, U.S. Bureau of Reclamation

U.S. EPA DETAILED COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE BAY DELTA CONSERVATION PLAN; AUGUST 25, 2014

Table of Contents

I. Water Quality Impacts

A. Adverse Impacts

Chapter 8 indicates that all project alternatives would result in adverse, significant, unmitigated effects to water quality and one or more beneficial uses within the affected water bodies. For example:

- The proposed changes in water management would measurably exacerbate impairment of agricultural and aquatic life beneficial uses in the South Delta and Suisun Marsh (p. 8-439);
- Bromide, chloride, dissolved organic carbon, and electrical conductivity (EC) are expected to increase due to changes in hydrodynamics as a result of the implementation of the CM1 Alternative 4 (pp.8-420, -428, -454, and -439). In addition, the feasibility of mitigation actions for EC is uncertain (p. 8-441); therefore, the net effect to overall salinity levels is unclear;
- Mercury, pesticide, and selenium exposure levels may increase and be cumulatively significant (p. 8-446, -767, -768); and
- Water quality degradation resulting from the increased pumping of freshwater from the North Delta could cause increases in water treatment costs (p. 8-420).

All Bay Delta Estuary waters are impaired due to numerous contaminants, including pesticides, manufacturing compounds, metals (including selenium), pathogens, nutrients/low dissolved oxygen, invasive species, salinity, and toxicity from unknown sources. Without adequate mitigation, these impairments would be exacerbated by any of the alternatives evaluated in the Draft EIS. Poor water quality in the Bay Delta Estuary and its tributaries adversely affects terrestrial and aquatic ecosystems, drinking water, recreation, industry, agriculture, and the local, state, and interstate economy.

Recommendation: *Discuss mitigation measures that would reduce the projected adverse impacts on water quality, and discuss whether the proposed actions would contribute to impairments of beneficial uses or further degrade water quality.*

B. Salinity (Electrical Conductivity, Chloride) and Bromide

1. Water Quality Standards Exceedances and Degradation

The Bay Delta Water Quality Control Plan (WQCP) contains EC objectives for the Delta to protect agricultural and fish and wildlife beneficial uses, and chloride objectives to protect municipal and industrial water supply beneficial uses. Bromide, a significant precursor to brominated disinfection byproducts, is subject to CALFED Drinking Water Program goals (p. 8-42). The Draft EIS estimates that EC, chloride and bromide concentrations would increase under CM1 Alternative 4, relative to the No Action Alternative and Existing Conditions for Delta locations. The document predicts increased exceedances of numeric water quality standards, which suggests that CM1 Alternative 4 would result in a loss of protection for municipal, agricultural, and aquatic life beneficial uses. Specifically, CM1 Alternative 4 would result in:

- A 17% increase in days out of compliance with the agricultural EC standard at Emmaton (p. 8-252 lines 6-7). The EC objective at Emmaton is intended to protect agricultural beneficial uses, but also has ancillary benefits to aquatic life. Increasing noncompliance days would further contribute to existing EC water quality impairments in the western Delta, and degrade beneficial use protection for agricultural and aquatic life beneficial uses.

- A 7% increase in days exceeding the municipal chloride standard (250 milligrams per liter (mg/L) mean daily maximum) at Contra Costa Canal Pumping Plant #1 (p. 8-243 line 26) and “substantial degradation during the months October through December when average concentrations would be near, or exceed, the objective” (p. 8-243 lines 33-34 and Appendix 8G, 27 Table Cl-9).

- A doubling of the frequency of exceeding the lower municipal chloride standard at Antioch and Contra Costa Canal Pumping Plant #1: “All of the Alternative H1-H4 Scenarios would result in substantially increased chloride concentrations in the Delta such that frequency of exceeding the 150 mg/L Bay-Delta WQCP objective would approximately double” compared to Existing Conditions (p. 8-429) and the No Action Alternative (Appendix 8G Table Cl-64).

- Increased EC levels in Suisun Marsh, exacerbation of the existing EC water quality impairment, and degradation of aquatic life beneficial use protection (p. 8-438 and Appendix 8H-27). “The most substantial EC increase would occur at Beldon Landing with long-term average EC levels increasing by 1.3-6.0 milliSiemens per centimeter (mS/cm), depending on the month and operations scenario, at least doubling during some months the long-term average EC relative to Existing Conditions” and the No Action Alternative (p. 8-438).

- Higher quality water to those receiving the exported water, but adverse impacts on those who rely on water directly from the Delta: “the operations and maintenance activities under Scenario H1-H4 of Alternative 4 would cause substantial degradation to water quality with respect to bromide at Barker Slough… and could necessitate changes in water treatment plant operations or require treatment plant upgrades” (p.8-420).

The EC and chloride analyses in the Draft EIS provide some confusing results. For example, the 16-year average EC concentration (mass balance) at Emmaton is 887 micromhos per centimeter (μmhos/cm) for CM7, and 935 μmhos/cm for CM8, even though outflow (an indicator of freshwater flow to the estuary) is twice as high for CM8. Similarly, chloride concentrations predicted for CM7 (mass balance and EC-chloride relationship) at Antioch on the San Joaquin River are slightly lower than those for CM8.

The water quality chapter of the Draft EIS does not evaluate the alternatives against the full suite of Water Quality Objectives for Fish and Wildlife Beneficial Uses, which are found in Table 3 of the Bay Delta WQCP. The Delta outflow objective is discussed in Chapter 5 Water Supply, and a brief discussion of Delta outflow objective is in the HCP for only the CEQA Preferred Alternative 4.

Recommendations: *Describe mitigation measures that would prevent the proposed project from resulting in increased exceedances of water quality objectives in the already-degraded Delta. These measures may include reducing exports to provide more outflow and mitigate salinity intrusion.*

Explain the differences in the predictions among CM1 alternatives, including why twice as much outflow would result in higher salinity concentrations for Alternative 8 relative to Alternative 7. Disclose the confidence intervals for the mass-balance and EC-chloride relationship approaches for predicting future concentrations of EC and chloride.

Evaluate all CM1 alternatives with respect to all water quality standards listed in Tables 1-3 of the Bay-Delta WQCP, and indicate whether each standard would be met under each alternative.

2. **Mitigation Effectiveness**

   Appendix 8H "Electrical Conductivity" states that, although the modeling results show exceedences of water quality D-1641 standards, the project proponents "intend" to operate the State Water Project and Central Valley Project facilities by fine tuning reservoir storage and exports in real time to meet the standards (p. 8H-1). The water quality objectives that would be met in this manner are not specified, nor is an estimate provided of the impact of this measure on water supply. Furthermore, the Draft EIS includes the caveat that "if sufficient operational flexibility to offset chloride increases is not feasible under Alternative 4 operations, achieving chloride reduction pursuant to this mitigation measure would not be feasible under this Alternative" (p.8-430). A similar caveat is stated regarding bromide (p. 8-422). These statements suggest that the water supply exports that define the Alternative 4 operational scenario would be given higher priority than meeting water quality standards, thus rendering that scenario potentially inconsistent with the protection of beneficial uses.

   Recommendations: *Clearly identify the water quality objectives that the proponents intend to meet by fine-tuning reservoir storage and exports in real time, and clearly state this intention as an enforceable commitment. Reconcile the conflicting caveats regarding operational flexibility with this commitment.*

   Provide an estimate of the amount of water that would be needed to meet water quality standards during periods when the modeling predicts exceedances, and describe how the use of water for this purpose would impact water diversions for upstream and downstream users. Include a comparison against drought years.

   Provide historical data to illustrate how D-1641 standards have been met in the past, including the number of times that DWR has submitted Temporary Urgency Change Petitions with the State Water Board requesting modification of requirements of D-1641 because of drought conditions.

3. **Mitigation Relationship to Water Quality Standards**

   EPA understands that the modeling for the water quality analysis was based on an assumption that the Emmaton EC water quality standard compliance point would be moved four miles upstream to Three Mile Slough, as DWR is anticipated to request. We also understand that DWR will request that the State Water Resources Control Board include this compliance point change as part of the Phase II update to the Bay Delta WQCP. The State Board will review this request, as will the EPA. We are concerned that the intended mitigation for the water quality violations at Emmaton relies on a change in the compliance point. We consider the movement of the compliance point to Three Mile Slough a relaxation of the EC standard because it would potentially permit four miles of additional salinity intrusion into the upper estuary, which could have negative impacts on multiple beneficial uses.

   Recommendations: *Explain the technical, scientific, and policy reasons for using Three Mile Slough in DSM2 modeling for assessing EC compliance at Emmaton. Describe how EC was estimated at Emmaton under the No Action Alternative and for Existing Conditions if it was not directly estimated using DSM2; and interpret the comparison of EC at Three Mile Slough in CM1 operational scenarios to EC at Emmaton.*

   Identify all of the water quality standards, including EC at Emmaton, which the BDCP assumes will be modified. Disclose the process for obtaining a modification of a water quality standard.

4. Impacts of Changes to the Salinity Gradient (X2)

The salinity gradient, approximated by X2[1], has an inverse relationship with many diverse bay and estuarine fishes, including the threatened and endangered species that are the conservation targets of the BDCP. As X2 decreases (i.e., moves out to sea) habitat conditions for some species improve and relative abundance increases[2]. Because the location of X2 is closely tied to freshwater flow through the Delta, the proposed project would have a strong influence on this parameter, yet the Draft EIS does not analyze each alternative's impacts on aquatic life in the context of this relationship.

Examination of the predicted changes in monthly average X2 for each CM1 operational scenario, A through G, would help determine how the quantity and quality of estuarine habitats and relative fish abundance would change under those scenarios for multiple fish species. It would also be useful to estimate the range of monthly average X2 values (and/or monthly Delta outflow) for each alternative and compare it to the pattern of freshwater flows and salinity gradients that characterized a reference time period when resident and migratory fish populations were in comparatively better condition. The operational scenarios that more closely mimic the reference period freshwater flow and salinity gradient pattern could be expected to produce aquatic conditions and habitats that benefit native and migratory fishes and support important food web processes at all ecosystem levels.

Freshwater flow may be one of the best tools available in the short term to improve fish populations and protect aquatic life beneficial uses prior to the completion of planned restoration projects, given its widely cited importance to ecosystem recovery. Relative fish abundance responses to freshwater flow can be estimated using regression equations provided in peer reviewed literature and government reports.[3] The equations do not directly include the effects of tidal marsh and floodplain restoration on fish populations; therefore, in their current form, they would be most useful for evaluating the impacts of flow variations prior to the completion of restoration projects. We anticipate that the ability to measure the benefits of restoration projects will improve after the projects are started and measurements and monitoring data become available.

The Draft EIS does not evaluate potential downstream effects of CM1 alternatives on San Francisco Bay fish populations. The description of impacts to San Francisco Bay from Delta Outflow changes (p. 11-132) stops at Suisun Bay even though outflow affects relative abundance of San Francisco Bay fishes such as Bay shrimp, starry flounder, and Pacific Herring. Some of these populations may be negatively affected by reduced outflows associated with CM1 alternatives, and the effect of restoration CMs (2-12) on these fish populations may or may not be beneficial.

***Recommendations**: Describe the estuarine salinity gradient and how it defines important aquatic habitats, including marine, low salinity zones, and migratory corridors for target fishes. Describe its relevance to important aquatic life communities, including phytoplankton and zooplankton.*

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[1] X2 refers to the distance from the Golden Gate up the axis of the estuary to the point where daily average salinity is 2 parts per thousand at 1 meter off the bottom (Jassby et. al. 1995).

[2] Jassby AD, Kimmerer WJ, Monismith SG, Armor C, Cloern JE, Powell TM, Schubel JR, Vendlinski TJ. 1995. Isohaline position as a habitat indicator for estuarine applications. Ecological Applications 5(1): 272-289;
Kimmerer, W. J. 2002. Effects of freshwater flow on abundance of estuarine organisms: Physical effects or trophic linkages? Marine Ecology Progress Series 243:39-55;
Kimmerer WJ, Gross ES, MacWilliams ML. 2009. Is the response of estuarine nekton to freshwater flow in the San Francisco Estuary explained by variation in habitat volume? Estuaries and Coasts 32: 375-389.

[3] United States Fish and Wildlife Service, September 27, 2005, Recommended Streamflow Schedules To Meet the AFRP Doubling Goal in the San Joaquin River Basin (FWS 2005), pp. 27 *available at:* http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/water_quality_control_planning/docs/sjrf_spprtinfo/afrp_2005.pdf;
Jassby AD, Kimmerer WJ, Monismith SG, Armor C, Cloern JE, Powell TM, Schubel JR, Vendlinski TJ. 1995. Isohaline position as a habitat indicator for estuarine applications. Ecological Applications 5(1): 272-289;
Kimmerer, W. J. 2002. Effects of freshwater flow on abundance of estuarine organisms: Physical effects or trophic linkages? Marine Ecology Progress Series 243:39-55;
Kimmerer WJ, Gross ES, MacWilliams ML. 2009. Is the response of estuarine nekton to freshwater flow in the San Francisco Estuary explained by variation in habitat volume? Estuaries and Coasts 32: 375-389.

Describe the Delta outflow objective in the Water Quality Chapter, including a description of the "X2" concept, recognizing that the "X2" concept provides the foundation for the Delta outflow objective and is the basis for protecting springtime estuarine habitat for resident and migratory fishes, which are the targets of the BDCP.

Include a year-round salinity gradient and/or Delta outflow analysis for each CM1 alternative. This can be accomplished using information already generated for the BDCP EIS.[4] *Compare the results to a defined and supported reference period to determine how closely each scenario may mimic the salinity gradient and/or monthly outflow pattern. Alternatively, use three-dimensional modeling that maps the salinity gradient within the estuary on a monthly time step for all CM1 alternatives. This would make it possible to estimate the size and location of salinity zones, such as the low salinity zone, under different operational scenarios; however, it is not clear if this approach could be easily compared to a reference period using the same modeling tools.*

Include at least one-dimensional salinity gradient and Delta outflow analyses for the fish species evaluated in Chapter 11. Define and support an agreed upon relative reference period for the analyses.

Use the referenced flow-abundance tools to predict a range of potential fish abundance changes under each operational scenario for CM1. The Kimmerer 2002 relationships should be used to evaluate potential downstream impacts to Bay fish populations. Provide the results of these analyses and explain that they do not include benefits of habitat restoration or entrainment reductions from minimizing use of south Delta pumping facilities when they cause the most harm for salmonids.[5]

C. Potential Increases in Methylmercury Formation and Transport

EPA agrees that restoring wetlands and floodplains in and near the Delta is an essential component of reviving the Estuary's health; however, nearly all the locations targeted for habitat restoration in the Delta have been, or are at risk of being, contaminated with mercury from historical mining sources and ongoing air deposition from industry. Sport fish in the Delta are already burdened with higher concentrations of mercury than anywhere else in the State,[6] and the presence of this powerful neurotoxin in the food web poses a threat to public health and the ecosystem as a whole. For this reason, health advisories have been issued for the Delta and several upstream rivers.

The BDCP relies heavily on proposed restoration in Yolo Bypass to mitigate for the adverse impacts of the CM1 alternatives on fish populations, noting that the Bypass is one of the places in the Delta that shows the most potential for providing floodplain benefits for fish, including salmon (BDCP p. 2-80). The Draft EIS, however, says that the Yolo Bypass may contribute up to 40% of the total methylmercury production in the entire Sacramento watershed (p. 25-63). The State Water Board has also observed that, when the Yolo Bypass is flooded, it becomes the dominant source of methylmercury to the Delta, and that restoration activities could exacerbate the existing mercury problem.[7] While EPA strongly supports restoration of aquatic habitat in the Delta, caution must be exercised to ensure that it

[4] Information needed to support salinity gradient and Delta outflow analyses appears to have been developed by completed modeling efforts for BDCP. The salinity gradient and low salinity zone are discussed in the HCP; X2 and Delta outflow are CALSIM outputs; a 3-dimensional model (UnTRIM) was used in Appendix 5A (Part D, Attachment 3 "Evaluation of Sea Level Rise Effects using UNTRIM San Francisco Bay-Delta Model") to predict salinity gradient changes in climate change scenarios; and a spring Delta outflow comparison was provided for the longfin smelt analysis in the Draft EIS. The longfin smelt analysis in Chapter 11 includes a comparison of average monthly spring Delta outflow between CEQA and NEPA baselines and the H1 – H4 operational scenarios.

[5] For more information, see EPA's comments to the State Water Resources Control Board regarding the State's effort to improve aquatic life beneficial use protection by modifying and/or adopting new water quality standards for flow in the Delta. See *l*etter from US EPA to SWRCB, December 11, 2012, available at http://www2.epa.gov/sites/production/files/documents/sfdelta-decpost-workshopltr-dec2012.pdf; EPA presentation to SWRCB available at http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/wrkshp2/erinforesman.pdf

[6] SWAMP- Surface Water Ambient Monitoring Program http://www.waterboards.ca.gov/water_issues/programs/swamp/rivers_study.shtml

[7] P. 29 Periodic Review of the 2006 Water Quality Control Plan, State Water Resource Control Board http://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/periodic_review/docs/periodicreview2009.pdf

does not result in unintended consequences that adversely affect water quality. Minimizing the formation and mobilization of methylmercury in wetlands is critical. Given the already high levels of mercury in the system, restoration in certain locations should be avoided if methylmercury production cannot otherwise be reduced or mitigated. For this reason, the BDCP's restoration acreage goals may not be attainable.

The DEIS underestimates the potential impacts of methylmercury on covered species and public health. Quantification of the methylmercury contributions from the proposed restoration were not provided in the document (this is acknowledged on p. 8-260), and the methylmercury NEPA Effects determinations rely on the success of unproven mitigation methods (CM12) that are currently under development to minimize formation and transport of methylmercury from Yolo Bypass, Cache Slough Complex, and the Cosumnes River Restoration Opportunity Areas (p.3-154). In the AQUA-8 "Effects of Contaminants Associated with Restoration Measures" evaluation of the impact of methylmercury, selenium, and other contaminants on delta smelt, the analysis of Alternative 1A concludes that methylmercury impacts to Delta smelt and winter-run Chinook salmon are "uncertain" (p. 11-277, 11-343). The analysis for Alternative 1A (and subsequent alternatives)[8] states that restoration actions (CM2, CM4–CM7, and CM10) may increase production, mobilization, and bioavailability of methylmercury in the aquatic system, but that many effects are unknown at this time.

Research studies in the Yolo Bypass that were conducted by the US Geological Survey found methylmercury production values in Yolo Bypass managed wetlands and agricultural lands to be "among the highest ever recorded in wetlands."[9] The Yolo Bypass mercury bioaccumulation study[10] reported that all caged and wild fishes sampled had methylmercury fish tissue concentrations greater than the small fish tissue objective in the Delta Methylmercury TMDL (0.03 micrograms per kilogram (μg/kg) wet weight).[11] In addition, 59% of wild fishes and 82% of caged fishes had methylmercury concentrations greater than 0.20 μg/g wet weight, which is a threshold above which fish health is impaired.[12] Finally, 52% of caged fish and 26% of wild fish had fish tissue concentrations greater than observed thresholds that reduce bird reproduction[13] and greater than the large fish tissue objective (intended to protect human health and wildlife consumers). These results suggest that increasing production, transport, and bioavailability of methylmercury through restoration actions could result in adverse effects to human health and the environment.

The Environmental Justice Chapter of the Draft EIS provides conflicting information and conclusions regarding whether or not the BDCP alternatives would create conditions conducive to increased bioaccumulation of mercury in Delta fish species, and whether such bioaccumulation would be cumulatively significant for increasing the body burden (pp. 28-22, 25, 103) in fish. The USGS Yolo

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[8] Analyses for subsequent alternatives refer back to the analysis for Alternative 1A.

[9] Alpers, C.N., Fleck, J.A., Marvin-DiPasquale, M., Stricker, C.A., Stephenson, M., and Taylor, H.E., Mercury cycling in agricultural and managed wetlands, Yolo Bypass, California: Spatial and seasonal variations in water quality: Science of The Total Environment, Volume 484, 15 June 2014, Pages 276–287 http://dx.doi.org/10.1016/j.scitotenv.2013.10.096.

[10] Ackerman, J. "Agricultural Wetlands as Potential Hotspots for mercury bioaccumulation: experimental evidence using caged fish" Environmental Science and Technology 2010, 44, 1451-1457.

[11] The Delta Mercury and Methylmercury TMDL contains two fish tissue objectives that target specific beneficial uses. The average methylmercury concentrations shall not exceed 0.08 and 0.24 mg methylmercury/kg, wet weight, in muscle tissue of trophic level 3 and 4 fish, respectively (150-500 mm total length). These objectives are protective of (a) people eating 32 g/day (eight ounces, uncooked fish per week) of commonly eaten, legal size fish, and (b) all wildlife species that eat large fish. Small fish (less than 50 mm in length) – 0.03 mg methylmercury/ kg, wet weight, in muscle. The average methylmercury concentrations shall not exceed 0.03 mg methylmercury/kg, wet weight, in whole fish less than 50 mm in length. Large fish (150 – 500 mm total length) – 0.08 and 0.24 mg methylmercury/ kg, wet weight, in muscle. These objectives target protection of sensitive wildlife that eat fish. http://www.swrcb.ca.gov/centralvalley/board_decisions/adopted_orders/resolutions/r5-2010-0043_res.pdf.

[12] Frayer, W. E.; Peters, D. D.; Pywell, H. R. Wetlands of the California Central Valley status and Trends: 1939 to mid-1980's; U.S. Department of the Interior, Fish and Wildlife Service: Washington, DC, 1989.

[13] Albers, P. H.; Koterba, M. T.; Rossmann, R.; Link, W. A.; French, J. B.; Bennett, R. S.; Bauer, W. C. Effects of methylmercury on reproduction in American kestrels. Environ. Toxicol.Chem.2007, 26, 1856–1866; Burgess, N. M.; Meyer, M. W. Methylmercury exposure associated with reduced productivity in common loons. Ecotoxicology 2008, 17, 83–91, as cited in Ackerman, J. "Agricultural Wetlands as Potential Hotspots for mercury bioaccumulation: experimental evidence using caged fish" Environmental Science and Technology 2010, 44, 1451-1457.

Bypass bioaccumulation study referenced above showed that the majority of wild and caged fishes had methylmercury tissue levels above the public health threshold for trophic level 3 fish and very close to the public health threshold for trophic level 4 (large) fish. Although the Delta is posted with fish advisories, people who rely on fishing for subsistence may consume more than the advisory recommends. Although the Draft EIS acknowledges that "restoration actions are likely to result in increased production, mobilization, and bioavailability of methylmercury in the aquatic system" (p. 25-64), it concludes that there would be no adverse effects on public health to any populations (p. 25-64, p. 28-22). This conclusion is inconsistent with the potential for increased methylmercury production, bioaccumulation, and effects to Environmental Justice communities, and the proposed mitigation actions described do not address the potential for significant negative effects to human health.

Recommendations: *Acknowledge that particular areas may not be suitable for restoration or that the acreages of proposed restoration may need to be reduced if such areas prove to be large contributors of methylmercury to the Delta ecosystem.*

Summarize recent research and current literature relevant to the potential for methylmercury impairment under existing conditions and future conditions; the potential impacts on covered fishes that use the Yolo Bypass; and the potential for bioaccumulation impacts to higher order species and human health.

Describe the existing methods that show potential for reducing formation and transport of methylmercury, and the CMs to which they could be applied. Further describe the range of potential reductions that could be expected from CM12 methods for minimizing methylmercury formation and transport.

Reconcile the Draft EIS's conflicting conclusions regarding the likely impact of the BDCP alternatives on the conditions conducive to bioaccumulation of methylmercury, and provide the basis for these conclusions.

Describe and commit to water column and fish and invertebrate tissue monitoring for mercury and methylmercury to support adaptive management actions. Include a commitment to ensure that adequate warning signs are posted in appropriate languages regarding the risks of consuming fish caught in the Delta, and provide further outreach to minority populations about these risks. Such outreach should include meaningful involvement by the affected populations.

D. Selenium

Soils on the west side of the San Joaquin Valley are high in selenium. As a result, it is present in agricultural drainage and enters the Delta in the San Joaquin River at Vernalis. When mobilized in the environment and transformed to organic, bioavailable forms, selenium is highly bioaccumulative and can be toxic to organisms at very low levels of chronic exposure. The BDCP proposes to bring additional reliable water to the west side of the San Joaquin Valley. This would result in a greater volume of water and greater loads of selenium being discharged to the San Joaquin River. Although available data show that the maximum selenium concentration at Vernalis is not exceeding the current water quality objective of 5 micrograms per liter (µg/L)[14] (p. 8-96), the operations of the proposed project would contribute significantly more selenium-laden San Joaquin River water to the Delta (p. 8-226). In addition, EPA is in the process of updating its national recommended chronic aquatic life criterion for selenium in freshwater to reflect the latest scientific information, which indicates that toxicity to aquatic life is driven by dietary exposures. As of this writing, a peer review draft of the

[14] 4-day average for above normal and wet year types and a monthly mean for dry and below normal water year types.

updated criterion is undergoing public review, with comments due to EPA in July 2014. Following consideration of comments received, the draft criterion will be revised, as appropriate, and released as a draft criterion for public review.

EPA is concerned that the potential effects of selenium on covered species, especially green sturgeon, are underestimated in the Draft EIS. The analysis discusses increased residence time of selenium in Suisun Bay and concludes that the impacts of the proposed restoration measures on green sturgeon are “not adverse”; but does not discuss the south Delta, which would receive increased loads of selenium under all CM1 alternatives (p. 11-526). The increased loads, combined with increased residence time, could lead to greater selenium absorption in clam tissue, which is a primary food item of sturgeon (p. 11-257). Adverse effects of elevated selenium on early life stages of green sturgeon have been documented[15].

Likewise, impacts of increased selenium loads to salmonids are not adequately addressed in the Draft EIS. Although salmonids do not eat clams, they are sensitive in all their life stages (figure 12 in Presser, Luoma 2010).[16] One objective of the San Joaquin River Restoration Project (SJRRP) is to manage the river to restore salmon migration. The increased drainage of selenium-enriched water from the West side of the San Joaquin Valley that would likely result from the BDCP could compromise this effort.

Recommendations: *To mitigate for the project’s impacts to selenium levels in the estuary as a result of the BDCP operations, consider reviving and funding the Bureau of Reclamation’s Land Retirement Program[17] to remove from cultivation and irrigation large areas of selenium laden lands on the West side of the San Joaquin Valley. This would save irrigation water, reduce discharges of selenium into the San Joaquin River basin, and advance attainment of selenium reduction targets[18] set by EPA and the Central Valley Regional Water Quality Control Board. Evaluate the extent to which restoration of these “retired” lands to the native plant community could also contribute to the recovery of threatened and endangered plants and animals listed by FWS. Consider analyzing the cost/benefit of implementing treatment technologies vs. land retirement. Although cost/benefit analyses are not required under NEPA, such an analysis may be useful to decision makers and the public in this case.*

Reanalyze the proposal to develop wetlands as part of the conservation plan, taking into account the increased amount of agricultural drainage water from selenium-enriched lands that would enter these areas in the Delta as a result of BDCP operations, and the potential for selenium build-up and availability.

Discuss hydrodynamics and increased residence time of selenium in the San Joaquin River in the southern Delta and its potential impact on clam uptake of selenium, bioaccumulation in sturgeon, and the potential for population effects.

Reference and summarize the available literature regarding the impacts of selenium on sturgeon, especially with respect to early life stages, and consider such impacts in the analysis of increased selenium loading.

The evaluation of the Alternatives should consider the objectives of ongoing or proposed projects and programs that are intended to improve Bay Delta water quality and fish and aquatic resources. Disclose

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[15] Linares, J., Linville, R. Eenennaam, JV, Doroshov, S. 2004 Selenium effects on health and reproduction of white sturgeon in the Sacramento-San Joaquin estuary. Final Report for Project No. ERP-02-P35.
[16] Presser TS and Luoma SN 2010 Ecosystem-Scale Selenium Modeling in Support of Fish and Wildlife Criteria Development for the San Francisco Bay-Delta Estuary, California USGS Administrative Report.
[17] http://www.usbr.gov/mp/cvpia/3408h/index.html
[18] http://www.gpo.gov/fdsys/pkg/FR-2000-05-18/html/00-11106.htm

potential conflicts with such projects or programs, as well as ways in which such conflicts could be avoided or minimized. In particular, the potential for competing management objectives between the BDCP and the SJRRP should be comprehensively analyzed and described.

E. Additional Water Quality Impacts

The conclusion that there would be no impact to dissolved oxygen concentrations in reservoirs (p. 8-192, lines 6-15) is unsupported given that three major reservoirs are predicted to experience a 10% increase in dead pool under the No Action Alternative.

Recommendation: *Describe how predicted dead pool conditions in reservoirs may impact dissolved oxygen concentrations and other contaminant concentrations that may increase in these extreme conditions, and revise the impact conclusions, as appropriate.*

It is not clear whether residence time was considered in the impact assessment of water quality contaminants such as pesticides and metals. It appears that southern Delta residence times would increase due to increased use of the north Delta pumps (and decreased use of south Delta pumps), limiting freshwater inputs to, and movement of water in, the south Delta. These conditions could increase residence time of water moving through the southern Delta, which would increase aquatic life exposure to contaminants such as pesticides and selenium.

Recommendation: *Explicitly state whether or not residence time was included in assessments of contaminant impacts on aquatic life and other beneficial uses in the water quality analysis. If residence time was not considered, explain why it was not included and how increasing residence time could increase negative effects of contaminants as a result of CM1 operations.*

II. Fish and Aquatic Resources

A. Aquatic Resources Beneficial Uses

Data and other information provided in the Draft EIS indicate that that all CM1 alternatives may contribute to declining populations of Delta smelt, Longfin smelt, green sturgeon, and winter-run, spring-run, fall-run and late-fall run Chinook salmon. Impact analyses in Chapter 11 show that entrainment, rearing, and migration conditions for these species are estimated, for many of the action alternatives, to be similar to, or worse than, existing conditions and sometimes worse than the future no action condition. Some of the NEPA effects that are described as “not determined” for some alternatives are very similar to effects that are described as “adverse” for other alternatives. Data regarding the impacts on fish is provided in various tables, and the summary statements made in the text do not always accurately reflect the information in those tables.

1. Longfin Smelt Abundance

Long-term and recent sharp declines in fish abundance have been cited by the lead federal agencies, their partners, and EPA as evidence of collapse in the Bay Delta ecosystem. Longfin smelt relative abundance is estimated to decline for all but one of the CM1 alternatives in most water year types (and in the average of all water year types) when compared to *Existing Conditions*.[19] Alternative 8 is the only alternative that has a predicted relative abundance increase for Longfin smelt relative to *Existing Conditions*. In comparison to the *No Action* Alternative, four CM1 alternatives are predicted to result in declines in the Longfin smelt abundance index, while five CM1 alternatives are predicted to result in positive changes to that index. Despite these predictions, the Draft EIS concludes that the

[19] Table 11-1A-8 page 11-297 “Estimated differences between scenarios for longfin smelt relative abundance in FMWT or Bay Otter Trawl,”, Table 11-2A-7 page 11-764, Table 11-3-7 page 11-1097, Table 11-4-8 page 11-1308; Table 11-5-7 page 11-1742; Table 11-6-8 page 11-1951; Table 11-7-7 page 11-2227, Table 11-8-8 page 11-2492; Table 11-9-8 page 11-2768.

impact on Longfin smelt abundance would be "not determined" for all CM1 alternatives for the NEPA effects determination. This conclusion disregards the predicted differences among the alternatives in comparison to the *No Action Alternative*, and the predominantly negative impacts in comparison to *Existing Conditions*.

2. **Entrainment of Juvenile Delta Smelt**
The summary table on page 11-55 of the Draft EIS states that Alternative 4's flow-related effects on fish would lead to "beneficial impacts" with respect to entrainment of Delta smelt. While the prediction for Alternative 4 shows somewhat less entrainment in comparison to the No Action Alternative, the predicted difference is much smaller for juveniles than for adults, and Alternatives 1, 2, 7, and 8 are predicted to result in substantially less entrainment at all life stages. Compared to Existing Conditions, Alternative 4 is predicted to result in *increased* entrainment of Delta smelt, especially juveniles. It is unclear how increases in juvenile entrainment would result in overall beneficial impacts. Entrainment estimates provided in the Draft EIS show reductions in adult entrainment, but increases in juvenile entrainment for all Alternatives except Alternatives 7 and 8, compared to Existing Conditions, and for Alternatives 3 and 5, compared to the No Action Alternative. The discussion in the text provides the caveat that "entrainment is expected to remain at or below the levels currently experienced by fish… there are very few instances where there would be increases, but these are substantially offset by decreases during other periods" (p.11-53).The analysis does not describe the relative importance of reducing entrainment of each life stage (adult and juvenile) to the overall population. No comparison among alternatives is provided, nor does the Draft EIS explain why some alternatives, such as Alternatives 7 and 8, show much larger reductions than other alternatives in both juvenile and adult entrainment.

3. **Impacts on Delta Smelt Rearing Conditions**
The Draft EIS forecasts changes to rearing conditions for Delta smelt by estimating the change in available fall abiotic habitat with and without estimated habitat restoration benefits relative to the two baselines: Existing Conditions and No Action Alternative. CM1 alternatives with "Fall X2" operational criteria are predicted to increase fall rearing habitat relative to the No Action Alternative. These include CM1 Alternatives 2, 4 H4, and 5-9. Alternatives 6 (isolated facility, eliminates south Delta exports) and 7 (enhanced flows) show the highest predicted increases in fall rearing habitat. The absolute values of fall rearing habitat or significance thresholds are not provided.

Recommendations: *Modify operational scenarios for CM1 alternatives to develop at least one alternative that would have more certain and beneficial effects on covered fish populations during all life stages.*

Present the predicted impacts to each of the covered fish species and impact categories (entrainment, spawning, rearing, migration), for all the alternatives and baselines in comparative form, sharply defining the issues and providing a clear basis for choice among options by the decision-makers and the public (40 CFR 1502.14).

Provide absolute value estimates and proportional changes, in addition to relative changes from baselines, for predictions under each CM1Alternative.

Describe the scientific basis of, and uncertainty associated with, any assumptions made in the analysis, including in the development of the No Action Alternative. This may include, for example, data regarding current entrainment levels of all covered fish species at all life stages in all water year types.

B. NEPA Effects Determinations

The NEPA Effects Determinations provided in the Draft EIS are not always consistent with the impacts described. We list a few examples below.

- **Alternative 1 AQUA-5: Effects of Water Operations on Rearing Habitat for Delta Smelt:** The description of impacts reports a 22% loss of rearing habitat (p. 11-265), which suggests that the impact should be considered adverse if proposed habitat restoration does not produce anticipated benefits. Instead, Table 11-1A-SUM2 (page 11-16) lists the NEPA Effects Determination as "Not Determined." The NEPA Effects discussion on page 11-265 does not explicitly state that the NEPA Conclusion is "not determined."
  Alternative 1 AQUA-21 Effects of Water Operations on Entrainment of Longfin Smelt: The description of impacts shows that entrainment is estimated to increase for juvenile Longfin smelt in dry (14%), below normal (46%), and above normal (33%) water year types (Table 11-1A-6), and the ***Summary*** text on page 11-295 states, "It is concluded that these changes in Longfin smelt entrainment would be adverse under Alternative 1A." The subsequent ***NEPA Effects*** statement comes to a different conclusion, "The overall effect of the Alternative 1A operations scenario would not be adverse to Longfin smelt." Table 11-1A-SUM2 also lists the NEPA conclusion for entrainment of Longfin smelt as "not adverse."
- **Impact AQUA-22: Effects of Water Operations on Spawning, Egg Incubation, and Rearing Habitat for Longfin Smelt.** The NEPA Effects discussion predicts reductions of 8 to 10 percent in relative abundance of Longfin smelt for Alternative 1A, suggesting an adverse impact on this species from Alternative 1A. No NEPA conclusion is explicitly stated in this section (p. 11-295); however, Table 11-1A- SUM2 (page 11-16) lists the NEPA conclusion as "not determined."

Furthermore, throughout the document, different NEPA Effects Determinations are provided for similar impact descriptions. For example, in the discussion of "Effects of Water Operations on Migration Conditions for Winter-Run Chinook Salmon", the Draft EIS concludes that Alternatives 1 and 8 would have "adverse" NEPA Effects and Alternatives 7 and 4 would have "not determined" NEPA Effects, even though the estimated NEPA effects are quantitatively similar for the multiple metrics evaluated. It is not apparent how the lead agencies decided that one impact was beneficial and another adverse.

Recommendations: *Describe the decision making process and decision rules used to make NEPA Effects Determinations from the analytical information presented for each impact category. Define the NEPA Effects Determinations and provide thresholds -- quantitative when possible -- for each category so that it is clear why some estimated impacts result in one NEPA Effects Determination over another. Explain whether all metrics are considered equal in the analysis or some are weighted. If negative impacts in one metric category translate into an adverse conclusion, regardless of the other metrics, this should be disclosed. Include summary tables for each impact category so that the reader can see the metrics and their results and how they compare among alternatives.*

Compare the NEPA Effects Determinations with the narrative text describing the metrics and NEPA Effects among all alternatives for each impact category (e.g., AQUA-42 above) to ensure that decision rules and methods are used consistently.

III. Analytical and Presentational Issues

A. Defining the Project Proposal

The proposed project evaluated in the Draft EIS is not fully defined. EPA is aware that interagency discussions with the project proponents regarding key aspects of the proposed project are ongoing. Many of the undefined aspects of the BDCP are fundamental to the potential environmental impacts of the proposal. For example, it is EPA's understanding that potential agreement, in advance, to a certain range of exports is under consideration in the HCP discussions. While an Implementation Agreement has been released for public comment, it is incomplete and is still being discussed by the involved parties. The Implementation Agreement's financing and decision making elements are important for public disclosure because they affect the likely implementation and success of mitigation and environmentally beneficial activities, yet these effects are not described for public review in the DEIS.

In addition, given the large scale nature of the construction activities associated with the BDCP, "minor" changes in proposed project design or operation can make a significant difference in the potential environmental impacts.

Recommendation: *Fully describe the proposed project and reasonable alternatives, including information that is integral to decisions that are being made about the proposed project design and operations.*

The Draft EIS explains that the adaptive management program is a work in progress (p. 3D-9, BDCP p. 3.4-32). The specific approach for an adaptive management program and its effect on environmental consequences is a fundamental issue that should be addressed during the NEPA process. Given that species recovery depends largely on the success of the adaptive management program, it is essential that a more fully formulated adaptive management program be described in the EIS.

Recommendation: *Describe the adaptive management program in detail, including clear objectives, explicit thresholds, alternative hypotheses, and designated responsible parties. In addition, explain any limitations imposed on the adaptive management program by the Implementation Agreement, and explain how those limitations affect the integrity of the adaptive management program.*

B. Alternatives Analysis

The Draft EIS states that alternatives in the document are "evaluated at an equal level of detail, as required by NEPA" (p. 3-5); however, the lead federal agencies' Progress Assessments indicate that the operational components of the alternatives were subjected to different levels of analysis. For example, iterative modeling runs were conducted for Operational Scenario H (solely associated with the CEQA Preferred Alternative 4) that were not run for other Operational Scenarios.

The Draft EIS defines the Alternatives in terms of the design and capacity of the proposed conveyance structure. Each alternative is then paired with a particular operational scenario. EPA agreed with this organizational construct early in the BDCP process, expecting to see a range of alternatives that could present the environmental and water supply tradeoffs being considered. Instead, the DEIS focuses primarily on Alternative 4. It appears that the environmental impacts of certain other alternatives would be reduced if those alternatives were matched with more optimal operational criteria (for example, Alternative 5 with Operational Scenario F); however, the DEIS does not attempt to optimize the other alternatives for environmental and water supply benefits. Other reasonable alternatives could be developed by incorporating a suite of measures, including water conservation, levee maintenance, and decreased reliance on the Delta.[20] Such alternatives would be consistent with the purpose and need for the project, as well as with the California Bay-Delta Memorandum of Understanding among federal agencies[21] and the Delta Reform Act of 2009.

[20] The "Portfolio Approach" developed by a diverse set of stakeholders is one attempt to place Delta water management into the larger context of facilities investments and integrated operations.

[21] http://www2.epa.gov/sites/production/files/documents/baydeltamousigned.pdf

Recommendations: *Work with State and federal partners to modify and further analyze the proposed Operational Scenarios to improve the precision and utility of the aquatic life analyses for all the operational alternatives.*

If differences in the level of analysis remain among the Alternatives, disclose, and explain the reason for those differences.

Evaluate the environmental impacts of pairing each Alternative with more optimal operational criteria.

C. Comparison of Alternatives

The Draft EIS does not clearly present the alternatives and their respective environmental impacts in a clear and comparative manner. Because technical results are not synthesized and displayed in a comparative format, it is difficult for the reader to compare the predicted effects of CM1 alternatives.

Further compounding the difficulty is the fact that the Draft EIS uses two very different baselines (Existing Conditions and No Action), pursuant to CEQA and NEPA regulations, and neither baseline is clearly defined. The assumptions that inform the baseline descriptions are spread throughout the document (Chapter 4, Appendix 4D, Appendix 5A, and Appendix 3A). Although Chapter 4 attempts to summarize the baselines, the summary is confusing, and references appendices that are hundreds of pages long. The baseline assumptions form the basis for all impact assessments; therefore, their lack of clarity creates an underlying uncertainty in the document's analyses and conclusions.

The Draft EIS considers many other types of uncertainties, including those related to long-term climate change and human behavior, however, the treatment of uncertainty is confusing and exhibits a strong tendency to assume outcomes favorable to the proposed project. Uncertainties are expressed by "non-determined" NEPA conclusions, but they are not explicitly detailed in the body of the Draft EIS. EPA has repeatedly raised concerns about the treatment of uncertainty in the Draft EIS, and the Delta Independent Science Board and an independent panel commissioned by the Delta Science Program recently expressed similar critiques.[22] Notably, the Panel concluded that the Effects Analysis of the BDCP (as incorporated by reference into the EIS) is "fragmented in its presentation, inconsistent with its technical appendices, and… inadequately conveys the fully integrated assessment that is needed to draw conclusions on the Plan due to incomplete information."

Recommendations: *Include, in the body of the document, summary tables comparing the effects of all CM1 alternatives and the No Action Alternative to the applicable water quality standards and other relevant environmental impact indicators, and compare and contrast the alternatives with respect to one another in the text. This discussion should inform potential mitigation strategies by identifying which alternatives would need more or less mitigation to comply with environmental objectives.*
Clearly explain the underlying assumptions inherent in the baselines. We suggest that this be presented in Chapter 4.

Explicitly acknowledge uncertainties encountered in the analyses, explain what has been or could be done to eliminate or reduce those uncertainties, and disclose any assumptions made in the face of uncertainties that could not be eliminated.

[22] Delta Independent Science Board Review: http://deltacouncil.ca.gov/sites/default/files/documents/files/Cover-letter-v.4.pdf
Independent Science Panel Review: http://deltacouncil.ca.gov/sites/default/files/documents/files/Delta-Science-Independent-Review-Panel-Report-PHASE-3-FINAL-SUBMISSION-03132014_0.pdf

D. Scope of Impact Analysis

The scope of analysis in the Draft EIS does not fully consider upstream and downstream impacts of the proposed actions in the Delta. As evidenced by the intergovernmental response to California's ongoing drought, the state and federal water projects are functionally and physically interconnected. For example, actions that Central Valley Project (CVP) operators take from the Trinity River have implications for South of Delta CVP and SWP deliveries, and operational changes in the Delta require upstream adjustments in project operations. Based on EPA's ongoing discussions with the federal lead agencies, we understand that the U.S. Bureau of Reclamation is continuing to evaluate its broad operational response to the proposed changes in the Delta, for both near term and longer term operations. Upstream operational changes caused by BDCP implementation could have significant environmental and water supply impacts in the upstream areas, and these impacts must be disclosed in the DEIS. Similarly, the BDCP activities are expected to have impacts on downstream aquatic resources in San Pablo and San Francisco Bay, primarily by changing the magnitude and timing of outflow and by altering the mix of contaminant inputs from upstream (see discussion of selenium, above.)

Recommendation: *Explicitly recognize the integrated nature of the watershed and the water supply projects operating in the watershed, and analyze the upstream and downstream impacts, in particular to water supply and aquatic resources.*

E. Integrated Water Management

The BDCP effort has been ongoing since 2006. Initially, its broad goals were (a) the preparation of an HCP for continued operation of the state and federal water projects, and (b) a change in the mode of conveyance of export water through the Delta. As evidenced by the Alternatives Screening Criteria, as well as Water Supply Chapter 5 of the Draft EIS, there is now also a strong water supply *enhancement* component to the BDCP. That is, the project proponents appear to be anticipating that the CEQA Preferred Alternative 4 of the BDCP would result in the same or greater water exports (ranging from a decrease of 1% to an increase of 18%) than would be available in the absence of the BDCP (Table 5-9). Since the goals of a project drive the scope of the alternatives that must be evaluated in the NEPA process (as well as in the subsequent CWA Section 404 permitting process), EPA believes that a more robust discussion and evaluation of the water supply component of this project is warranted in the EIS.

California is moving quickly towards integrated water management, yet it is not clear how, as currently drafted, the BDCP conveyance component is consistent with this approach. Although the Draft EIS acknowledges California's progress in Demand Management in Appendix 1C, demand management is not incorporated into the project alternatives. Alternatives, such as the Portfolio Alternative, that proposed a more comprehensive and integrated approach to meeting the stated dual goals of the BDCP, were not evaluated.

Recommendations: *Explain how the proposed changes in conveyance and exports fit within the larger integrated water management plan for California. Include a more comprehensive consideration of, and response to, suggested alternatives such as the "Portfolio Alternative" and discuss the demand scenario driving the Delta export facilities. Include a consideration of the significant water conservation efforts Statewide and in the export areas.*

F. Habitat Restoration

We are concerned that the analysis assumes a 100 percent success rate for habitat restoration, which is not consistent with our experience, or supported by restoration ecology and conservation biology academic literature and scientific investigation. The potential adverse impacts of CM1 operations would be greater than projected in the DEIS in the likely event that restoration of the Bay Delta ecosystem is not 100 percent successful.

Recommendations: *Discuss restoration methods, performance metrics, and documented success rates for each habitat restoration type proposed.*

Work with the federal and state wildlife agencies to develop analytical methods to evaluate gradients of partial success for each habitat type. Re-evaluate the impacts of each Alternative (CMs2-11) in light of these gradients and the likely success rates for each habitat restoration type. Incorporate the results into final conclusions about the impacts of BDCP alternatives.

G. Aquatic Species Recovery

Although not explicitly stated in the Draft EIS, the primary premise of the BDCP appears to be the hypothesis that endangered and threatened fish populations in the San Francisco Estuary can be protected from further degradation by habitat restoration without increasing freshwater flow to the Estuary. As noted in the Executive Summary, restoration of more than 150,000 acres of habitat is proposed under most BDCP alternatives. Only moderate changes in freshwater flows (Delta outflow) to the Estuary are proposed under any of the alternatives. In particular, all sub-alternatives for CEQA Preferred Alternative 4) would result in less Delta outflow compared to the No Action Alternative (DEIS Table 5-9).

The habitat restoration-only premise is inconsistent with broad scientific agreement, reflected in EPA's Delta Action Plan[23], that existing freshwater flow conditions in the San Francisco Estuary are insufficient to protect the aquatic ecosystem and multiple fish species, and that *both increased freshwater flows and aquatic habitat restoration* are needed to restore ecosystem processes in the Bay Delta and protect native and migratory fish populations.[24]

The Draft EIS acknowledges the importance of freshwater flow to fish species abundance, but is inconsistent in describing its analyses of the benefits of habitat restoration versus increased freshwater flow. For example, page 11-202, lines 24 to 28 state that "although it is recognized that there are statistically significant correlations between freshwater flow and abundances of several fish species (e.g., Kimmerer 2002, FWS 2005), these correlations were not used in the EIR/EIS analysis to estimate fish population responses to alternatives because they do not directly include the effects of tidal marsh and floodplain restoration on fish populations." Elsewhere (e.g., p. 11-297), the document states that the Kimmerer 2002 model *was* used for the analysis. Correlations that do not include the effects of restoration were rejected for some analyses, but not for others.

Recommendation: *A consistent approach that recognizes the demonstrated significant correlations between freshwater flow and fish species abundance should be used to analyze all of the Alternatives. Describe the analytical approach and provide the rationale for, and implications of, any deviations from it.*

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[23] http://www2.epa.gov/sites/production/files/documents/actionplan.pdf

[24] This broad scientific agreement is illustrated in the following reports: (a) Public Policy Institute of California (2013) Scientist and Stakeholder Views on the Delta Ecosystem "a strong majority of scientists prioritizes habitat and flow management actions that would restore more natural processes within and upstream of the delta" (p. 2). http://www.ppic.org/content/pubs/report/R_413EHR.pdf

(b) State Water Resources Control Board (2010) Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem Flows Report, p.7. "Both flow improvements and habitat restoration are essential to protecting public trust resources [defined as "native and valued resident and migratory species habitats and ecosystem processes" p. 10].

(c) National Academy of Sciences Natural Resource Council Committee on Sustainable Water Management in California's Bay-Delta (2012) Report: Sustainable Water and Environmental Management in California's Bay-Delta "…sufficient reductions in outflow due to diversions would tend to reduce the abundance of these organisms ["these organisms" = 8 Bay Delta aquatic species at various trophic levels]." Page 60 and "Thus, it appears that if the goal is to sustain an ecosystem that resembles the one that appeared to be functional up to the 1986-93 drought, exports of all types will necessarily need to be limited in dry years, to some fraction of unimpaired flows that remains to be determined." Page 105

(d) California Department of Fish and Wildlife (2010) Quantifiable Biological Objectives and Flow Criteria "…current Delta water flows for environmental resources are not adequate to maintain, recover, or restore the functions and processes that support native Delta fish." Page 1 in Executive Summary

H. Project-level Decision-making

The Draft EIS indicates that it provides a *project level* analysis of the proposed changes in conveyance (CM1) and a *programmatic* analysis of other BDCP elements. The level of engineering detail provided for the tunnels is not commensurate with the level of site-specific information typically provided in an EIS for a project that would require federal permits. For example, actions that would result in impacts to aquatic resources (e.g., grading, dredging, trench and fill, boring, spoils piling, levee work, excavation, etc.) are not detailed or quantified at a project-level of detail (e.g., limited information is provided regarding acres and/or linear feet of estimated impacts to waters of the US, the volume of sediment proposed for disposal sites, or the size and length of intakes, p. 3-92; 3C-3). Where reusable tunnel material sites are estimated for the pipelines and the forebays, they are estimated only for the preferred alternative and "may" be on the order of thousands of acres (p. 3-96). We do not believe the information provided in the Draft EIS is adequate to support a full assessment of the project-level impacts and mitigation opportunities, or to determine whether the project, as proposed, would satisfy requirements for requisite authorizations and permits. Given the lack of project-level information, EPA agrees with the Corps that supplemental NEPA review will be needed before a section 404 permit or CWA section 408 "Letters of Permission" could be issued.[25]

The use of programmatic inputs to project-level analyses in the Draft EIS also substantially limited the predictive power of evaluations that were intended to provide project-level precision. For example, Section 8.4.1.7 "Constituent-Specific Considerations Used in the Assessment" states that the modeling to predict water quality effects (salinity) of CM1 operational scenarios relied on estimates of impacts from implementation of other conservation measures, specifically CM2 (Yolo Bypass Floodplain Restoration) and CM4 (tidal marsh restoration), which are evaluated in the Draft EIS at a programmatic level (p. 8-153). A representative estimate of the location and amount of tidal marsh restoration was used to predict water quality effects under each CM1 operational scenario. The programmatic nature of the CM4 input, which is based on an assumed 100 percent success rate, represents only one potential future configuration of tidal marsh restoration. The actual success rate and physical location(s) of tidal marsh restoration will have varying impacts on water quality elements such as salinity. The representative locations and amounts of CM4 and CM2 that were used for CM1 water supply modeling were not disclosed in the Draft EIS, nor has any feasibility analyses been cited that describes the availability of suitable sites in the restoration opportunity areas. The uncertainties introduced by the use of CM4 programmatic estimates raises concerns over the reliability of water quality modeling results, and whether the analysis presented in the Draft EIS is sufficient to support federal permit decisions.

Despite the substantial impact that the physical location of tidal marsh habitat restoration may have on water quality elements such as salinity, the Draft EIS does not describe how the locations for CM4 estimates were chosen or how likely it is that CM4 would result in the targeted amount of restoration (65,000 acres). A tidal marsh restoration success rate of less than 100 percent may yield very different results for predicted salinity values under each CM1 operational scenario. Typical success rates for wetland restoration have been reported to be substantially lower, e.g., on the order of 20-60 percent, and full restoration may require decades[26], yet this underlying uncertainty associated with the predicted salinity values is not characterized in the Draft EIS.

The envisioned CM-1 tunnels would require one of the largest construction projects in the nation, which would occur in the upper portion of a sensitive estuary. The proposed structure includes elements (e.g.,

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[25] See Corps comments on the Draft EIS July 16, 2014 and July 29, 2014

[26] J.L. Lockwood and S.L. Pimm (1999), When Does Restoration Succeed? (Chapter 13 in Ecological Assembly Rule: Perspectives, Advances, and Retreats; and Angel Borja & Daniel M. Dauer & Michael Elliott & Charles A. Simenstad (2010) Medium- and Long-term Recovery of Estuarine and Coastal Ecosystems: Patterns, Rates and Restoration Effectiveness, Estuaries and Coasts (2010) 33:1249-1260.

intake facilities and fish screens) that have never been constructed in the Sacramento River at this scale, yet the Draft EIS provides only a qualitative analysis of construction-related water quality impacts. This is inconsistent with the intent of the Draft EIS to support project-level decision making, which necessitates project-level analysis. Assessment of construction-related impacts is a basic element of project-level analysis, yet the Draft EIS provides no quantitative estimates of the amounts of soil, sediment, and contaminants that would be discharged to water bodies during CM1 construction, nor a rationale for not including such estimates. The qualitative description of best management practices does not provide an adequate basis for a lead federal agency to write permit conditions that would be effective in minimizing the water quality impacts of constructing CM1.

Additionally, on page 8-293, in lines 35 to 38, the Draft EIS states that "Alternative 1A would result in similar potential contaminant discharges to water bodies and associated water quality effects to those discussed above for the no action alternative." It is not clear how the impacts on water quality from construction-related activities of building a 35-mile twin tunnel facility, with 5 screened on-bank intakes, would be the same as not building it.

Recommendations: *Provide quantitative information regarding project footprints and estimates of soil, sediment and contaminant discharges during construction, as well as the impacts of those discharges and measures that would mitigate those impacts.*

Provide the level of detailed information necessary to support project-level analyses and permit and authorization decision making, or specify and commit to the additional detailed work and appropriate supplemental NEPA analysis that will need to be done prior to project-level decision making.

Provide confidence intervals around predicted water quality effects of CM1 operational scenarios. Describe the methods used to identify tidal marsh habitat locations for estimating water supply effects of CM1 operational scenarios, and explain the reasons for choosing these locations. Disclose the tidal marsh habitat locations that were used to estimate water supply effects of CM1 operational scenarios. Evaluate water supply effects of CM1 scenarios using several configurations and success rates of CM4 and disclose methods and results.

Provide a summary of tidal marsh habitat success rates reported in academic literature and restoration industry reporting. Include a description of elements that drive restoration success, including location characteristics and restoration actions.

Describe the locations in Restoration Opportunity Areas that exhibit the location characteristics that optimize restoration success, would provide salinity gradient habitat benefits for pelagic native fishes and would protect municipal water supply intakes.

I. Energy Infrastructure

The Draft EIS indicates that DWR will conduct a five-to-seven year Systems Impact Study (SIS) to evaluate the electrical transmission and power needed for conveyance facilities (p. 21-22). This study is projected to be completed in time to procure the necessary power to support construction and operation of the facilities. Based on the Draft EIS, it is not clear whether the SIS could affect the conclusions summarized in the EIS, of the energy needed for the system (Table 21-11 p. 21-34) or to what extent it may influence the procurement and placement of future transmission and associated infrastructure.

Recommendations: *Provide additional details on the purpose of the SIS and how it may affect the assessment of the BDCP's energy needs as well as the procurement and placement of future transmission and associated infrastructure.*

In the absence of the SIS, disclose the assumptions made regarding electrical transmission placement and energy needs for the proposed conveyance facilities and whether the SIS could affect the analysis of environmental impacts.

Clarify, particularly with respect to impacts on terrestrial species, the level of uncertainty involved with future placement, and associated impacts, of the transmission line and related infrastructure pending the completion of the SIS.

Discuss whether the SIS would provide an opportunity to focus procurement of a guaranteed source of 100% renewable energy (e.g., contractually binding agreement) for the BDCP.

J. No Action Alternative

The No Action Alternative assumes that no BDCP actions would be undertaken, and that climate change and sea level rise would occur and water demands and diversions north and south of the Delta would increase, resulting in reduced freshwater flows into the Delta (p. 5-57). Under the No Action Alternative described in the Draft EIS, no action would be taken in response to the impacts of climate change and sea level rise on the Delta.

EPA supports the Draft EIS's recognition that climate change and sea level rise would likely result in decreased freshwater flows into and through the Delta and increased salinity intrusion; however, the assumption that, in the face of diminished overall water supply due to climate change, diversions north of the Delta would be allowed to increase seems unrealistic. Similarly, maintaining existing reservoir operations and meeting existing water supply demands is unlikely with the predicted effects of sea level rise and climate change. Comparing the CM1 alternatives to a "No Action" Alternative that assumes that no actions would be taken by *any* party to address climate change-induced reductions in overall water availability has the potential effect of exaggerating the benefits of the CM1 alternatives to the project proponents.

The Draft EIS appears to contradict itself by stating that some of the water supply delivery differences between CM1 alternatives and the No Action Alternative in the year 2060 are "*solely* attributable to sea level rise and climate change, and not to the operational scenarios themselves (emphasis added, p. 5-47, lines 20-23)." This overlooks the significant impact of the CM1 project operational scenarios, which propose exporting volumes of water approximately equal to, or greater than, those exported under existing conditions, regardless of overall water availability. In a future affected by climate change and sea level rise, with less fresh water to allocate among all water users, exports of such magnitude would further reduce water availability for other uses and users.

Recommendations: *Consider and incorporate into the No Action Alternative predictable actions by other parties to address the anticipated effects of increased north of Delta demands, climate change, and sea level rise on water availability. This should include consideration of any measures that would likely be taken to reduce demands both north and south of the Delta.*

Clarify that the comparisons of CM1 alternatives to the No Action Alternative isolate the effects that would be attributable to CM1, and that such effects would occur in the context of increased north of Delta demands, sea level rise, and climate change, not "in the absence of" the effects of those stressors.

K. Impacts to Wetlands

At this time, no Clean Water Act (CWA) Section 404 permit application has been submitted for discharges of dredged or fill material into waters of the United States, including wetlands, associated with projects described in the BDCP. EPA and the Corps encourage lead agencies to proactively integrate CWA Section 404 regulatory requirements into the NEPA process to streamline environmental review by using NEPA documents for multiple permitting processes. With this in mind, EPA and the Corps met with the lead and federal state agencies multiple times over the past several years in the interest of using the BDCP EIS/EIR to inform Corps' CWA 404 regulatory decisions. Although constructive and informative, those meetings did not result in an agreement to coordinate the NEPA and CWA 404 permit reviews.

Information provided in the Draft EIS and through meetings with the lead agencies illustrate that there are substantial challenges to finding that discharges associated with Alternative CM1 are consistent with the CWA Section 404(b)(1) Guidelines. In addition, the Draft EIS acknowledges that additional analyses for NEPA may be required to support Corps CWA Section 404 permit decisions for CM1 and that additional NEPA work will be done for other conservation measures (p.1-13). The Corps also submitted comments on the Draft EIS verifying that the Draft EIS does not provide the site-specific information necessary to form the basis for a permit decision, and we agree with that comment.[27]

Recommendation: *Demonstrate that the proposed project would meet the requirements for a CWA section 404 permit.*

Wetland Extent and Jurisdiction (Section 12.3.4)
The accuracy of the CWA jurisdictional determination and estimates of impacts to jurisdictional waters need to be improved for project-level analysis. The Draft EIS is intended to provide project-level information for CM1. However, the BDCP applicants were not able conduct field delineations of wetlands and waters of the U.S. Instead the extent of wetlands and other waters in the study area was determined primarily using aerial photography interpretation in a GIS with limited (26 sites) field delineations (p. 12-146). However, the Draft EIS does not provide an estimate of GIS-based mapping accuracy as compared to the on-the-ground mapping. The Draft EIS also states that the extent of impacts to jurisdictional wetlands and other waters is likely an overestimate because actual construction footprints will be smaller than presented in the document and because some mapped wetlands and waters could be non-jurisdictional (p. 12-147). However, in some areas, when compared for other projects (e.g., Delta Wetlands project EIS) the extent of potential wetlands and waters mapped for BDCP is substantially lower. While the extent of ground disturbance may be overestimated in the document, it is likely that the extent of wetlands and waters have been substantially underestimated.

Recommendations**:** *In Section 12.3.2.4, clearly describe how the GIS-based mapping compared to the field delineations and provide an estimate of GIS mapping accuracy. Use available approved wetland delineations from other projects to supplement the GIS mapping.*

Identify a schedule for improving delineation methods completing wetland delineations on sites where DWR has access or can reasonably obtain access. Estimate direct fill impacts and secondary effects to waters using engineering drawings and cross sections.

L. Air Quality Impacts

General Conformity
The Draft EIS discloses that this project would generate emissions within multiple air basins that are federally designated as nonattainment for ozone, PM2.5 (particulate matter smaller than 2.5 microns), and/or PM10 (particulate matter smaller than 10 microns); as well as designated maintenance areas for

[27] See Corps comments on the Draft EIS July 16, 2014 and July 29, 2014

carbon monoxide (CO; p. 22-13, Table 22-4). The Draft EIS states that general conformity to the State Implementation Plan (SIP), with regard to all of these pollutants except CO, would be demonstrated through the use of a combination of mitigation measures and the purchase of offsets. For CO, conformity would need to be demonstrated through the use of local air quality modeling analyses (i.e., dispersion modeling).

The availability of sufficient offsets to demonstrate conformity for the BDCP may be limited. EPA is aware that other construction projects scheduled to take place in the BDCP project area during the BDCP's proposed construction time frame also include the purchase of offsets to demonstrate conformity. For example, two segments of the California High Speed Rail project scheduled to be constructed in the San Joaquin Valley Air District are currently pursuing a significant amount of offsets for several criteria pollutants.

The Draft EIS is not clear as to whether the federal lead agencies have made a general conformity determination. To the extent there is information regarding conformity, the Draft EIS also appears to rely on qualitative, not quantitative information. EPA interprets the general conformity rule as including all direct and indirect emissions from the federal action; therefore, the emissions from all conservation measures required as part of this federal action should be quantified and evaluated in the general conformity determination.

Recommendation: *Demonstrate that all direct and indirect emissions of the federal action, including all required conservation measures, would conform to the applicable SIPs and not cause or contribute to violations of the National Ambient Air Quality Standards (NAAQS).*

Continue to work closely with the local air districts to secure legally binding offset agreements and complete the general conformity determinations.

Include the Draft General Conformity Determination either as a detailed summary or as an appendix, and the previously referenced "Conformity Letters."

IV. Additional Issues

A. Alternatives

The reason for including maximum pumping capacity (10,600 cfs) for the State Water Project's Banks Pumping Plant in all CM1 alternatives that include north Delta intakes is not clear. The existing pumping restriction for Banks Pumping Plant for the gates of Clifton Court Forebay is intended to minimize erosive forces. Section 5.2.1.3 refers to the Corps of Engineers' Public Notice for the Bank Pumping Plant, which states that that additional permitting for the SWP's diversions would not be required so long as the SWP did not exceed a diversion of 13,250 acre feet (daily and 3-day running average). It is not clear that the Corps' goal of minimizing erosion would be met by full pumping capacity operation.

Recommendations: *Describe the Corps of Engineers' pumping restriction for the Banks Pumping Plant. Describe the circumstances under which the Banks pumping plant would be able to pump at maximum capacity, and why erosion would no longer be a significant effect from pumping.*

The description of CM2 (Yolo Bypass fisheries enhancement) in Section 3.6.2.1 (p. 3-122) does not contain information about the amount and location of planned restoration activities, disclosure of targeted flood frequency, or a description of how CM2 differs from what is already required of the Bureau of Reclamation by the 2009 NMFS Biological Opinion, Section I.6.1 (page 34 in the 2009

Biological Opinion with 2011 amendments). That Biological Opinion requires Reclamation to "provide significantly increased acreage of seasonal floodplain rearing habitat, with biologically appropriate durations and magnitudes, from December through April, in the lower Sacramento River basin, on a return rate of approximately one to three years, depending on water year type." The Biological Opinion indicates that the amount of floodplain restoration should range between 17,000-20,000 acres (excluding tidally-influenced areas), with appropriate frequency and duration.

It is EPA's understanding that CM2 is evaluated programmatically and subsequent NEPA document(s) will further define aspects of this alternative. Indeed, the Bureau has already collected scoping comments for the development of an EIS specific to CM2. It is not clear how programmatic information from this Conservation Measure was used to inform project-level impact determinations for Chapter 5 through Chapter 11 in the current Draft EIS.

Recommendations: *Provide additional available information about the planning of CM2, including floodplain acreages, frequency and duration of estimated inundation, and maps of potential locations of restoration sites.*

Summarize the potential overlap between CM2 and Section I.6.1 of the 2009 Biological Opinion so that the reader is informed about the existing requirements under Section 7 of ESA and how actions taken or proposed pursuant to the Biological Opinion may be modified by the BDCP.

Indicate whether additional water would be needed to flood the Yolo Bypass and, if so, where the water would come from.

Explain how programmatic information drawn from this Conservation Measure was used to inform project-level impact conclusions for water supply and water quality.

Recent floodplain habitat loss over the last few decades is listed as one of the reasons for proposing CM2, however, floodplain habitat loss has been occurring for more than a few decades.

Recommendations: *Provide a broader description of long-term floodplain habitat loss over a 100 year timeframe and describe how it has affected fisheries populations, with appropriate citations.*

It does not appear that a feasibility analysis was conducted to determine the availability of lands for restoration within the Restoration Opportunity Areas for CMs 2, 4-11. We understand that much of this information is confidential; however, there are multiple other draft HCP efforts moving forward that overlap with the project area, creating the potential for restoration planning conflicts on the same parcel of land.

Recommendation: *Conduct an analysis of areas that support each type of proposed habitat restoration in each of the Restoration Opportunity Areas and develop criteria for prioritizing acquisition based on potential restoration success and availability. Consider the other draft HCP efforts that overlap or are immediately adjacent to the project area to identify potential conflicts on restoration areas.*

The Draft EIS does not include a comprehensive description of the CVP and SWP with and without new north Delta intake facilities or through-Delta operations. Such information is needed to assist the reader in understanding how the water delivery system operates under Existing Conditions and how it would change under CM1 alternatives.

Recommendation: *Include a description of existing CVP and SWP operations in the Chapter 3 discussion of the No Action alternative, including how operations would change or remain static under each proposed alternative.*

The North Delta Bypass rules are difficult to understand and should be more clearly explained, particularly in the context of how flows occur currently (p. 3-181-3-209). Listing the rules does not enable the reader to understand how the new facilities would operate within the CVP and SWP system and, subsequently, how the new rules could modify the Sacramento River where new intakes would be placed and operated.

Section 3.6.4.2 provides only an annual average of how often the north Delta intakes would be used versus the south Delta intakes. For the reader to understand how the system would work, information about the potential timing, frequency, and duration of operation of each of the pumps throughout the year would be more useful.

Recommendations: *Provide information and references that describe current CVP and SWP operations. Describe modifications to reservoir operations to avoid dead pool conditions for all alternatives.*

Clearly state that BDCP's North Delta Bypass rules are intended to protect flows from only one storm pulse or, potentially, two storm pulses if the first storm arrives before December 1st. Explain that subsequent storm pulses (that are important fish cues for migration) can be exported after BDCP's new operational rules have been met.

Provide information about the potential timing, frequency, and duration of operation of each of the pumps throughout the year, including when and the conditions under which each pump would be used alone or simultaneously with the other.

Provide information about Sacramento River flows to put the North Delta Bypass rules in context. For example, describe how often flows are at the levels used as thresholds in the bypass rules to help the reader to generally understand how much flow would remain in the river versus be diverted into the new intakes. Also provide exceedance curves of Sacramento River flows and the Post Pulse Water Operations for each CM1 alternative, and consider including a chart that summarizes information in Table 3-16 (p. 3-183) describing Post Pulse Water Operations, and include Sacramento River flows for comparison.

The Export/Import ratio (also known as Export Limits in Table 3 of the Water Quality Control Plan) does not necessarily solely apply to the south Delta or explicitly exclude new points of diversion. The description of how the export/import ratio from the 1995 Bay-Delta WQCP is included in operational requirements and impacts from the CM1 alternatives (p. 3-32) may not be consistent with the description of the E/I ratio as interpreted by NMFS.[28]

Recommendation: *Describe how the E/I ratio was used in evaluations of each operational scenario for the alternatives. If the approach ultimately used in the analysis differs from the D-1641 approach, explain the reason(s) for, and implications of, using the different approach.*

[28] See NMFS Progress Assessment p. 10 http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/NMFS_Progress_Assessment_Regarding_the_BDCP_Administrative_Draft_4-11-13.sflb.ashx

State whether or not project proponents will request that the State Water Board modify the existing E/I water quality standard so it does not apply to the north Delta intakes and describe the process for having that modification approved.

Information that provides context for the Fremont Weir and Yolo Bypass Operational Criteria should be provided in the section that generally describes these operational criteria (p. 3-187). In the absence of context, it is unclear how the rules would change. For example, with no information about how often Sacramento River flows at Freeport are expected to be greater than 25,000 cfs, it is unclear how often the 17.5 and 11.5-foot elevation gates would be open and how often the Yolo Bypass floodplain restoration work would provide benefits to aquatic life using these resources.

Recommendations: *Provide cumulative distribution curves that show expected flows at Freeport under each CM1 alternative for each type of water year. Discuss the curves in the text and identify the median frequency at which Sacramento River flows at Freeport are expected to be greater than 25,000 cfs.*

Provide maps showing Yolo Bypass inundation of 3,000 to 6,000 cfs.

The Fremont Weir is described as a necessary component of CM1; however, the Draft EIS states that "CM2 is a programmatic element that will be further developed and analyzed in future technical and environmental reviews." The impacts associated with this element are not estimated and disclosed in the Draft EIS. For example, although Fremont Weir gate operational rules were developed for the purposes of modeling, the impacts of the proposed operation of the Fremont Weir do not appear to have been analyzed. Without such analysis, the impacts of CM1 cannot be fully evaluated.

Recommendation: *Describe the updates to Fremont Weir that would take place under all of the Alternatives.*

The Rio Vista Minimum Instream Flow Criteria shown on p. 3-188 are substantially different from the Rio Vista flow criteria in the 2006 Bay-Delta WQCP, which are implemented through water right permit D-1641. It is not clear how the BDCP process would result in a change to the Bay-Delta WQCP water quality standards and the water right permit.

Recommendations: *Describe the Rio Vista flow criteria in the 2006 Bay-Delta WQCP and the D-1641 permit requirements. Describe the difference in flows proposed by the BDCP and explain how they would be attained.*

If it is anticipated that water quality standards would be modified subject to a request connected to the implementation of BDCP, describe the process by which the modification would be requested and processed by the State Water Board.

The discussion in Section 5.2.2.2 "The Revised Water Quality Control Plan (2006)" does not reflect substantial work the State Water Board has completed or undertaken relevant to the 2006 Bay Delta WQCP, including the 2009 Triennial Review and its conclusions, the 2010 Flow Criteria Report, and the Phase I and Phase II Updates to the 2006 Bay-Delta WQCP. These updates include potential modifications to San Joaquin River tributary and lower San Joaquin River flows, Delta outflow objectives, export/inflow objectives, Delta Cross Channel Gate closure objectives, Suisun Marsh objectives, potential new reverse flow objectives for Old and Middle Rivers and potential new floodplain habitat flow objectives. Under recent state legislation, the State Water Board will also be evaluating changes to outflow requirements for major Delta tributaries. Although the outcome of these

State Water Board regulatory processes is unknown at this time, it is reasonable to expect that all will have significant impacts on BDCP planning and implementation.

Recommendation: *Summarize the current status of the State Water Board's update to flow objectives, including export limits and minimum Delta outflows. Updated objectives should be considered in the impacts analyses, and the document should describe how any proposed or pending updates to flow standards may affect the analyses and the implementation of the BDCP. Describe the mechanisms that would be in place in the BDCP, the Implementation Agreement or other BDCP agreements to assure implementation of future SWRCB water quality and water rights actions.*

B. Water Supply

We are concerned that the "Overview of California Water Demand" discussion in Section 5.1.1.3 provides an incomplete summary of water demand in California. For example, population growth is discussed as a reason for increasing urban water demand (p. 5-4); however, there is no reference to the statewide mandate to increase water efficiency 20% by the year 2020 for urban water uses, which is discussed in appendices to other chapters. Details are not provided regarding the rate of urban water demand growth or estimated urban water demand and use, and no basis other than population growth is provided for the conclusion that water demands will increase. Similarly, the importance of water to the agricultural economy is discussed (p. 5-4); however, there is no discussion about the importance of water to other economic sectors.

Municipal and industrial (M & I) demand north of the Delta was estimated by assuming full build out of facilities associated with water rights and contracts north of the Delta, primarily to meet projections of increasing urban water demand (p. 5-57). It is not clear whether the 81% estimated increase under the No Action Alternative, compared to Existing Conditions, takes into consideration the required water efficiency efforts for municipal and industrial water use (see table 5-8). This is important because "increased system demands by water rights holders, especially in El Dorado, Placer, and Sacramento counties" is identified as a reason for projected decreases in reservoir storage and CVP and SWP deliveries under the No Action Alternative (p. 5-61 through 5-64). An overestimation of M & I demand would result in exaggerated projected decreases in water availability for those other uses.

Recommendations: *Modify Table 5-1 to include sectors of consumptive water use, average water use in each category, and estimated rates of growth in each category.*

Summarize the information in Table 5-1 in the text of Section 5.1.1.3.

Provide an overview of water demand in California that summarizes water use by sector (e.g., urban, agricultural, industrial), discloses the economic value generated by each sector, and estimate the rates of water demand growth in each sector.

Clarify whether or not the 2010 urban water efficiency mandate of a 20% reduction in M & I water use by 2020 is included in estimates of future water demand. If it is not included in water demand estimates, explain why it is excluded in the context of the potential impact of overestimating demand on BDCP estimates of water supply effects.

Evaluate water supply effects of CM1 scenarios using several configurations and success rates of CM4, and disclose methods and results.

C. Groundwater

The Draft EIS describes beneficial impacts on groundwater resources for some alternatives as a result of CM1 (p. 7-54). It states that for all alternatives, increases in surface water supplies as a result of BDCP would result in diminished use of groundwater (p.7-84); however, no documentation is provided to support this assumption.

The Draft EIS states that groundwater use in the San Joaquin River area is estimated to be between 730,000 and 800,000 acre-feet per year, which exceeds the basin's estimated safe yield of 618,000 acre-feet per year and that each groundwater basin has experienced some overdraft (p.7-18). The Draft EIS also states that the estimated overdraft is between 1 and 2 million acre-feet annually, with many basins in Tulare Lake Basin in critical condition (p.5-4). The Draft EIS assumes that these overdrafts would stop after implementation of the BDCP. On the contrary, we believe it is reasonable to expect that provision of more water could result in more water being used, including as much groundwater as allowed, rather than in strict substitution of surface water for groundwater. Without management of groundwater resources, it is not clear that the pressure on groundwater resources would be diminished as a result of the BDCP.

Recommendations: *Explain the basis for the assumption that increases in surface water supplies would result in diminished use of groundwater. The likelihood and potential impacts of increased use of surface water supplies for aquifer storage and recovery should be discussed.*

Consider development of a mitigation measure to address management of groundwater resources in the southern San Joaquin Valley.

D. Water Quality

Reporting methods for the chloride and EC analyses may partially obscure conclusions about the predicted range of salinity intrusion, chloride, and EC concentrations for existing conditions, the No Action Alternative, and CM1 alternatives. The chloride modeling analysis (Appendix 8G) provides a 16-year average of estimated chloride concentrations, a 5-year drought average chloride concentration, and a percent exceedence of the minimum health objective of 250 mg/L chloride. Combining 16 years of water quality data and reporting the average omits the predicted range of maximum mean daily chloride concentrations predicted for each of the compliance points under various alternatives compared to their baselines. Averages can mask the severity of chloride and EC concentrations by allowing wet years with lower salinity (chloride and EC) levels to balance dry years with higher salinity concentrations. The 5-year drought average provides some indication for time periods when increased salinity concentrations are expected; however, elevated EC and chloride concentrations at certain compliance points may also occur in above normal and below normal years following dry years.

The reason for, and consequences of, constraining the water quality analysis by using a 16-year hydrology modeling period is not described in the Draft EIS nor its appendices. The 16-year hydrology period extends from 1975 to 1991 and includes a drought period and the highest water year recorded in recent decades (1982). If this hydrology period is different than other periods that could have been chosen or the entire 82-year period available for modeling, results of the water quality analysis may be inaccurate.

Recommendation: *Explain why the 16-year period was used and the 82-year period was not used, and describe the potential impacts on the precision of the water quality effects predicted by the modeling exercise reported in the Draft EIS Chapter 8 appendices and summarized in the text of the Draft EIS. Compare the 16-year hydrology period (1975-1991) to the entire hydrology period available, disclose* *that comparison to the public and decision-makers, and explain how the smaller time period may influence water quality predictions.*

The assertion that water demand will go down in the Tulare basin, in the face of large increases in population, is not thoroughly supported (p. 30-31). This is stated to be the expected result of a decrease in agriculture (now using 82% of the water p. 30-32), but it is not a given that the acreage in agriculture would decrease when additional water resources become available as a result of BDCP. Rather, increases in both population and agriculture are plausible.

Recommendations: *Include a discussion of growth that considers the potential for increases in both urbanization and agricultural development in response to increased reliable water supplies, and that addresses the entire San Joaquin Valley. Include an explanation of why additional water resources are needed (p. 5-4) if projected urbanization would use less water (p. 30-11).*

Water Quality Impact Conclusion WQ-26 (effects on selenium concentrations resulting from restoration activities) lists impacts before mitigation, as "Less Than Significant." After mitigation, conclusions are "Less Than Significant" and "Not Adverse." Analysis of residence time for planned remediation efforts is not quantitative and, therefore, lacks sufficient resolution to substantiate impact conclusions.

Recommendation*: Re-analyze Impact WQ-26 based on quantitative measures of residence time and selenium bioaccumulation that: (1) include specificity of locations and species, and (2) reflects current science that assesses the Delta as one interconnected system physically and biologically.*

Consider making the environmental commitments for selenium in restored areas a high priority by addressing these impacts within the main water quality and aquatic resources part of the EIS. Clearly identify the potential impacts of using water supplies containing selenium for wetlands with high residence times and selenium risks to fish and wildlife.

Selenium bioaccumulation modeling for sturgeon is shown in Appendix 8M2, but an impact conclusion is not listed within the category of impacts to white and green sturgeon (e.g., AQUA-136). Other identified species considered of concern in terms of selenium effects, for which no conclusions are provided, are diving ducks (scoter and scaup), clapper rail, salmonids (Chinook salmon, steelhead) and splittail.

Recommendations*: Provide an impact analysis for these species, and add impact conclusions for these species to the category of Fish and Aquatic Resources impacts.*

Illustrate and conceptualize mixing of selenium sources. Document representativeness of sites to selenium modeling to enable coordination of site locations to modeling predictions.

Perform selenium bioaccumulation modeling to specifically address the potential for (1) less Sacramento River flow (i.e., less estuary dilution and increased residence times), and (2) more San Joaquin River flow (increased Se loads or concentrations) entering the Plan Area. Perform an analysis that is both species-specific and location-specific, and develop habitat-use and life-cycle diagrams to inform the selenium modeling. Identify the times and places of greatest ecosystem sensitivity to selenium as outcomes of the modeling and relate the outcome to the entire plan area. Add selenium bioaccumulation modeling of additional fish and bird species to identify the predators with the greatest selenium exposure within fish and bird communities. Development of a comprehensive set of enrichment factors to relate dissolved selenium concentrations to suspended particulate material selenium concentrations would address the uncertainty in this step of selenium modeling.

The data sets that were used to model selenium in sturgeon and derive impacts are not spatially and temporally matched. Locations in the western Delta are ecologically and hydrologically disconnected from the Bay, where effects to sturgeon are known to be greatest.[29]

***Recommendation**: Consider comprehensive sturgeon habitat and cumulative effects in selenium modeling and impact analysis.*

The multiple times that eutrophication is mentioned on page 8-70 (Section 8.2.3.1.0 Nitrate/Nitrite and Phosphorous) may suggest to some readers that the San Francisco Estuary is suffering from large-scale eutrophication. Currently, eutrophication is not one of the major stressors negatively affecting the open waters of the San Francisco Estuary.

***Recommendations:** Clarify that monitoring shows that the open waters of the San Francisco Estuary do not show signs of large-scale eutrophication and that anoxic waters and sediment are not commonly reported in the Estuary. Identify the sites with demonstrated low dissolved oxygen problems and describe the extent to which nutrients, subsequent algal blooms, and microbial respiration contribute to low DO problems in the Estuary.*

Discuss the lack of diatom algal blooms as a stressor in the Estuary and the relationship between nutrients and the composition of the algal community and subsequent frequency of desired algal blooms. This can be a short summary in a few sentences and can refer to other locations in the document where nutrients and algal community composition is discussed in more detail. See http://www.sfestuary.org/pea-soup/ for more information.

E. Fish and Aquatic Resources

The temperature analysis does not provide biologically meaningful temperature estimates for Chinook salmon and, potentially, other fishes. The majority of temperature estimates are calculated using models that predict monthly average temperatures which can obscure the occurrences of daily temperatures fluctuating above life stage impairment and lethal thresholds for Chinook salmon and other fishes. Daily temperatures are estimated for the mainstem of the upper Sacramento River in the segment downstream of Keswick dam because a model with a daily time unit of analysis is available for this exercise (Sacramento River Water Quality Model). Temperature models with a daily time unit are not yet available for the Feather, American, lower Sacramento, and Trinity Rivers, but we understand Bureau of Reclamation is developing daily temperature models as part of the OCAP Biological Opinion remand process. Completion of these models should be prioritized and used in any additional analyses to provide meaningful estimates of temperature impacts to fishes.

***Recommendations:** Estimate potential temperature impacts when updated models become available. Identify temperature thresholds for specific life stages based on NMFS recommendations and other available guidance; for example, EPA temperature criteria. Identify mitigation measures that would minimize adverse temperature conditions.*

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[29] (1) Linares, J., Linville, R. Eenennaam, JV, Doroshov, S. 2004 Selenium effects on health and reproduction of white sturgeon in the Sacramento-San Joaquin estuary. Final Report for Project No. ERP-02-P35.
(2) Linville RG 2006 Effect of excess selenium on the health and reproduction of white sturgeon (*Acipenser transmontanus*): Implications for San Francisco Bay-Delta. Ph.D. dissertation, University of California, Davis, CA 232 pp.
(3)Beckon, WN & Maurer, TC, 2008 Species at Risk from Selenium Exposure in the San Francisco Estuary. Final Report to the US EPA IAA No. DW14022048-01-0.
(4) Presser TS and Luoma SN 2010 Ecosystem-Scale Selenium Modeling in Support of Fish and Wildlife Criteria Development for the San Francisco Bay-Delta Estuary, California USGS Administrative Report.

EPA Region 10 developed EPA Guidance Criteria for Water Temperature[30] to assist States and Tribes in adopting water quality standards for the protection of coldwater salmonids. The guidance criteria provide an averaging period for temperature targets and would be an appropriate benchmark against which to evaluate estimated impacts from CM1 alternatives, in addition to the evaluated criteria summarized in Table 11-1A-11.

Recommendation: *Compare impacts from CM1 and other CMs with the potential to impact water temperatures to EPA Guidance Criteria for Water Temperature to provide an additional metric for estimated impacts to Chinook salmon.*

The Draft EIS assumes that state-of-the art fish screens would function in a way that results in minimal to zero entrainment, but provides no evidence that these screens would completely or almost completely prevent entrainment of larval, juvenile, or adult covered fishes. No details are provided regarding the design or operation of the proposed fish screens.

Recommendation: *Explain how the proposed fish screens would prevent entrainment of all life stages of covered fishes. Describe the entrainment thresholds that would trigger reduced pumping at the North Delta Diversion intakes, and mitigation strategies for minimizing entrainment if the fish screens do not function as anticipated.*

The construction analysis relies on Best Management Practices for concluding that potential impacts to aquatic species would not be adverse. The construction is estimated to span ten years, coffer dams are expected to be constructed simultaneously, and potentially increasingly severe weather conditions during the ten-year construction period are likely to challenge the most effective Best Management Practices. Additionally, some of the equipment that would need to be constructed (including the dual 40 foot wide tunnel boring machines) would be some of the largest in the world and the Best Management Practices that have been designed for more conventional construction projects may not be applicable or effective as anticipated.

Recommendation: *Describe options for minimizing construction impacts in the event that BMPs do not perform as anticipated or completely fail, given the size and scale of the construction.*

NEPA effects determinations used in Chapter 11 include: beneficial, not adverse, adverse, and no determination. These terms are not defined nor are thresholds for selecting among them identified. The reader is not provided with an indication or description of the magnitude of estimated positive or negative impacts or uncertainty associated with each conclusion.

Recommendation: *Define the NEPA conclusions and provide thresholds -- quantitative when possible -- for each category so that it is clear why some estimated impacts result in a NEPA conclusion.*

Multiple indicators are used to evaluate impact and derive NEPA Effects determinations; however, the Draft EIS does not describe how each indicator was used to support the NEPA effects determination. For example, AQUA-42 Effects of Water Operations on Conditions for Chinook salmon (Winter-Run ESU) uses nine indicators to determine the overall effect of CM1 alternatives on adult and juvenile migration for winter run Chinook salmon. We have summarized key information from this section in the following table:

[30] http://www.epa.gov/region10/pdf/water/final_temperature_guidance_2003.pdf

AQUA-42 Effects of Water Operations on Conditions for Chinook salmon (Winter-Run ESU)

Migration Indicators	Alt 1	Alt 4	Alt 7	Alt 8
Upstream of Red Bluff flow during juvenile emigration period (Nov – August)	Similar to No Action Alternative (NAA) July & October + 36% Aug, Sept, & Nov -44%	Similar to NAA November 5-18% lower	Similar to NAA November -14%	Flows 26% lower than NAA
Monthly mean temperature between Keswick and Bend Bridge (Nov – Aug)	Less than 5% difference in monthly mean T relative to NAA	Less than 5% difference in monthly mean T relative to NAA	Less than 5% difference in monthly mean T relative to NAA	Less than 5% difference in monthly mean T relative to NAA
Flow during adult migration (Dec – Aug)	Similar to NAA; August flows could be 19% lower.	Similar to NAA but May & June +12%	Similar to NAA or greater w/ few (unstated) exceptions.	Similar to NAA but up to 18% lower in July and August
Monthly mean T btw Keswick and Bend Bridge (Dec – Aug)	Less than 5% difference in monthly mean T relative to NAA	Less than 5% difference in monthly mean T relative to NAA	Less than 5% difference in monthly mean T relative to NAA	Less than 5% difference in monthly mean T relative to NAA
Through-Delta Monthly mean flows downstream of NDD	10-31% lower than NAA	11-23% lower than NAA	25% lower than NAA	15% lower than NAA in November
Predation at intakes % of annual juvenile production (2 methods)	9%-3% 18.5%	0.02 – 0.30% 12%	0.02 – 0.30% 12%	0.02 – 0.30% 11.6%
	19,000 linear feet 22 acres of habitat	6360 linear feet 12.3 acres	6360 linear feet 12.3 acres	6360 linear feet 12.3 acres
DPM analysis of % survival through the Delta to Chipps	Wet – 45.5% Dry – 26% All – 33.3%	Wet – 45-46% Dry – 25-27% All – 33-35%	Wet – 45% Dry – 26% All – 33%	Wet – 44% Dry – 27% All – 33.5%
Adult migration -- % of Sacramento River-origin water at Collinsville	December – 63% January – 71% February – 67%	December – 66% January – 73% February – 68%	December – 65% January – 73% February – 67%	Results not provided for Alt 8 but a range of 58–71%
NEPA Effects Determination	**Adverse**	**Not Determined**	**Not Determined**	**Adverse**

It is not clear whether all nine indicators are considered equal when identifying the NEPA effect determination for migration overall. The monthly mean temperatures do not substantially vary among alternatives, so that indicator appears to be less useful than the others in differentiating between the alternatives. Some indicators show improved conditions relative to the No Action Alternative, while others show relatively worse conditions. For some indicators, the level of detail that is provided in the text differs from one alternative to another. The narrative descriptions of the multiple indicators in the NEPA Effects paragraphs often highlights different indicators when discussing the NEPA Effects determination, suggesting that some indicators are more important than others, depending on the alternative being evaluated. The reader sees only the summarized results of multiple indicators but cannot ascertain how the information was used to determine NEPA effects.

Recommendation: *Explain how each metric was used, and how the metrics were used in combination, to derive the NEPA Effects determinations, including whether the metrics were weighted in any way. Thresholds that were used to determine the appropriate NEPA Effects conclusion should be disclosed.*

The description of Clean Water Act programs in the Water Quality Regulatory Setting Section 8.3.1.1 (p. 8-112-114) contains a number of errors. For example, it appears to indicate that EPA has delegated its CWA oversight responsibility to the State of California. A useful description of CWA programs and how they operate in the San Francisco Bay Estuary can be found in the US EPA Advance Notice of Proposed Rule-making for Water Quality Challenges in the San Francisco Bay/Sacramento San Joaquin Delta, available at http://www2.epa.gov/sites/production/files/documents/baydeltaanpr-fr_unabridged.pdf pages 11-18.

Recommendation: *Review the description of CWA programs in the San Francisco Bay Delta Estuary and California.*

It appears from the Draft EIS that there could be significant impacts to vernal pools from implementation of CM1 and CM4. Impacts and mitigation for vernal pools are only presented as “vernal pool complex” and it is not clear from the document what percentage of this habitat is vernal pool wetlands (wetted surface area).

The Draft EIS states that implementation of CM4 may result in the loss of 372 acres of vernal pool complex habitat and CM1 could result in up to an additional 37 acres of loss (depending on alternative). With the information in the Draft EIS we cannot assess what proportion of these impacts are to wetlands. The document also states that AMM12 limits removal of “vernal pool crustacean habitat” to 10 wetted acres. However, it is not clear if all vernal pool wetlands are being considered “crustacean habitat.” According to the document, these 10 wetted acres of crustacean habitat equates to approximately 67 acres of “vernal pool complex” habitat. The 67 acres of impact allowed by AMM12 is significantly less than the 372 acres of potential loss identified for CM4.

Because the Draft EIS only presents theoretical footprints for tidal marsh restoration under CM4, it is unclear whether CM4 can be fully implemented while limiting vernal pool loss to 10 wetted acres as called for under AMM12. As the Draft EIS acknowledges, vernal pools are a highly sensitive community that has experienced significant loss in California. Yet, only 40 acres of restoration and 400 acres of protection are proposed in the near-term under the plan. Given the potential direct loss identified for CM1 and CM4, and the potential functional loss identified from implementation of CM2, the proposed vernal pool restoration may not be sufficient to meet mitigation needs under CWA Section 404. Mitigation needs cannot be fully assessed until project level information is available for all CMs.

Recommendations: *Clearly state what percentage of the vernal pools complex habitat may be vernal pool wetlands (by wetted surface area). Clarify whether AMM12 applies to all vernal pool wetlands or only vernal pool wetlands occupied by special status crustaceans.*

Clearly state how many acres of vernal pool wetlands may be lost from implementation of CM1 and CM4. Clarify whether it is feasible to fully implement CM4 while limiting vernal pool losses to 10 wetted acres and if there is a tradeoff, please disclose and discuss.

Quantify the potential functional loss to vernal pool habitat from changes in inundation and acknowledge that compensatory mitigation may be required for loss of function even if there is no net loss in area. Acknowledge and address that compensatory mitigation requirements under CWA Section 404 maybe greater than the vernal pool complex restoration and protection proposed under the plan.

Appendix 3B details dredged material (DM) and reusable tunnel material (RTM) disposal and reuse commitments, among other environmental commitments. Neither Appendix 3B nor Chapter 3 details how much DM and RTM will be generated by each alternative; however, Chapter 12 identifies potentially significant impacts to wetlands and waters from disposal of this material. Impacts to jurisdictional wetlands and waters must be avoided and minimized to the maximum extent practicable consistent with the 404 Guidelines. Furthermore, the Draft EIS does not address the Delta Long Term Management Strategy (LTMS)[31] goal to maximize beneficial reuse of DM by setting specific reuse targets for both DM and RTM. Appendix 3B states that material will be placed in multiple storage locations and reused in BDCP projects to the extent feasible, however, there are potentially many other construction and restoration projects in the Delta that could use the DM and RTM. If material will be placed in waters either temporarily or permanently, sediment testing will need to be coordinated with the Corps, EPA, and Regional Water Quality Control Boards.

Recommendations: *Include the volume of DM and RTM in Chapter 3 and Appendix 3B. In Appendix 3B clearly state that placement of DM and RTM must comply with the CWA 404(b)(1) Guidelines, in addition to meeting to BDCP goals.*

Discuss beneficial reuse goals for DM and RTM, including whether material will be made available for reuse in projects within and outside the BDCP.

Discuss whether placement of DM and RTM on peat soils, either temporarily or permanently, will further subsidence and undermine levee stability.

Clearly identify accessibility of placement sites and commit to promoting beneficial reuse of DM and RTM both within and outside BDCP projects.

For any material placed in waters, clarify that sediment testing must be coordinated with the USACE, EPA, and RWQCB.

F. Energy

The Draft EIS states that conveyance facility energy requirements are moderate and would not result in any substantial impacts (p. 21-25). The cumulative impacts analysis concludes that, while the cumulative energy demands of the BDCP, in combination with ongoing and reasonably foreseeable

[31] The San Francisco Bay Long Term Management Strategy (LTMS) is a cooperative effort of EPA, the US Army Corps of Engineers, the San Francisco Regional Water Quality Control Board, the San Francisco Bay Conservation and Development Commission, and stakeholders in the region to develop a new approach to dredging and dredged material disposal in the San Francisco Bay area. The LTMS serves as the "Regional Dredging Team" for the San Francisco area, implementing the National Dredging Policy in cooperation with the National Dredging Team.http://www.epa.gov/region9/water/dredging/ltms/index.html

future projects, may affect regional resources, the increase attributable to any alternative is not cumulatively considerable, compared to statewide use (300,000 gigawatt-hours) (p. 21-61). A comparison only to statewide use does not provide sufficient context for decision makers and the public to understand the new energy demands associated with the BDCP alternatives and evaluate their potential effects on local and regional energy supplies.

Recommendations: *Include a table showing the current overall energy usage by the CVP and SWP to supply water to the end users, compared to the projected overall energy demand by the CVP and SWP to do the same under the No Action and each of the BDCP build alternatives. Separately, for additional context, compare these projections to recent and reasonably foreseeable development projects, including the High Speed Rail project. Include an evaluation of the effects of each alternative on peak and base period demands, as well as effects on local and regional energy supplies, as recommended by the State CEQA Energy Conservation Guidelines (Appendix F).*

EPA supports the use of gravity-fed tunnels to transport water to minimize net energy use for conveyance to the greatest extent possible. Alternative 4 is designed to take greater advantage of gravity than the other alternatives. According to the Draft EIS, the Department of Energy has estimated that construction of two 40-foot tunnels (Alternative 4) would require about 78% more electrical energy than would be needed for alternatives requiring two 33-foot tunnels (p. 21-31 and Table 21-9); however, since Alternative 4 would eliminate the need for an intermediate low-head pumping plant for flows of more than 9,000 cfs (p. 21-31), Alternative 4 would be able to 'recover' the extra energy used during construction in 25 years. It is not clear why the 33-foot tunnel alternatives do not include gravity-fed designs.

Recommendations: *Discuss the practicability of increasing the energy head (difference in water elevation) between the intermediate Forebay at the north of the Delta and the Clifton Court and Byron Forebays to allow for greater gravity-fed flow through the 33-foot tunnel alternatives. Discuss whether 9,000 cfs could be achieved without the need for intermediate low-head pumping through 33-foot tunnels.*

Consider alternate locations for the intakes, including upstream of the Sacramento Regional Wastewater Treatment Plant, and evaluate whether an increase in the energy head between the alternative north end intake locations and the south end of the proposed conveyance system could decrease net energy use for each alternative.

Include a table that demonstrates, for each alternative, the time that would be needed to 'recover' the energy used during construction. Incorporate into the table any additional alternatives that would minimize net energy use, and the time to 'recover' energy used during their construction. As part of the same table, include the overall energy for construction and operation of the BDCP for the total expected life of the project.

EPA strongly supports the goal, stated in the Draft EIS, to power the BDCP's average 270 megawatt (MW) construction load and 57 MW permanent load with 100% renewable energy (p. 21-33). This would avoid emissions of greenhouse gases and other pollutants associated with the generation of energy from fossil fuels. We find, however, that the Draft EIS defers much of the necessary analysis of renewable energy benefits, challenges, and opportunities to the future development of other documents, and lacks clear commitments regarding procurement of renewable energy. For example, regarding construction, Mitigation Measure AQ-15 in Chapter 22 includes a suite of greenhouse gas emission reduction strategies that would be utilized to develop a future GHG Mitigation Program to reduce construction related GHG emissions to net zero (p. 22-75). At this time, it is unclear which strategies would comprise the program and whether a commitment would be made to enter into a purchase agreement for 100% renewables (Strategy 1) or temporarily increase renewable energy purchases to offset BDCP construction emissions (Strategy 12).

Regarding operations, Chapter 21 of the Draft EIS explains that the energy needed for pumping water would be provided from a mix of hydro, power purchase contracts, power exchanges and power markets (p. 21-22). The Draft EIS notes that 60% of the State Water Project's (SWP) 2010 load was met by hydro resources, while the remainder of the load was met by a mix of coal power and real-time purchases from the California Independent System Operator's (CAISO) energy market (p. 21-7). According to Chapter 21, the potential for new or expanded electrical power generation facilities is not discussed in the Draft EIS because it will be addressed through SWP power purchase programs (p. 21-33). Similarly, new energy sources to support the potential increased load from the Central Valley Project (CVP) are not discussed in the Draft EIS. It is unknown what type of power source (e.g., renewable, natural gas) would be substituted for the CVP-generated electricity that would be consumed by the project, itself, or to what extent some of additional energy required would be made up with higher efficiency (p. 22-198).

The Draft EIS references DWR's Climate Action Plan, which established near-term (by 2020) and long-term (by 2050) goals of reducing emissions of greenhouse gases throughout DWR's operations -- including those of the SWP -- in part, by increasing the use of renewable energy sources. Similarly, the President's June 2013 Climate Action Plan established a goal for the federal government of consuming 20 percent of its electricity from renewable energy sources by 2020.

Recommendations:
Identify opportunities to power the BDCP conveyance system with renewable energy for the life of the project to demonstrate how the stated goal of powering the anticipated construction and operations energy loads with 100% renewable energy could be met. Consider committing to power construction and/or the conveyance system operations with 100% renewable energy, similar to the CA High Speed Rail (HSR) Authority's commitment to use 100% renewable energy for operation of the HSR. At minimum, commit to ensure that construction and operation of the BDCP facilities are powered by renewable energy sources to the greatest extent feasible.

Discuss whether DWR's Renewable Energy Procurement Plan (REPP) would provide a mechanism to secure 100% renewable sources for construction and operations of the BDCP prior to project approval. Consider adopting an approach similar to the California High Speed Rail Authority's partnership with the National Renewable Energy Laboratory to create and implement a strategic energy plan for the BDCP. Outline the steps that would need to occur, the barriers that would need to be overcome and the potential for partnerships with entities in the vicinity of the Delta that are aiming to achieve similar goals.

Quantify how securing new,100% renewable energy sources for construction and operations of the BDCP would assist DWR in achieving its Climate Action Plan (CAP) goals. Discuss the extent to which hydropower resources will be used to meet the 2020 and 2050 goals in the CAP, and whether larger hydropower generators would qualify.

Discuss the extent to which the CVP is currently being used to meet California's renewable energy goals. To reduce potential indirect effects from substitute electricity for any new CVP energy usage, consider a commitment to ensure that new, renewable sources are secured to compensate for any use of CVP electricity for the BDCP.

Under the "NEPA Effects" section for each alternative in Chapter 21.3.3, the Draft EIS indicates that the use of Best Management Practices will ensure that only high-efficiency equipment is utilized during construction and that all feasible control measures to improve equipment efficiency and energy use are included. Similarly, it is noted that operation of the water conveyance facilities would be managed to maximize efficient energy use, including off-peak pumping and the use of gravity and, therefore, would not result in a wasteful or inefficient energy use. These conclusions are identical for every tunnel conveyance alternative.

Recommendations: *Explain how all of the energy efficiency mitigation measures and Best Management Practices referenced in Chapter 21 would be made an enforceable part of the project's implementation schedule. We recommend implementation of applicable mitigation measures prior to or, at a minimum, concurrently with, commencement of construction of the project.*

With regard to solicitations for future contracts for project construction and operations, consider including the following as energy efficiency requirements:

- *The use of energy- and fuel-efficient fleets;*
- *For construction, the utilization of grid-based electricity and/or onsite renewable electricity generation, to the extent possible, rather than diesel and/or gasoline powered generators;*
- *Using lighting systems that are energy efficient, such as LED technology;*
- *Recycling construction debris to maximum extent feasible;*
- *Planting shade trees in or near construction projects where feasible;*
- *Giving preference to construction bids that use Best Available Control Technology, particularly those seeking to deploy zero emission technologies;*
- *Employing the use of alternative fueled vehicles;*
- *Using the minimum feasible amount of GHG-emitting construction materials that is feasible;*
- *Use of cement blended with the maximum feasible amount of flash or other materials that reduce GHG emissions from cement production; and,*
- *Use of lighter-colored pavement where feasible.*

G. HCP Monitoring and Assessment

The BDCP is a project of such significance, with a reliance on extensive monitoring and technical information, that its development and approval represents an opportunity to advance aquatic resource monitoring for the entire state of California. For several years, EPA and partner state and federal agencies have been advancing a comprehensive monitoring program that supports integration of federal and state aquatic resource permitting for Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs). When implemented as a monitoring program, the framework that has been established will generate information to evaluate site specific and regional outcomes of habitat conservation and aquatic resource mitigation activity. This framework has been created in consideration of the Clean Water Act (CWA) Mitigation Rule (33 CFR Parts 325 and 332; 40 CFR Part 230), the "Five Point Policy" (Addendum to the HCP Handbook), Tenets of a State Wetland and Riparian Monitoring Plan (CA Water Quality Monitoring Council 2010)[32], and Designing Monitoring Programs in an Adaptive Management Context for Regional Multiple Species Conservation Plans[33].

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[32] Tenets of a State Wetland and Riparian Monitoring Program. 2010. California Water Quality Monitoring Council (CA Wetland Monitoring Workgroup). (http://www.waterboards.ca.gov/mywaterquality/monitoring_council/wetland_workgroup/docs/2010/tenetsprogram.pdf).

[33] Atkinson, A. J., P. C. Trenham, R. N. Fisher, S. A. Hathaway, B. S. Johnson, S. G. Torres and Y. C. Moore. 2004. Designing Monitoring Programs in an Adaptive Management Context for Regional Multiple Species Conservation Plans. U.S. Geological Survey Technical Report. USGS Western Ecological Research Center, Sacramento, CA. 69 pages. (http://www.dfg.ca.gov/habcon/nccp/publications.html).

At the state level, the 2007 MOU signed by the Secretaries of the California Environmental Protection Agency (Cal/EPA) and the California Natural Resources Agency (Resources Agency) establishes the Water Quality Monitoring Council. The Council now requires the boards, departments and offices within Cal/EPA and the Resources Agency to integrate and coordinate their water quality and related ecosystem monitoring, assessment, and reporting. The Monitoring Council is further aligning state aquatic resource monitoring programs with their federal counterparts in order to develop an integrated monitoring program that addresses the needs of the HCP/NCCPs while providing CWA monitoring data and information that will satisfy the Corps of Engineers, EPA, and the Water Boards.

The primary goal of such a program is to develop a fully integrated monitoring framework (covering ESA, CESA, CWA, and the Porter-Cologne Act) that provides the best available information on the extent of impacts from permitted activities and progress toward achieving conservation targets using common databases to facilitate the sharing of this information across eco-regions and among local, regional, state and federal programs.

The monitoring design for this comprehensive federal/State monitoring program is based on the EPA tiered monitoring approach (http://water.epa.gov/type/wetlands/outreach/upload/techfram_pr.pdf), which has also been adopted by the State, is increasingly used by programs across the country, and is consistent with the tiered approach described by Atkinson et al. (2004)[34]. The Delta Science Plan (dated 12/30/2013 and found at http://deltacouncil.ca.gov/science-program/delta-science-plan) describes a process by which this monitoring approach could be developed and implemented, including sections on adaptive management, data management, modeling, and communication. EPA strongly supports the recommendations in the Delta Science Plan.

Recommendation: *Discuss how the BDCP mitigation monitoring and reporting program will be consistent with the federal and State efforts discussed above.*

[34]Ibid

8/27/2014 1:33pm

BDCP DEIS: Corrections and Additional Editorial Recommendations

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Will, Ryan –

Yesterday, I sent you EPA's major comments on the BDCP DEIS. During our review of the DEIS, we also identified a number of corrections that are needed, as well as some missing information that would improve the document's usefulness. These are listed below. In our role as a Cooperating Agency, we request that you also address the following in the Supplemental Draft EIS:

- Potential funding sources shown on page 8-105 of the BDCP are not valid. The table in the BDCP shows EPA's 2011 budget being spent on conservation measures under the BDCP. The text states that "Funding for this program [California Bay-Delta Restoration appropriations] is assumed to continue and to support natural community restoration under BDCP" (p.8-106 of the BDCP). EPA has not committed any funding towards the construction and implementation of the BDCP and any future funds that are available for projects in the San Francisco Bay Delta are subject to EPA's future budget, legislative mandates, and agency discretion. Please remove the section of the BDCP that indicates that EPA funding is assumed to continue and support restoration components of the BDCP for 50 years.

- There are errors in the Draft EIS describing multiple Clean Water Act programs including the CWA 404 Regulatory Program. In addition, the CWA Section 404 Program is described differently in different chapters. Please make the following corrections:

    - Correct language on page 8-114 that states that CWA Section 404 is implemented "via the issuance of National Pollutant Discharge Elimination System permits." The NPDES program comes from Section 402 of the CWA. The words "NPDES" permits should be replaced with "Section 404 permits." The following sentence in the Draft EIS accurately states that the "USACE is authorized to issue Section 404 permits."

    - Correct language on page 8-113 (lines 4-6) that states California "administers the CWA through the Porter-Cologne Act." Section 303 of the CWA gives the states the authority to establish water quality standards, subject to EPA approval, and the NPDES Program is delegated to the State of California under CWA Section. California administers these CWA programs **and** the Porter-Cologne Act.

    - The following sentence in the Draft EIS on page 8-114 is not correct and should be removed: "If a federal agency is a partner in the implementation of a project, the proposed action/project must be recognized as the LEDPA." A proposed action is not the LEDPA simply because a federal agency is a partner and chooses that proposed action as its preferred alternative. Federal agencies are required to comply with the 404(b)(1) Guidelines and their preferred alternative must meet the restrictions to discharge outlined at 40 CFR 230.10.

- Table 3-3 (p.3-19) "Summary of Proposed BDCP Conservation Measures of All Action Alternatives" is the only complete Conservation Measure (CM) summary table provided in the entire Draft EIS. While it is helpful to the extent that it lists all of the CMs in one place, it is lacks key information such as acreage targets.

- CM2 is not included in the list of Conservation components for Alternative 1A on p. 3-49. The Draft EIS states that CM2 is included in all of the Alternatives considered.

- CM2 is not included in the description of CM3 Natural Communities Protection and Restoration (page 3-129).

- Table 8-1 Designated Beneficial Uses for Water Bodies in the Study Area identified Estuarine Habitat as an "Additional Beneficial Use of the Delta" suggesting the Delta is the only group of water bodies with the Estuarine Habitat beneficial use. The San Francisco Bay and its component water bodies, including Suisun Bay and Marsh also have the Estuarine Habitat beneficial use and they are part of the BDCP "Plan Area."

- The 2012 Pulse of the Delta was finalized in October 2012. Delete the word "draft" in reference to the *2012 Pulse of the Delta* on Page 8-48, line 39.

- Figure 8-7 shows the compliance locations commonly discussed in Chapter 8 with so many labeled locations that the reader cannot see their location precisely.

- It is very helpful to readers to provide citations when "available evidence" is referred to in the Draft EIS. For example, page 8-457, line 7, states "available evidence suggests that restorations activities establishing new tidal and non-tidal wetlands, new riparian and new seasonal floodplain habitat could potentially lead to new substantial sources of localize DOC loading within the Delta."

- Existing Conditions and No Action Alternative values are slightly different in Tables 11-1A-5 (p. 293) and 11-4-4 (page 1302). The tables rely on the same entrainment analysis at south Delta pumps, but one is for Alternative 1A and the other is for Alternative 4. The Existing Conditions and No Action Alternative numbers are very similar, but should be identical, and it is not clear why they are different. This occurs again for the North Bay Aqueduct Analysis (p. 11-295 Table 11-1A-7 v. page 11-4-6 page 11-1304).

- The list of local habitat conservation plans and natural community conservation plans in the Delta includes plans that are adjacent to the Delta is missing the south Sacramento HCP (page 11-176).

- Page 11-160: There is very little description of Section 10 and Section 7 of ESA. The Revised or Supplemental Draft EIS should include a description of basic regulatory requirements and targets that are applicable to the BDCP such as "contribute to recovery" for Section 10 and "avoid jeopardy" for Section 7.

- Page 11-166: CWA Section 303(c) Water Quality Standards and protection of beneficial uses should be discussed in this section.

- Page 11-175: The need for a change in point of diversion to D1641 should be discussed in this section.

- Page 11-183: Table 11-3, please discuss options for soft stabilization along river banks near the intake structures.

- Table ES-11 and its associated text describe changes in average Delta outflow, total exports, and south Delta pumping for the BDCP alternatives in the late long term (2060); however, the baseline for this comparison should be specified.

- The change in total exports from the No Action Alternative to Alternative 1 is listed in Table ES-11 as 1,025 thousand acre feet however, subtracting the value of No Action Alternative total exports (4441 TAF) from that of Alternative 1 total exports (5459 TAF) yields a difference of 1018 TAF. Similar small potential errors are present in the rest of the Total Exports Change column.

- The average Delta outflow and export values in Table ES-11 do not match average Delta outflow and export values in Table 5-4 Water Supply Summary Tables. Many of the values are very close to one another, but are not the same. The true values are important for determining compliance with Delta outflow water quality standards.

- Selenium effects and thresholds vary between the EIS and the appendices (see p. 8-167 (table 8-55) and page 8M-9 (table 8M-3)).

- Language used to describe Total Maximum Daily Loads in the Plan Area and Study area for Chapter 8 could be misinterpreted. Table 8-4 and the text in lines 13-15 on page 8-24 state that a number of TMDLs are "complete", which could be read as suggesting that TMDL water quality targets have been achieved, which is not accurate for most TMDLs. Many of these TMDLs are *adopted* and water quality is improving as a result, but is not yet meeting the TMDL quantitative targets. Replace the word "complete" with "adopted" in reference to TMDLs in this section.

- Table 22-5 should be updated to identify the annual PM2.5 NAAQS as 12 micrograms per meter cubed ($\mu g/m^3$).

- Table 22-3 provides ambient air quality monitoring data, in terms of standards exceedances, for the relevant air basins from 2008 to 2010. This table should be updated to provide monitoring data from 2010 to 2012.

- The data used to describe organophosphate pesticides on page 8-85, Tables 8-23 and 8-24 do not characterize existing conditions. More recent data show that diazinon is rarely detected in Delta waters in recent years and chlorpyrifos detections and exceedences have substantially declined. Update the pesticide discussion using more recent data. These data are available at http://www.ceden.org.

- In Table 30-2, it is unclear how much of the environmental water is also used by agriculture and urban users. Separate tables by water year type would be more informative.

Thank you for your consideration of these recommendations. If you have any questions, please contact me.

-Kathy

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